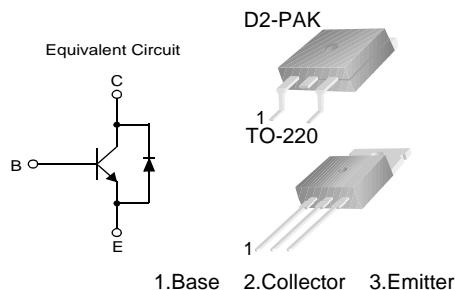


KSC5504D/KSC5504DT

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



NPN Triple Diffused Planar Silicon Transistor

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

Symbol	Parameter	Value	Units
V_{CB0}	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=40μs)							
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

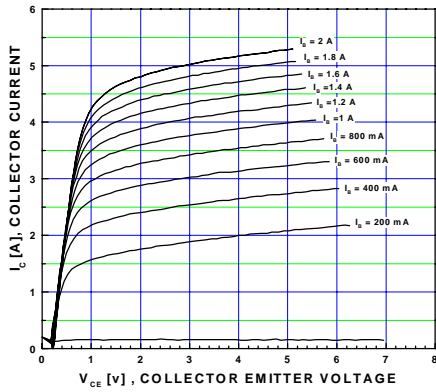


Figure 1. Static Characteristic

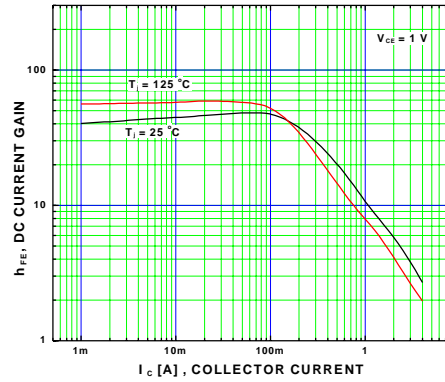


Figure 2. DC current Gain

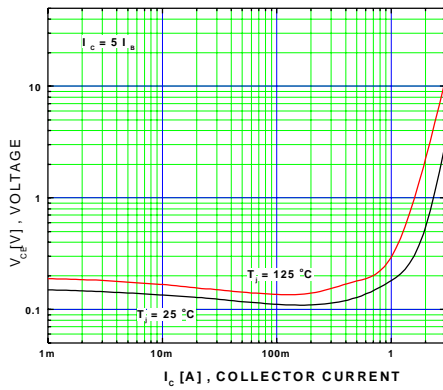


Figure 3. Collector-Emitter Saturation Voltage

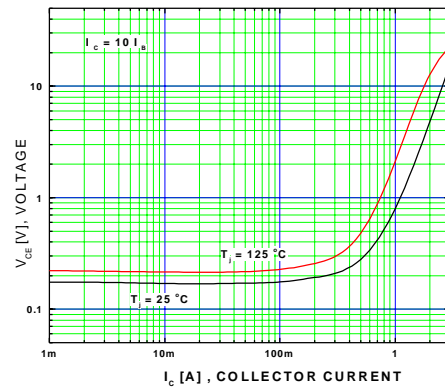


Figure 4. Collector-Emitter Saturation Voltage

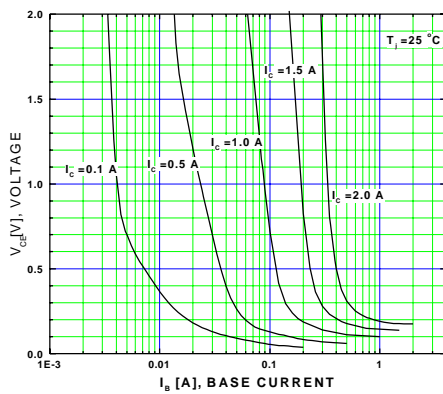


Figure 5. Typical Collector Saturation Voltage

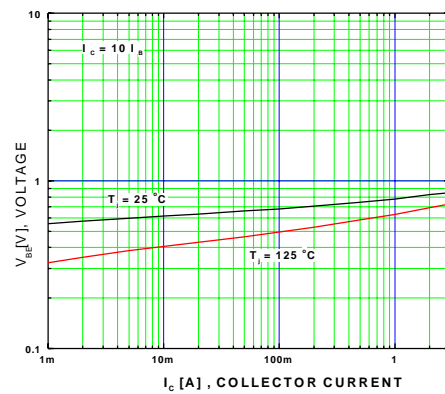


Figure 6. Base-Emitter Saturation Voltage

Typical Characteristics (Continued)

