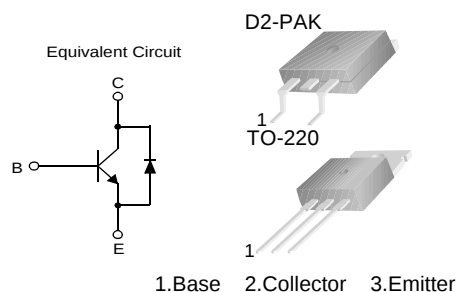


KSC5504D/KSC5504DT

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_{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	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	$V_{EB}=12\text{V}, I_C=0$	$T_C=25^{\circ}\text{C}$		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 Froward Recvery Time (di/dt=10A/μs)	I _F =0.4A I _F =1A I _F =2A			770 870 1.2		ns ns μs
V _{CE} (DSAT)	Dynamic Saturation Voltage	I _C =1A, I _{B1} =100mA V _{CC} =300V	@ 1μs		10		V
			@ 3μs		3		V
		I _C =2A, I _{B1} =400mA V _{CC} =300V	@ 1μs		10		V
			@ 3μs		2		V
RESISTIVE LOAD SWITCHING (D.C ≤ 10%, Pulse Width=40μs)							
t _{ON}	Turn ON Time	I _C =2A, I _{B1} =0.4A I _{B2} =1A, V _{CC} =300V R _L = 150Ω	T _C =25°C		160	250	ns
			T _C =125°C		170		ns
t _{STG}	Storage Time		T _C =25°C		1.5	2.5	μs
			T _C =125°C		1.7		μs
t _F	Fall Time		T _C =25°C		125	300	ns
			T _C =125°C		160		ns
t _{ON}	Turn ON Time	I _C =2A, I _{B1} =0.4A I _{B2} =0.4A, V _{CC} =300V R _L = 150Ω	T _C =25°C		170	300	ns
			T _C =125°C		175		ns
t _{STG}	Storage Time		T _C =25°C		2.8	3.5	μs
			T _C =125°C		3.1		μs
t _F	Fall Time		T _C =25°C		400	650	ns
			T _C =125°C		850		ns
INDUCTIVE LOAD SWITCHING (V _{CC} =15V)							
t _{STG}	Storage Time	I _C =2A, I _{B1} =0.4A I _{B2} =1A, V _Z =300V L _C =200H	T _C =25°C		1.75	2.5	μs
			T _C =125°C		2.2		μs
t _F	Fall Time		T _C =25°C		100	250	ns
			T _C =125°C		100		ns
t _C	Cross-over Time		T _C =25°C		210	400	ns
			T _C =125°C		250		ns
t _{STG}	Storage Time	I _C =2A, I _{B1} =0.4A I _{B2} =0.4A, V _{CC} =300V L _C =200H	T _C =25°C		3.6	4.5	μs
			T _C =125°C		4.2		μs
t _F	Fall Time		T _C =25°C		170	350	ns
			T _C =125°C		320		ns
t _C	Cross-over Time		T _C =25°C		540	800	ns
			T _C =125°C		1.1		ns

