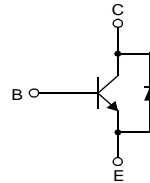


KSC5504D/KSC5504DT

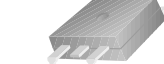
High Voltage High Speed Power Switch Application

- Wide Safe Operating Area
- Built-in Free-Wheeling Diode
- Suitable for Electronic Ballast Application
- Small Variance in Storage Time
- Two Package Choices : D2-PAK or TO-220

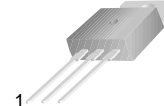
Equivalent Circuit



D2-PAK



TO-220



1.Base 2.Collector 3.Emitter

NPN Triple Diffused Planar Silicon Transistor

Absolute Maximum Ratings $T_C=25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Value | Units |
|-----------|--|------------|------------------|
| V_{CBO} | Collector-Base Voltage | 1200 | V |
| V_{CEO} | Collector-Emitter Voltage | 600 | V |
| V_{EBO} | Emitter-Base Voltage | 12 | V |
| I_C | Collector Current (DC) | 4 | A |
| I_{CP} | *Collector Current (Pulse) | 8 | A |
| I_B | Base Current (DC) | 2 | A |
| I_{BP} | *Base Current (Pulse) | 4 | A |
| P_C | Collector Dissipation ($T_C=25^\circ\text{C}$) | 75 | W |
| T_J | Junction Temperature | 150 | $^\circ\text{C}$ |
| T_{STG} | Storage Temperature | - 65 ~ 150 | $^\circ\text{C}$ |
| E_{AS} | Avalanche Energy ($T_J=25^\circ\text{C}$) | 3 | mJ |

* Pulse Test : Pulse Width = 5ms, Duty Cycle \leq 10%

Thermal Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

| Symbol | Characteristics | | Rating | Unit |
|-----------------|--|---------------------|--------|--------------------|
| $R_{\theta jc}$ | Thermal Resistance | Junction to Case | 1.65 | $^\circ\text{C/W}$ |
| $R_{\theta ja}$ | | Junction to Ambient | 62.5 | |
| T_L | Maximun Lead Temperature for Soldering Purpose : 1/8" from Case for 5 seconds | | 270 | $^\circ\text{C}$ |