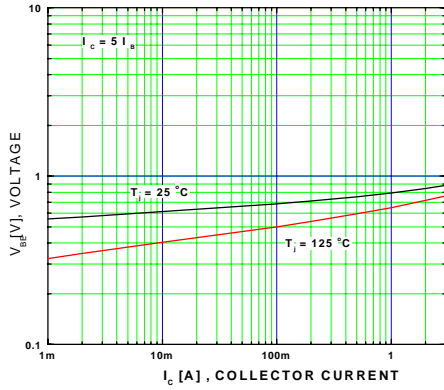


Figure 7. Base-Emitter Saturation Voltage

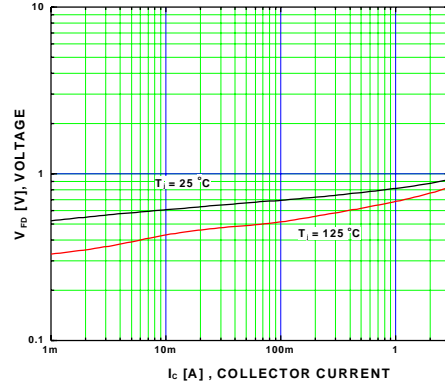


Figure 8. Diode Forward Voltage

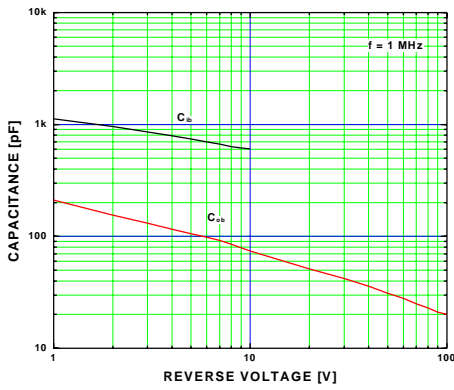


Figure 9. Collector Output Capacitance

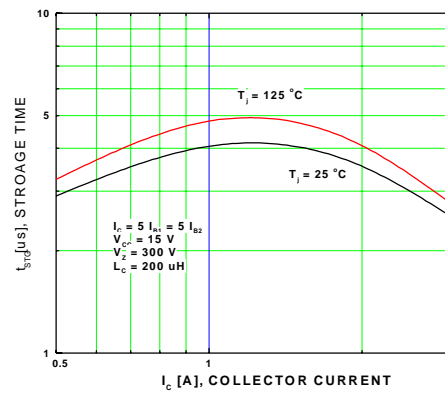


Figure 10. Inductive Switching Time, t_{si}

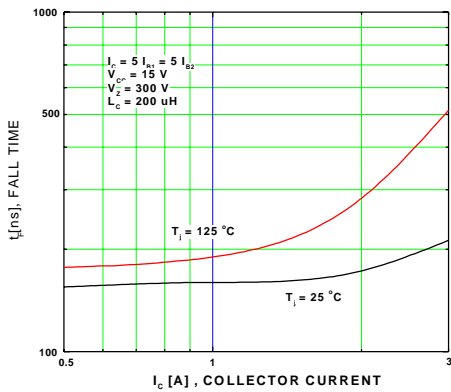


Figure 11. Inductive Switching Time, t_{fi}

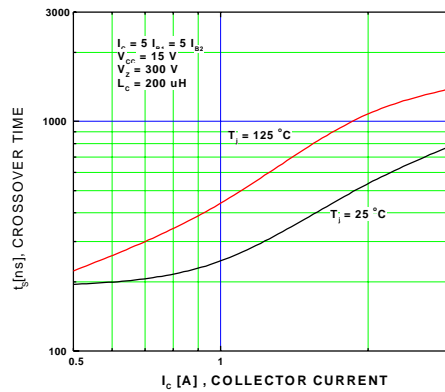


Figure 12. Inductive Switching Time, t_c

Typical Characteristics (Continued)