Typical Characteristics

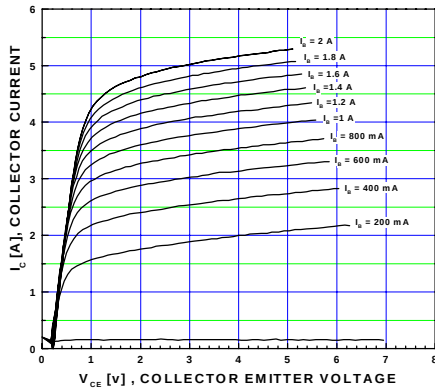


Figure 1. Static Characteristic

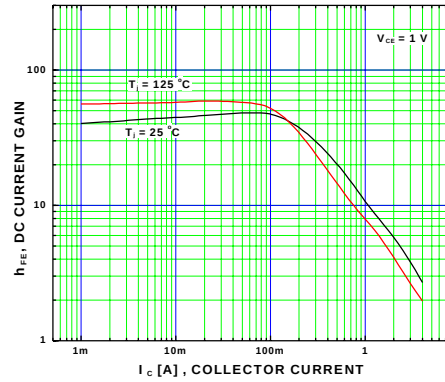


Figure 2. DC current Gain

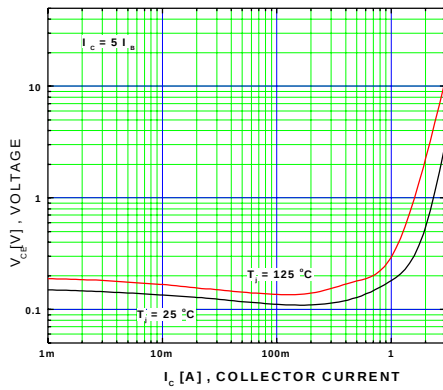


Figure 3. Collector-Emitter Saturation Voltage

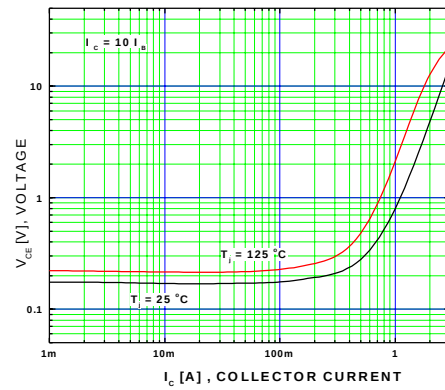


Figure 4. Collector-Emitter Saturation Voltage

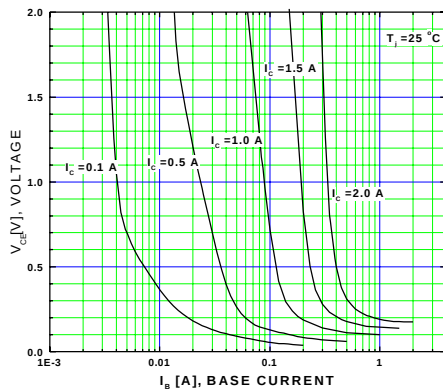


Figure 5. Typical Collector Saturation Voltage

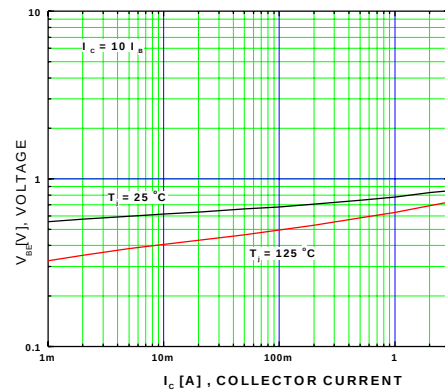


Figure 6. Base-Emitter Saturation Voltage

Typical Characteristics (Continued)