Electrical Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units | |
|---------------|--------------------------------------|---|-------------------------|------|------|---------------|---|
| BV_{CBO} | Collector-Base Breakdown Voltage | $I_C=1\text{mA}, I_E=0$ | 1200 | 1350 | | V | |
| BV_{CEO} | Collector-Emitter Breakdown Voltage | $I_C=5\text{mA}, I_B=0$ | 600 | 750 | | V | |
| BV_{EBO} | Emitter-Base Breakdown Voltage | $I_E=500\mu\text{A}, I_C=0$ | 12 | 13.7 | | V | |
| I_{CES} | Collector Cut-off Current | $V_{CES}=1200\text{V}, V_{BE}=0$ | $T_C=25^\circ\text{C}$ | | 100 | μA | |
| | | | $T_C=125^\circ\text{C}$ | | 500 | | |
| I_{CEO} | Collector Cut-off Current | $V_{CE}=600\text{V}, I_B=0$ | $T_C=25^\circ\text{C}$ | | 100 | μA | |
| | | | $T_C=125^\circ\text{C}$ | | 500 | | |
| I_{EBO} | Emitter Cut-off Current | $V_{EB}=12\text{V}, I_C=0$ | | | 10 | μA | |
| h_{FE} | DC Current Gain | $V_{CE}=1\text{V}, I_C=0.5\text{A}$ | $T_C=25^\circ\text{C}$ | 15 | 20 | 35 | |
| | | | $T_C=125^\circ\text{C}$ | 10 | 13 | | |
| | | $V_{CE}=1\text{V}, I_C=2\text{A}$ | $T_C=25^\circ\text{C}$ | 4 | 6 | | |
| | | | $T_C=125^\circ\text{C}$ | 3 | 4.1 | | |
| | | $V_{CE}=2.5\text{V}, I_C=1\text{A}$ | $T_C=25^\circ\text{C}$ | 12 | 18 | 30 | |
| | | | $T_C=125^\circ\text{C}$ | 8 | 10 | | |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C=0.5\text{A}, I_B=0.05\text{A}$ | $T_C=25^\circ\text{C}$ | | 0.28 | 0.6 | V |
| | | | $T_C=125^\circ\text{C}$ | | 0.5 | 1.0 | V |
| | | $I_C=1\text{A}, I_B=0.2\text{A}$ | $T_C=25^\circ\text{C}$ | | 0.18 | 0.5 | V |
| | | | $T_C=125^\circ\text{C}$ | | 0.3 | 0.75 | V |
| | | $I_C=2\text{A}, I_B=0.4\text{A}$ | $T_C=25^\circ\text{C}$ | | 0.5 | 1.5 | V |
| | | | $T_C=125^\circ\text{C}$ | | 2.0 | 3.0 | V |
| $V_{BE(sat)}$ | Base-Emitter Saturation Voltage | $I_C=0.8\text{A}, I_B=0.08\text{A}$ | $T_C=25^\circ\text{C}$ | | 0.77 | 1.0 | V |
| | | | $T_C=125^\circ\text{C}$ | | 0.60 | 0.9 | V |
| | | $I_C=2\text{A}, I_B=0.4\text{A}$ | $T_C=25^\circ\text{C}$ | | 0.85 | 1.2 | V |
| | | | $T_C=125^\circ\text{C}$ | | 0.70 | 1.0 | V |
| C_{ib} | Input Capacitance | $V_{EB}=10\text{V}, I_C=0, f=1\text{MHz}$ | | 600 | 750 | pF | |
| C_{ob} | Output Capacitance | $V_{CB}=10\text{V}, I_E=0, f=1\text{MHz}$ | | 75 | 100 | pF | |
| f_T | Current Gain Bandwidth Product | $I_C=0.5\text{A}, V_{CE}=10\text{V}$ | | 11 | | MHz | |
| V_F | Diode Forward Voltage | $I_F=1\text{A}$ | $T_C=25^\circ\text{C}$ | | 0.83 | 1.3 | V |
| | | | $T_C=125^\circ\text{C}$ | | 0.7 | | V |
| | | $I_F=2\text{A}$ | $T_C=25^\circ\text{C}$ | | 0.88 | 1.5 | V |
| | | | $T_C=125^\circ\text{C}$ | | 0.8 | | V |

