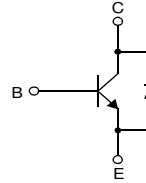


KSC5504D/KSC5504DT

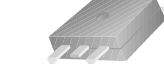
High Voltage High Speed Power Switch Application

- 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

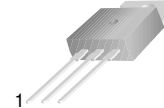
Equivalent Circuit



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	$^\circ\text{C}/\text{W}$
$R_{\theta ja}$		Junction to Ambient	62.5	
T_L	Maximum 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		
$V_{CE}(\text{sat})$	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
$V_{BE}(\text{sat})$	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

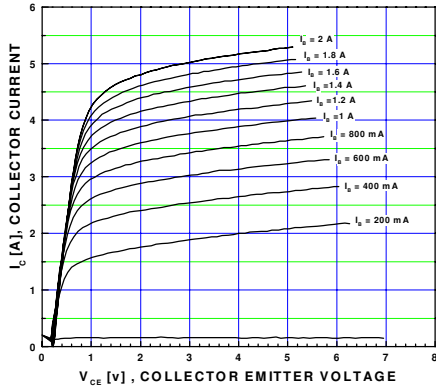


Figure 1. Static Characteristic

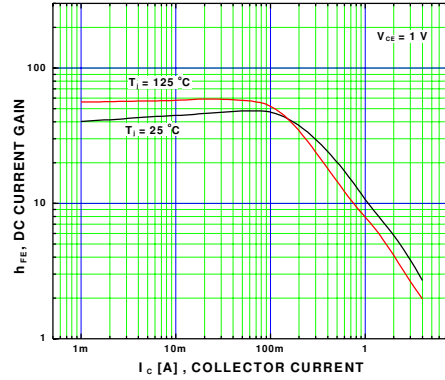


Figure 2. DC current Gain

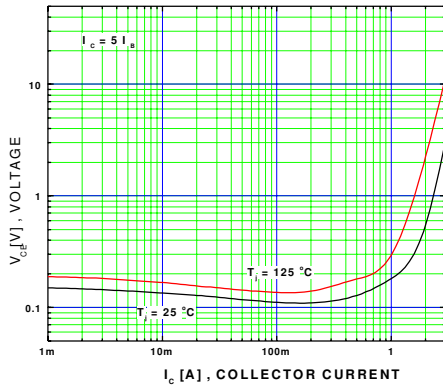


Figure 3. Collector-Emitter Saturation Voltage

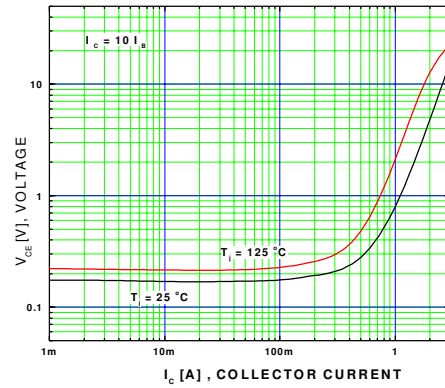


Figure 4. Collector-Emitter Saturation Voltage

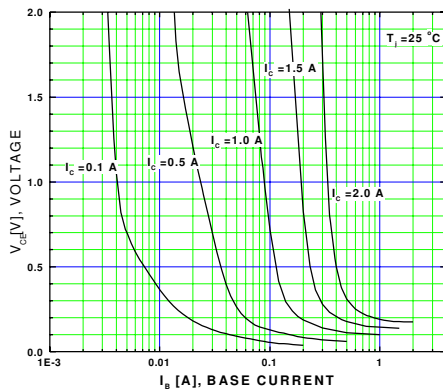


Figure 5. Typical Collector Saturation Voltage

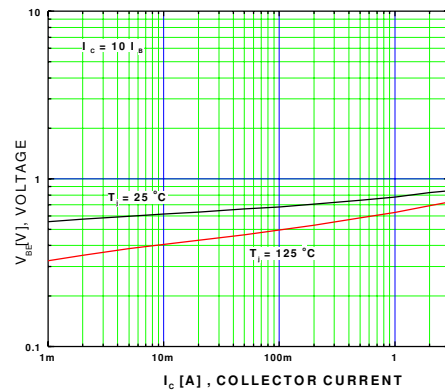


Figure 6. Base-Emitter Saturation Voltage

Typical Characteristics (Continued)