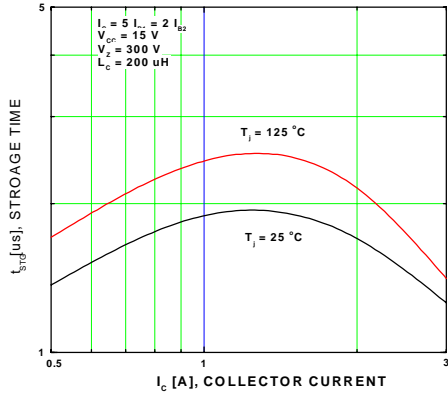


Figure 13. Inductive Switching Time, t_{si}

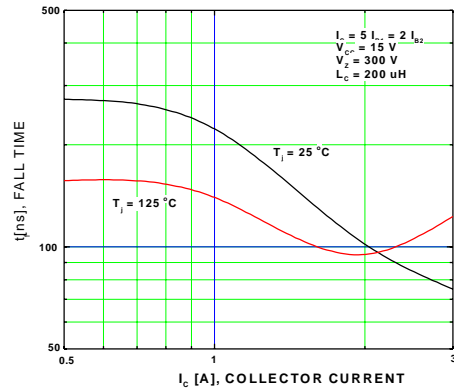


Figure 14. Inductive Switching Time, t_{fi}

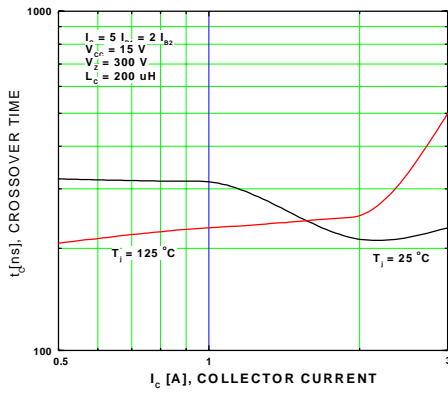


Figure 15. Inductive Switching Time, t_c

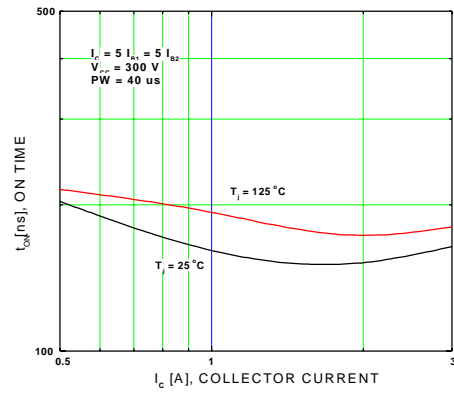


Figure 16. Resistive Switching Time, t_{on}

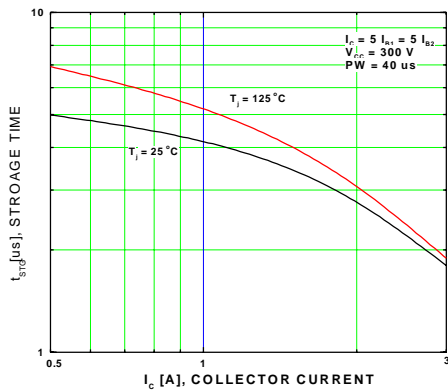


Figure 17. Resistive Switching Time, t_{sif}

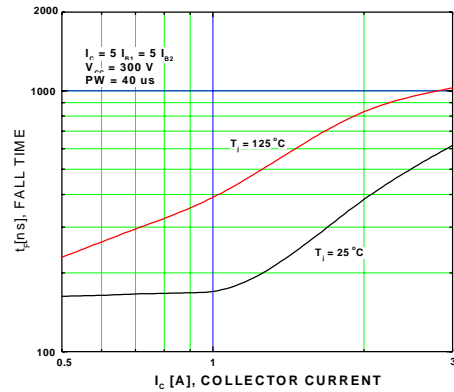


Figure 18. Resistive Switching Time, t_{fif}

Typical Characteristics (Continued)