Electrical Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Test Condition | Min | Typ. | Max. | Units | |
|---|---|---|-------------------------|------|------|---------------|----|
| t_{fr} | Diode Forward Recovery Time ($di/dt=10\text{A}/\mu\text{s}$) | $I_F=0.4\text{A}$ | | 770 | | ns | |
| | | $I_F=1\text{A}$ | | 870 | | ns | |
| | | $I_F=2\text{A}$ | | 1.2 | | μs | |
| $V_{CE(DSAT)}$ | Dynamic Saturation Voltage | $I_C=1\text{A}$, $I_{B1}=100\text{mA}$ $V_{CC}=300\text{V}$ | @ $1\mu\text{s}$ | 10 | | V | |
| | | | @ $3\mu\text{s}$ | 3 | | V | |
| | | $I_C=2\text{A}$, $I_{B1}=400\text{mA}$ $V_{CC}=300\text{V}$ | @ $1\mu\text{s}$ | 10 | | V | |
| | | | @ $3\mu\text{s}$ | 2 | | V | |
| RESISTIVE LOAD SWITCHING (D.C. $\leq 10\%$, Pulse Width=$40\mu\text{s}$) | | | | | | | |
| t_{ON} | Turn ON Time | $I_C=2\text{A}$, $I_{B1}=0.4\text{A}$ $I_{B2}=1\text{A}$, $V_{CC}=300\text{V}$ $R_L = 150\Omega$ | $T_C=25^\circ\text{C}$ | | 160 | 250 | ns |
| | | | $T_C=125^\circ\text{C}$ | | 170 | | ns |
| t_{STG} | Storage Time | | $T_C=25^\circ\text{C}$ | 1.5 | 2.5 | μs | |
| | | | $T_C=125^\circ\text{C}$ | 1.7 | | μs | |
| t_F | Fall Time | | $T_C=25^\circ\text{C}$ | 125 | 300 | ns | |
| | | | $T_C=125^\circ\text{C}$ | 160 | | ns | |
| t_{ON} | Turn ON Time | $I_C=2\text{A}$, $I_{B1}=0.4\text{A}$ $I_{B2}=0.4\text{A}$, $V_{CC}=300\text{V}$ $R_L = 150\Omega$ | $T_C=25^\circ\text{C}$ | 170 | 300 | ns | |
| | | | $T_C=125^\circ\text{C}$ | 175 | | ns | |
| t_{STG} | Storage Time | | $T_C=25^\circ\text{C}$ | 2.8 | 3.5 | μs | |
| | | | $T_C=125^\circ\text{C}$ | 3.1 | | μs | |
| t_F | Fall Time | | $T_C=25^\circ\text{C}$ | 400 | 650 | ns | |
| | | | $T_C=125^\circ\text{C}$ | 850 | | ns | |
| INDUCTIVE LOAD SWITCHING ($V_{CC}=15\text{V}$) | | | | | | | |
| t_{STG} | Storage Time | $I_C=2\text{A}$, $I_{B1}=0.4\text{A}$ $I_{B2}=1\text{A}$, $V_Z=300\text{V}$ $L_C=200\text{H}$ | $T_C=25^\circ\text{C}$ | 1.75 | 2.5 | μs | |
| | | | $T_C=125^\circ\text{C}$ | 2.2 | | μs | |
| t_F | Fall Time | | $T_C=25^\circ\text{C}$ | 100 | 250 | ns | |
| | | | $T_C=125^\circ\text{C}$ | 100 | | ns | |
| t_C | Cross-over Time | | $T_C=25^\circ\text{C}$ | 210 | 400 | ns | |
| | | | $T_C=125^\circ\text{C}$ | 250 | | ns | |
| t_{STG} | Storage Time | $I_C=2\text{A}$, $I_{B1}=0.4\text{A}$ $I_{B2}=0.4\text{A}$, $V_{CC}=300\text{V}$ $L_C=200\text{H}$ | $T_C=25^\circ\text{C}$ | 3.6 | 4.5 | μs | |
| | | | $T_C=125^\circ\text{C}$ | 4.2 | | μs | |
| t_F | Fall Time | | $T_C=25^\circ\text{C}$ | 170 | 350 | ns | |
| | | | $T_C=125^\circ\text{C}$ | 320 | | ns | |
| t_C | Cross-over Time | | $T_C=25^\circ\text{C}$ | 540 | 800 | ns | |
| | | | $T_C=125^\circ\text{C}$ | 1.1 | | ns | |