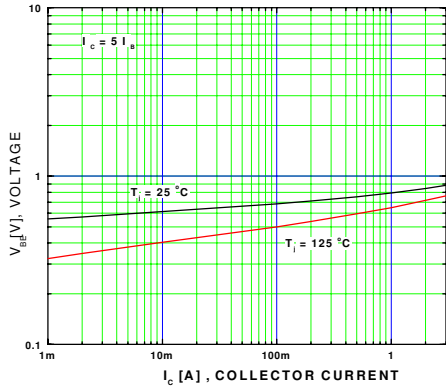


Figure 7. Base-Emitter Saturation Voltage

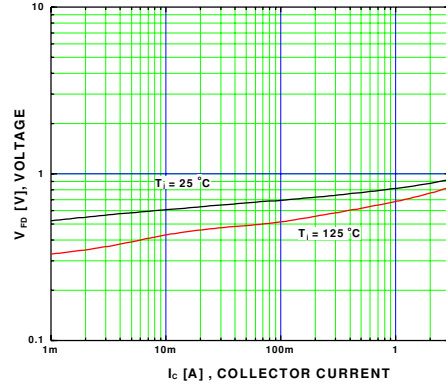


Figure 8. Diode Forward Voltage

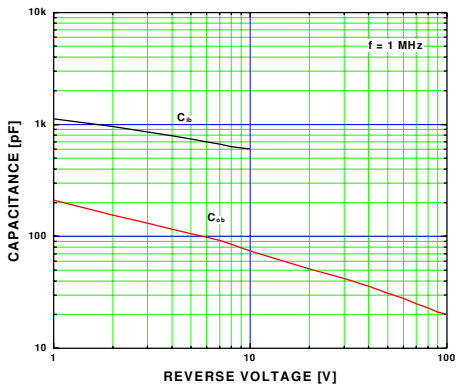


Figure 9. Collector Output Capacitance

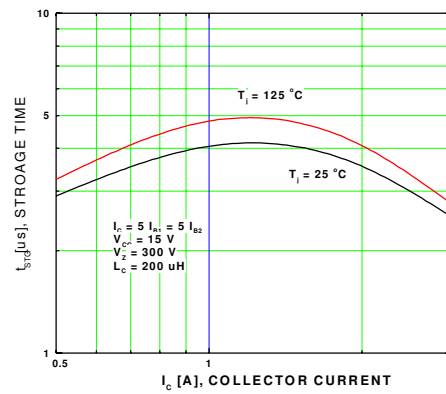


Figure 10. Inductive Switching Time, t_{si}

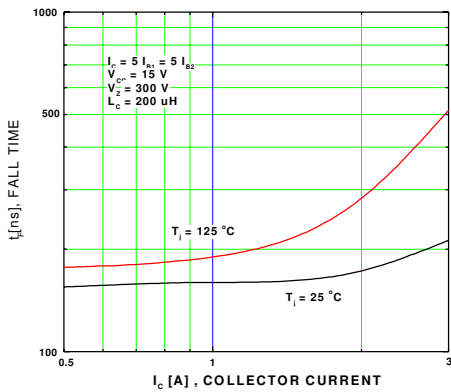


Figure 11. Inductive Switching Time, t_{fi}

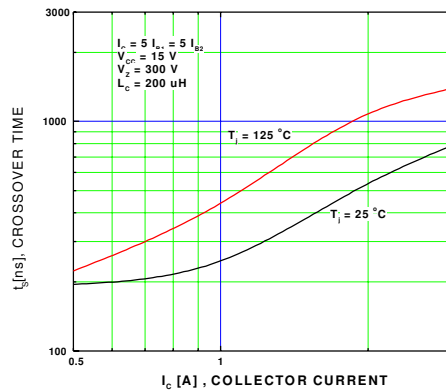


Figure 12. Inductive Switching Time, t_c

Typical Characteristics (Continued)