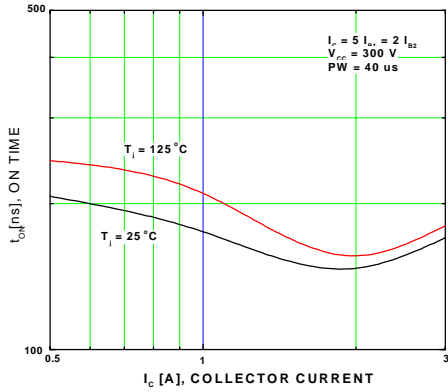


Figure 19. Resistive Switching Time, t_{on}

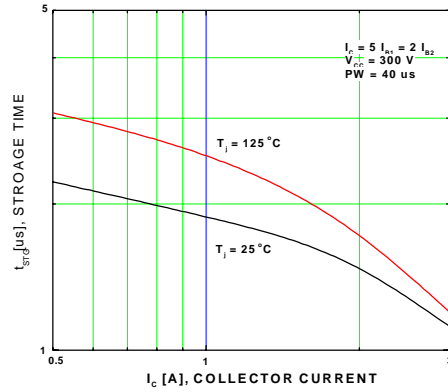


Figure 20. Resistive Switching Time, t_{si}

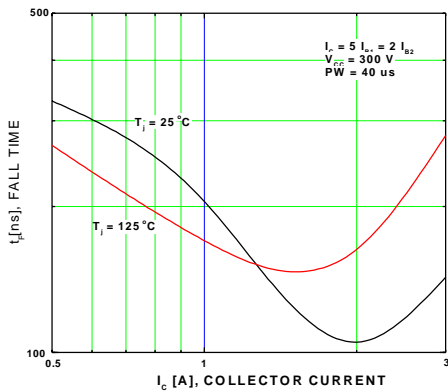


Figure 21. Resistive Switching Time, t_{fi}

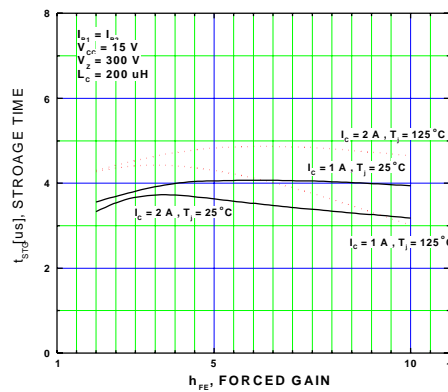


Figure 22. Inductive Switching Time, t_{si}

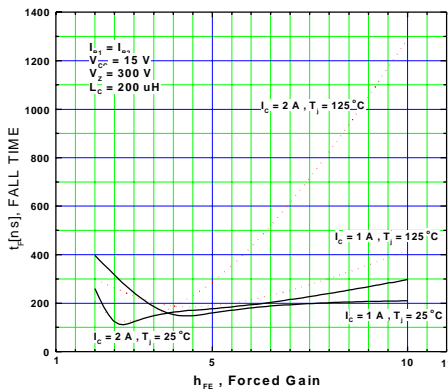


Figure 23. Inductive Switching Time, t_{fi}

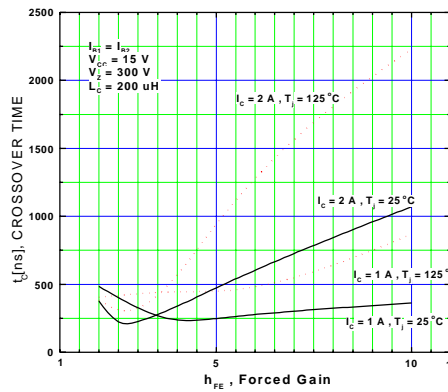


Figure 24. Inductive Switching Time, t_c

Typical Characteristics (Continued)