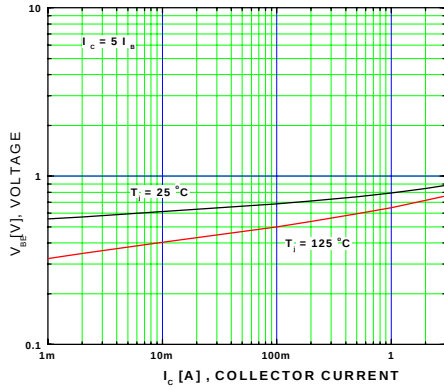


Figure 7. Base-Emitter Saturation Voltage

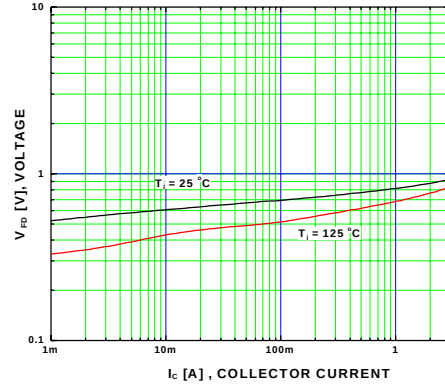


Figure 8. Diode Forward Voltage

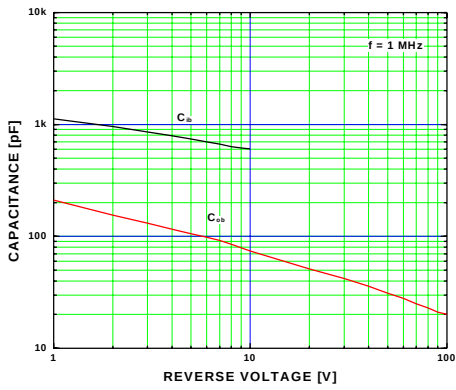


Figure 9. Collector Output Capacitance

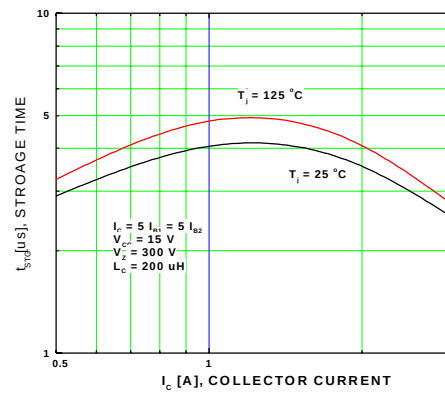


Figure 10. Inductive Switching Time, t_{SI}

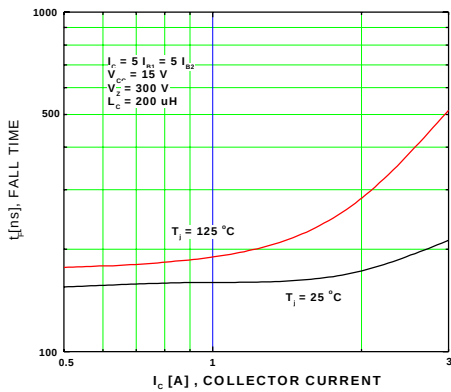


Figure 11. Inductive Switching Time, t_{fi}

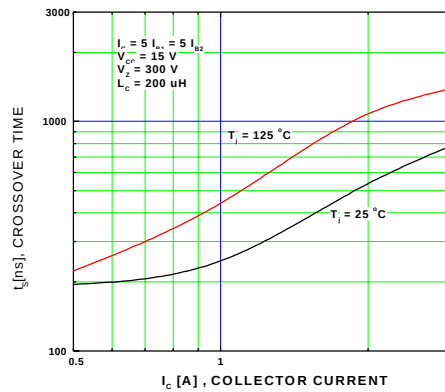


Figure 12. Inductive Switching Time, t_c

Typical Characteristics (Continued)