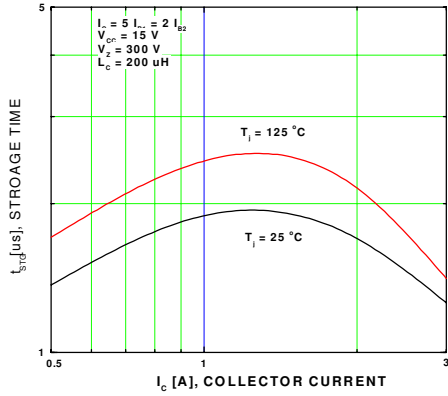


Figure 13. Inductive Switching Time, t_{si}

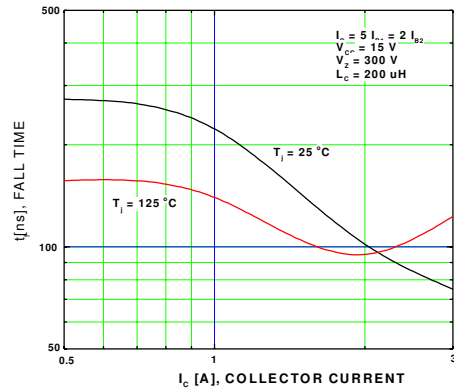


Figure 14. Inductive Switching Time, t_{fi}

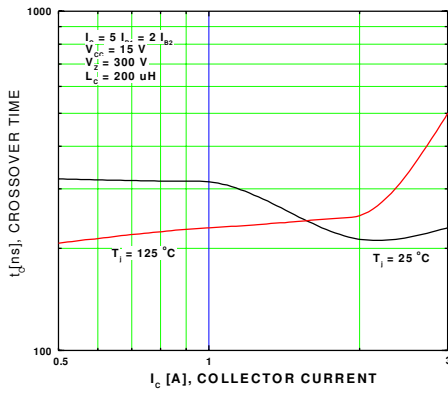


Figure 15. Inductive Switching Time, t_c

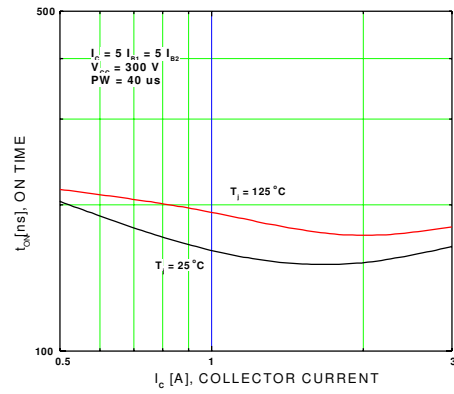


Figure 16. Resistive Switching Time, t_{on}

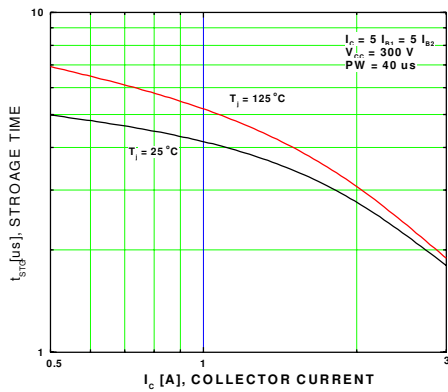


Figure 17. Resistive Switching Time, t_{sri}

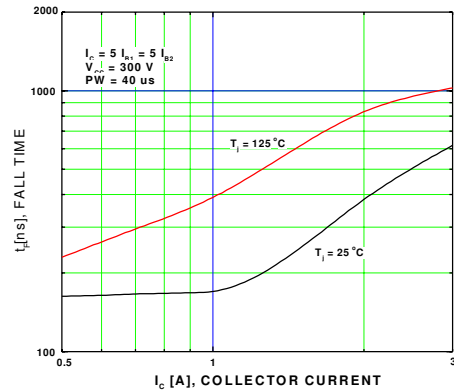


Figure 18. Resistive Switching Time, t_{fri}

Typical Characteristics (Continued)