Typical Characteristics

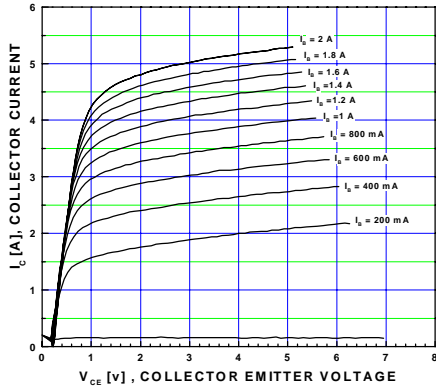


Figure 1. Static Characteristic

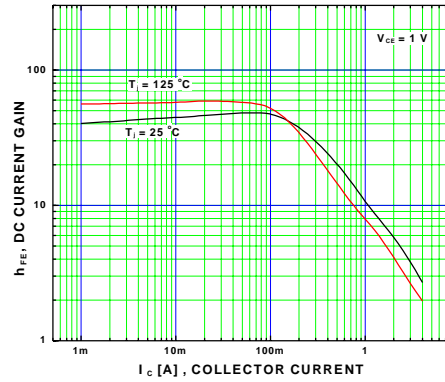


Figure 2. DC current Gain

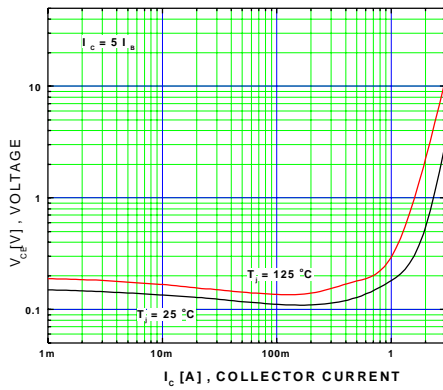


Figure 3. Collector-Emitter Saturation Voltage

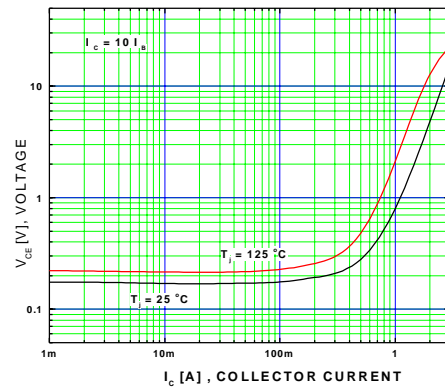


Figure 4. Collector-Emitter Saturation Voltage

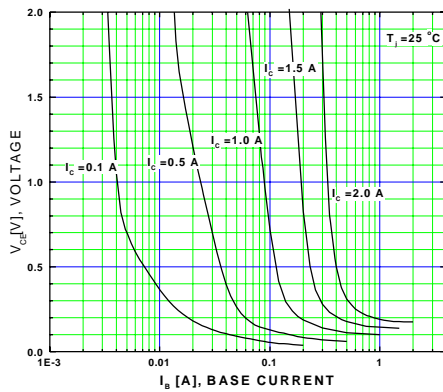


Figure 5. Typical Collector Saturation Voltage

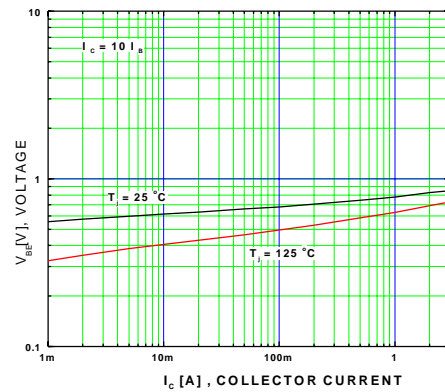


Figure 6. Base-Emitter Saturation Voltage

Typical Characteristics (Continued)