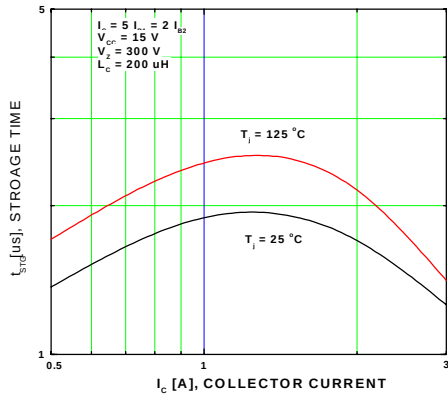


Figure 13. Inductive Switching Time, t_{si}

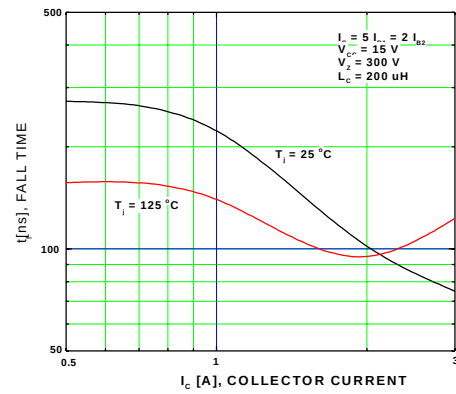


Figure 14. Inductive Switching Time, t_{fi}

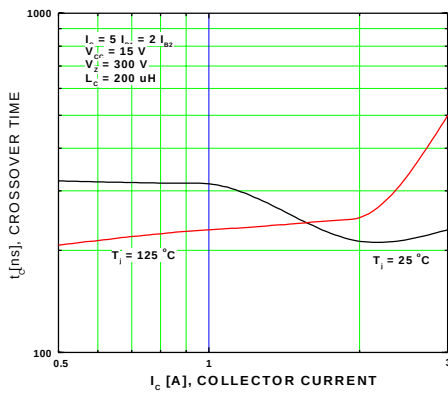


Figure 15. Inductive Switching Time, t_c

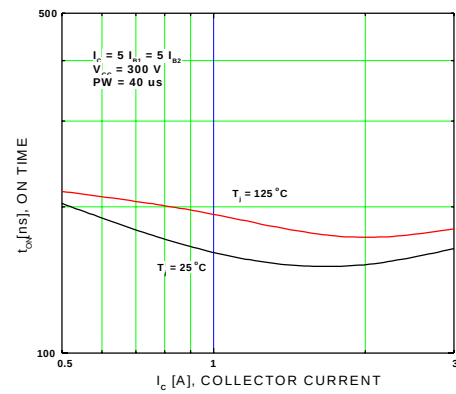


Figure 16. Resistive Switching Time, t_{on}

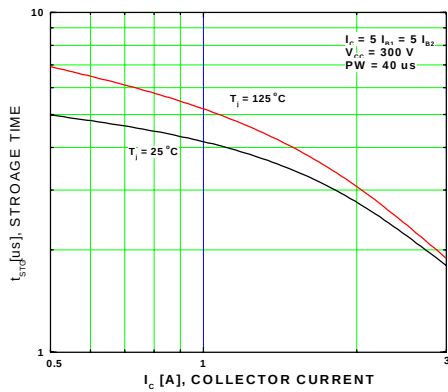


Figure 17. Resistive Switching Time, t_{si}

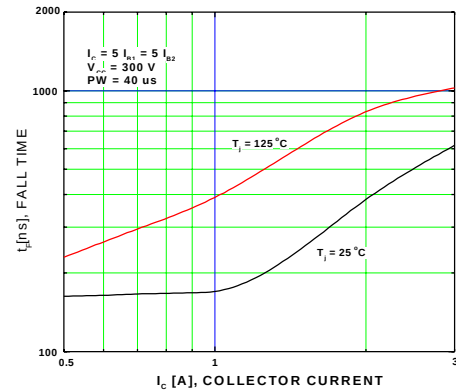


Figure 18. Resistive Switching Time, t_{fi}

Typical Characteristics (Continued)