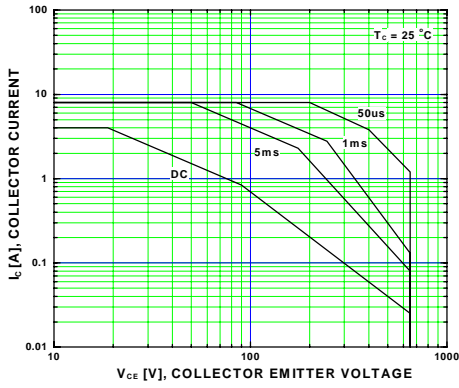


Figure 25. Forward Bias Safe Operating Area

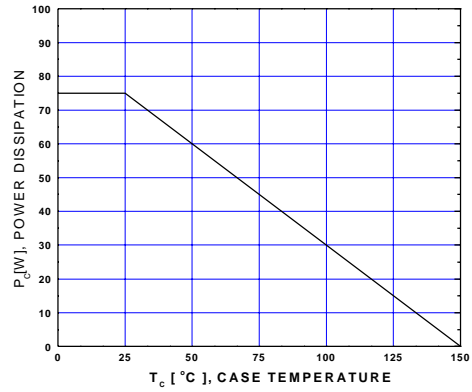
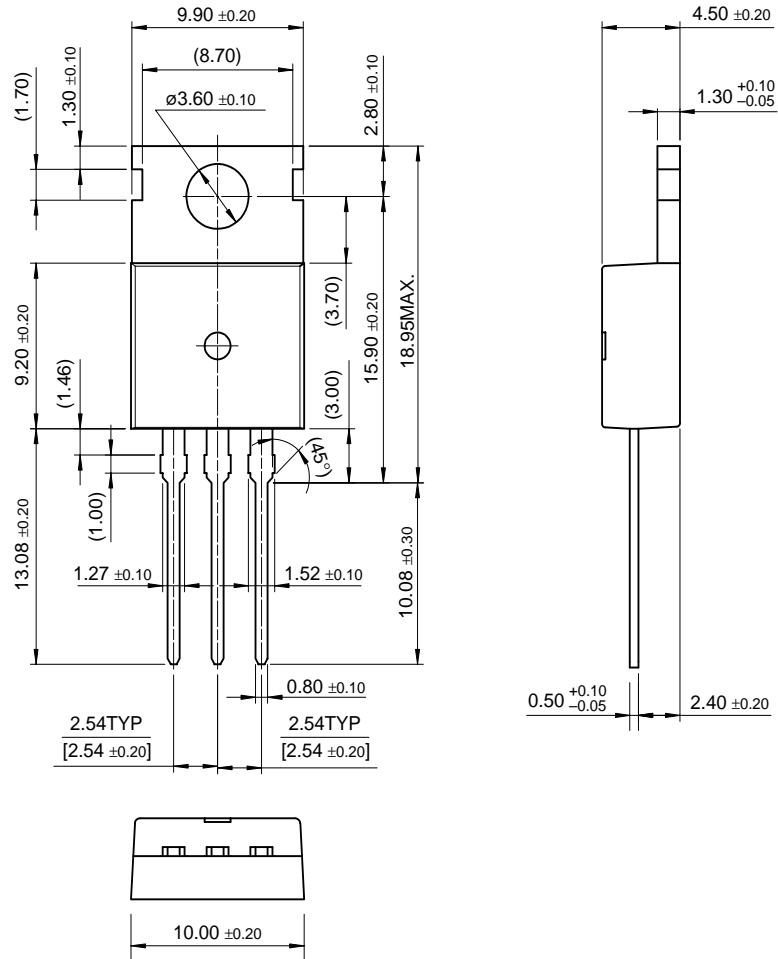


Figure 26. Power Derating

Package Dimensions

TO-220



KSC5504D/KSC5504DT

Dimensions in Millimeters

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

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No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
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