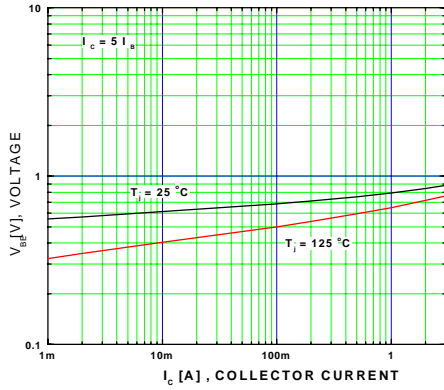


Figure 7. Base-Emitter Saturation Voltage

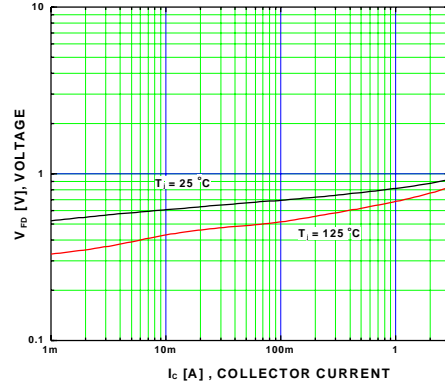


Figure 8. Diode Forward Voltage

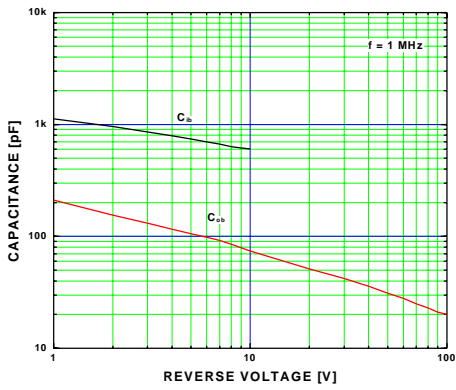


Figure 9. Collector Output Capacitance

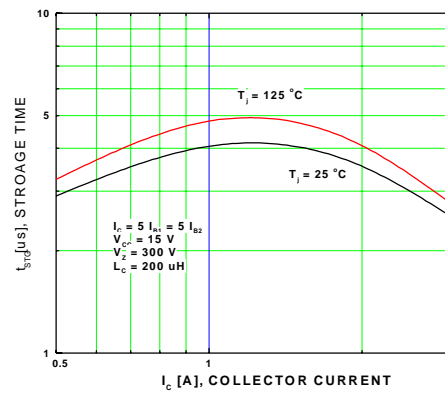


Figure 10. Inductive Switching Time, t_{si}

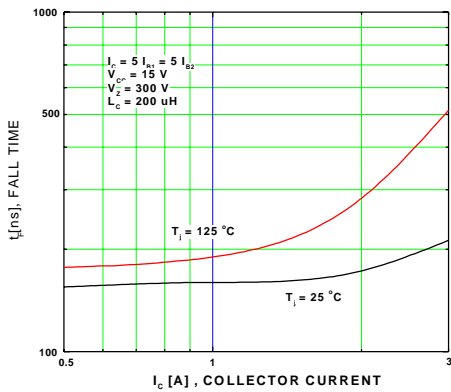


Figure 11. Inductive Switching Time, t_{fi}

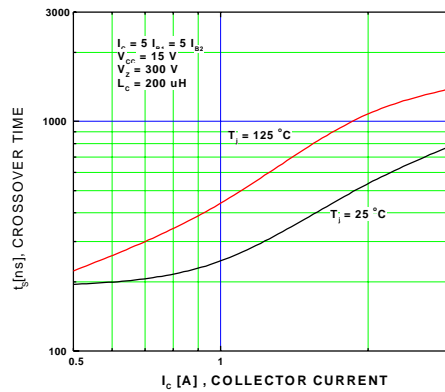


Figure 12. Inductive Switching Time, t_{ci}

Typical Characteristics (Continued)