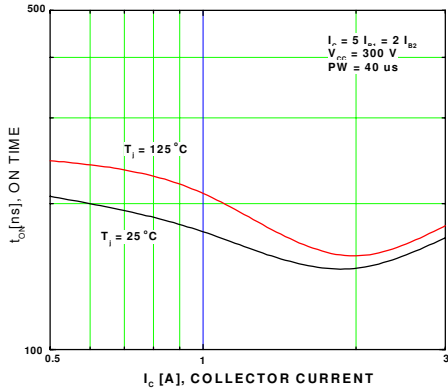


Figure 19. Resistive Switching Time, t_{on}

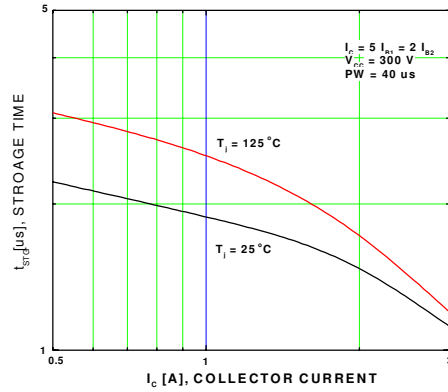


Figure 20. Resistive Switching Time, t_{si}

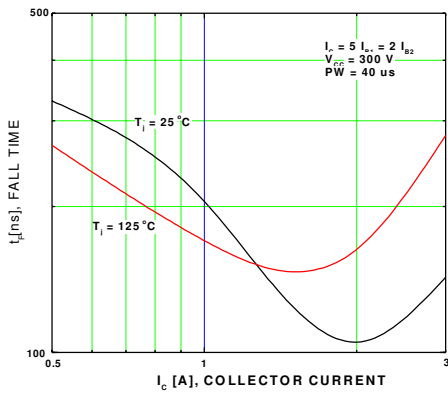


Figure 21. Resistive Switching Time, t_{fi}

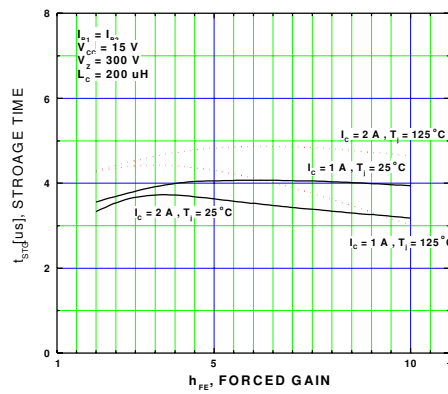


Figure 22. Inductive Switching Time, t_{si}

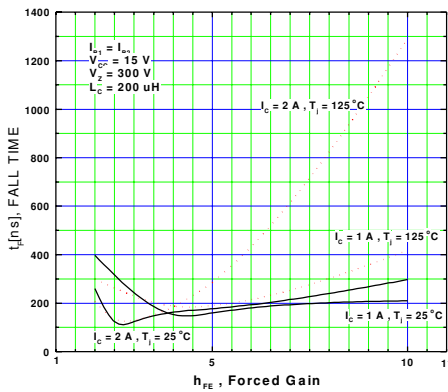


Figure 23. Inductive Switching Time, t_{fi}

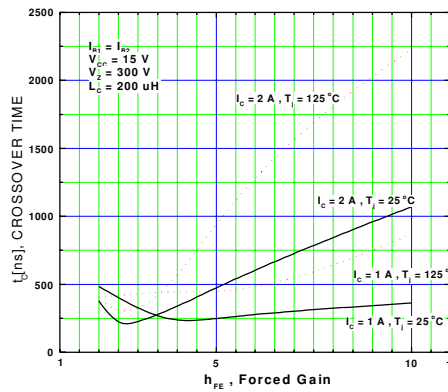


Figure 24. Inductive Switching Time, t_c

Typical Characteristics (Continued)