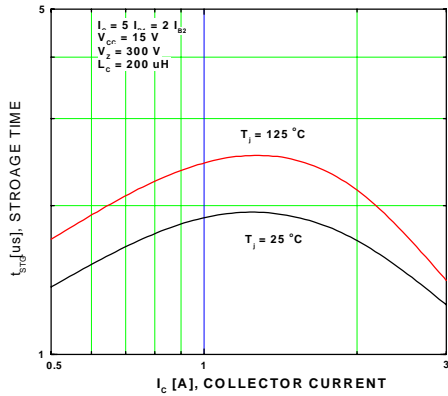


Figure 13. Inductive Switching Time, t_{st}

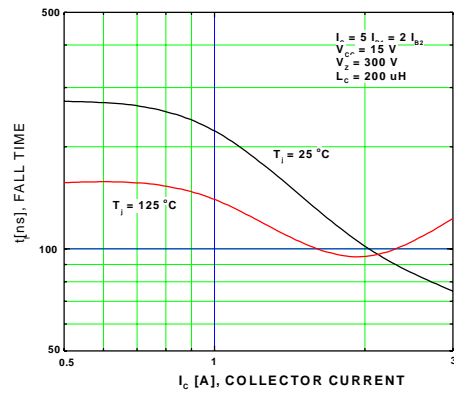


Figure 14. Inductive Switching Time, t_{fi}

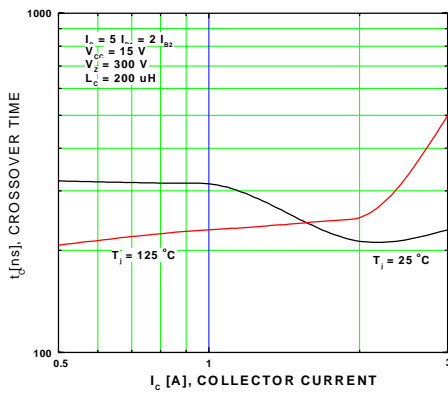


Figure 15. Inductive Switching Time, t_c

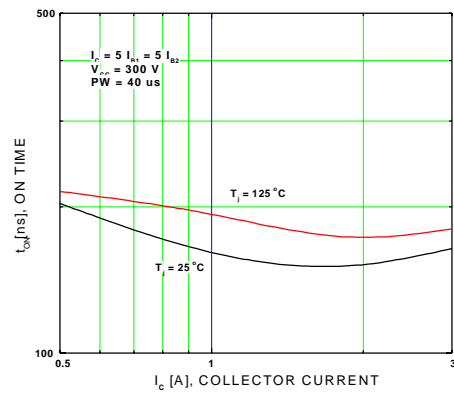


Figure 16. Resistive Switching Time, t_{on}

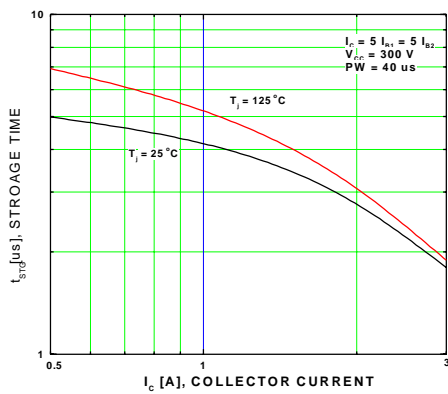


Figure 17. Resistive Switching Time, t_{st}

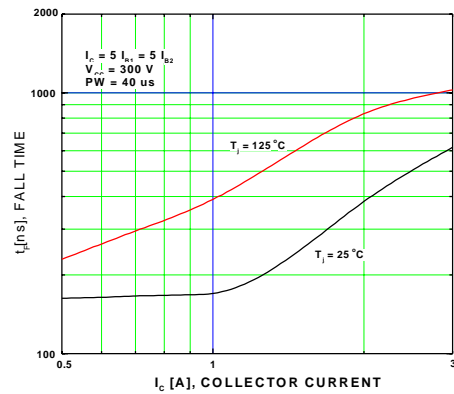


Figure 18. Resistive Switching Time, t_{fi}

Typical Characteristics (Continued)

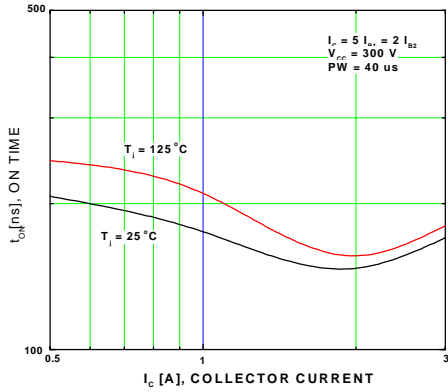


Figure 19. Resistive Switching Time, t_{on}

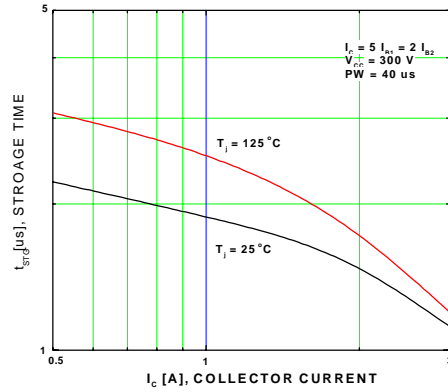


Figure 20. Resistive Switching Time, t_{si}

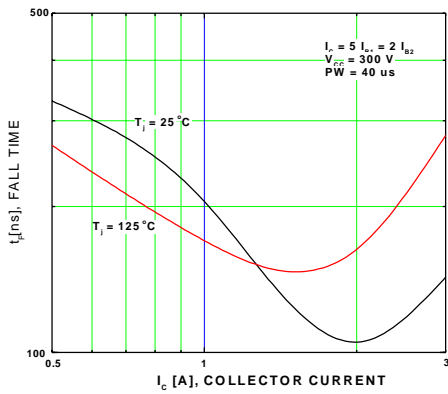


Figure 21. Resistive Switching Time, t_{fi}

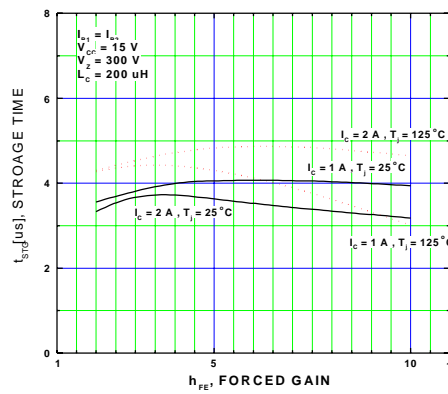


Figure 22. Inductive Switching Time, t_{si}

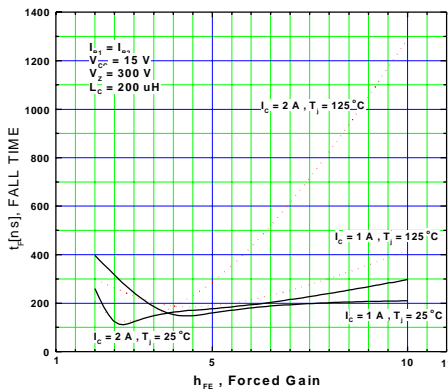


Figure 23. Inductive Switching Time, t_{fi}

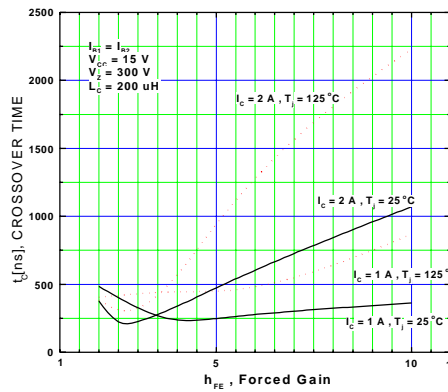


Figure 24. Inductive Switching Time, t_c

Typical Characteristics (Continued)