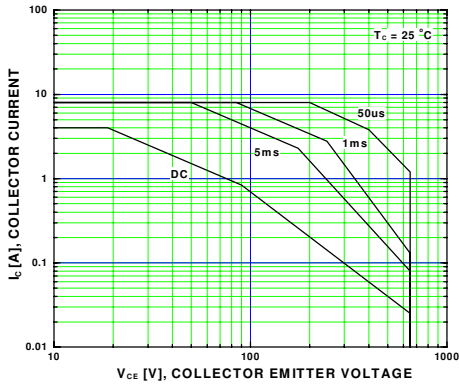


Figure 25. Forward Bias Safe Operating Area

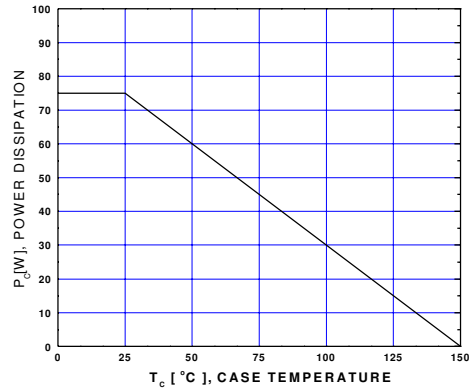
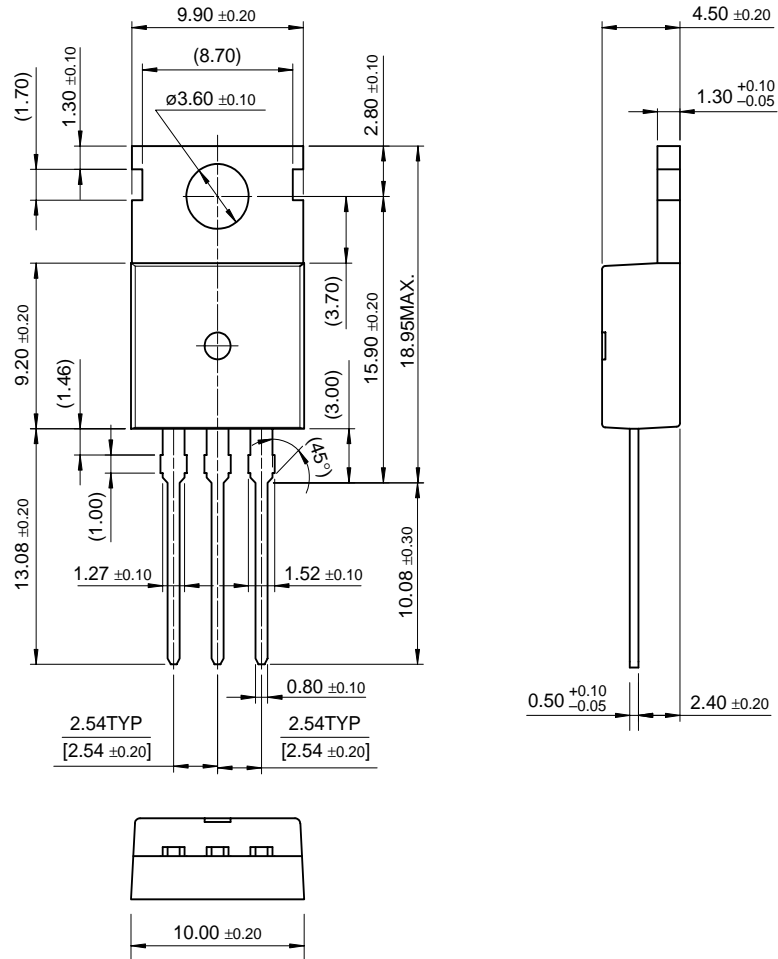


Figure 26. Power Derating

Package Dimensions

TO-220



Dimensions in Millimeters

KSC5504D/KSC5504DT

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Definition of Terms

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