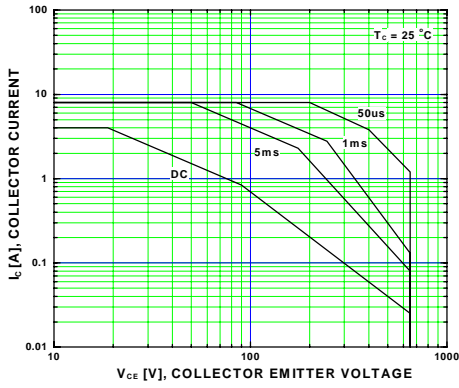


Figure 25. Forward Bias Safe Operating Area

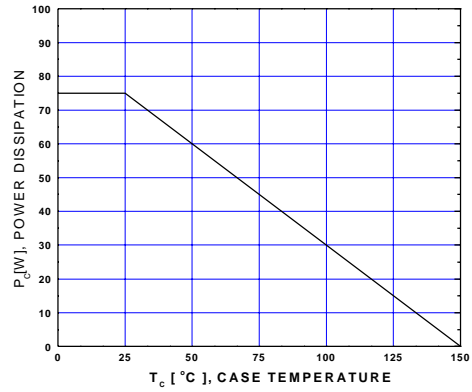
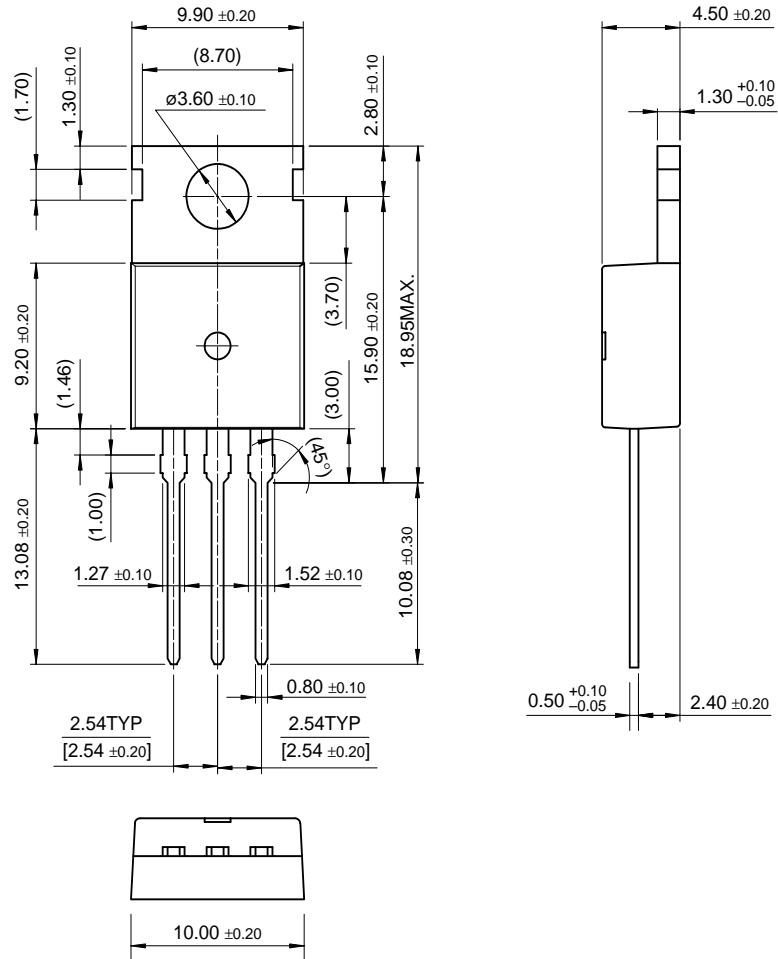


Figure 26. Power Derating

Package Dimensions

TO-220



Dimensions in Millimeters

KSC5504D/KSC5504DT

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|--------------------------|------------------------|---|
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KSC5504DT

NPN Triple Diffused Planar Silicon Transistor

Contents

[Features](#) | [Applications](#) | [Product status/pricing/packaging](#)

Features

- Wide Safe Operating Area
- Built-in Free Wheeling Diode
- Suitable for Electronic Ballast Application
- Small Variance in Storage Time
- Two Package Choices: D²-PAK or TO-220

Datasheet

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Applications

High Voltage Power Switch Switching

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Product status/pricing/packaging

| Product | Product status | Pricing* | Package type | Leads | Packing method |
|-------------|-----------------|----------|--------------|-------|----------------|
| KSC5504DTTU | Full Production | \$0.61 | TO-220 | 3 | RAIL |

* 1,000 piece Budgetary Pricing

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