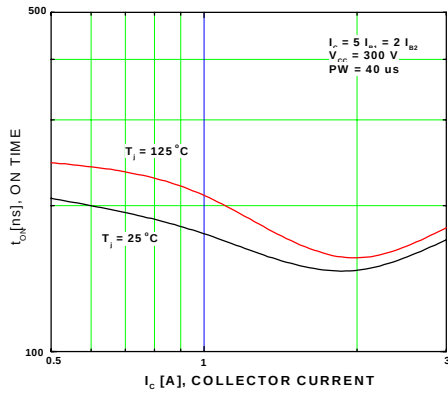


Figure 19. Resistive Switching Time, t_{on}

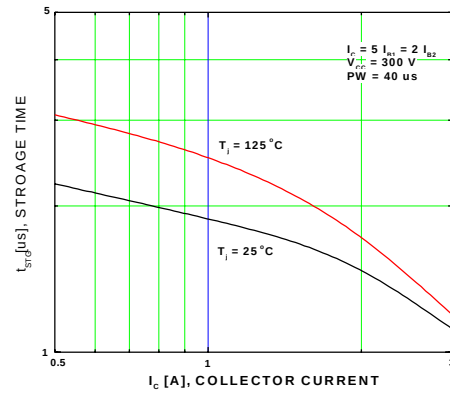


Figure 20. Resistive Switching Time, t_{si}

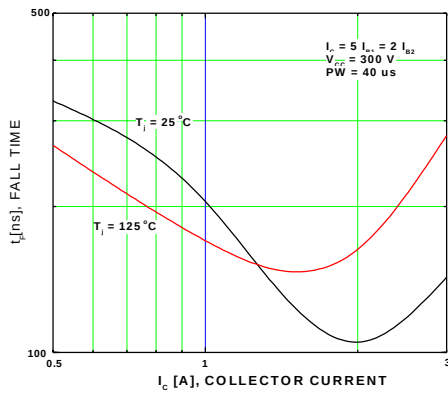


Figure 21. Resistive Switching Time, t_{fi}

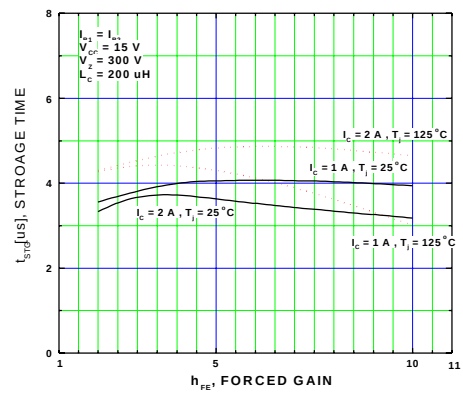


Figure 22. Inductive Switching Time, t_{si}

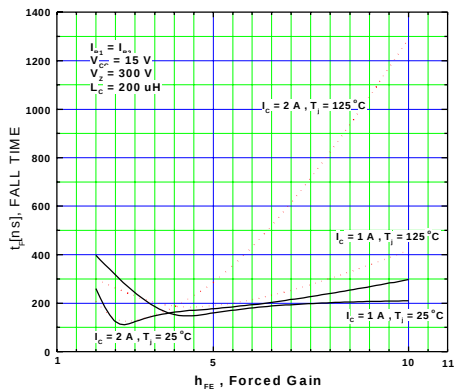


Figure 23. Inductive Switching Time, t_{fi}

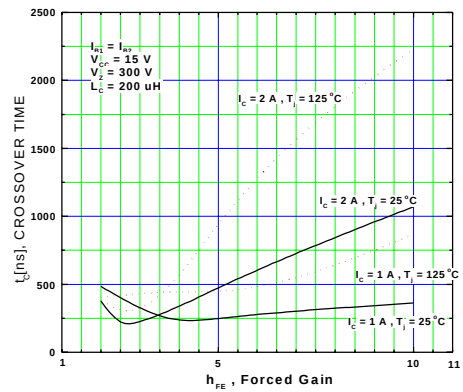


Figure 24. Inductive Switching Time, t_c

Typical Characteristics (Continued)

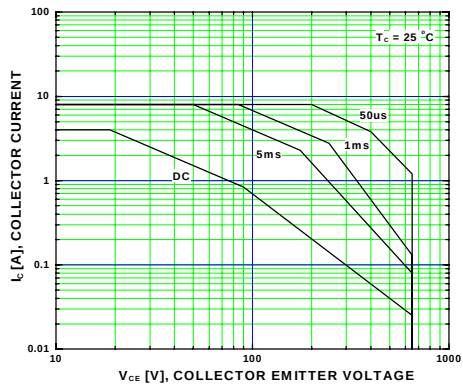


Figure 25. Forward Bias Safe Operating Area

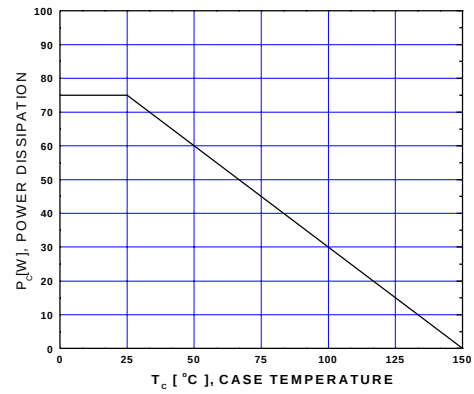
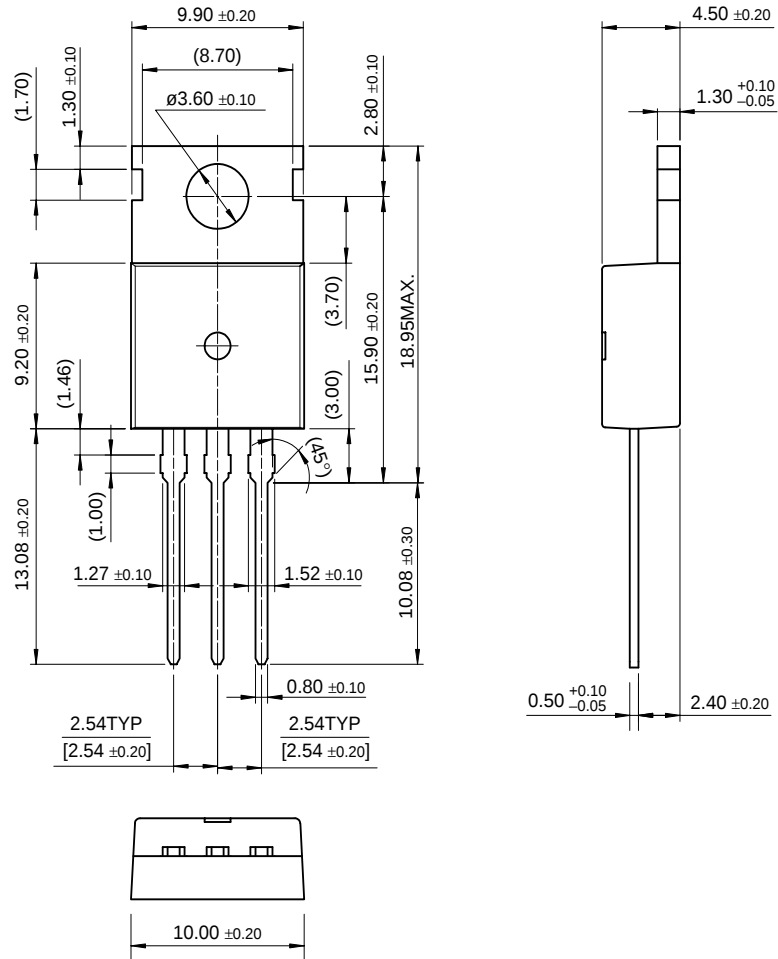


Figure 26. Power Derating

Package Dimensions

TO-220



Dimensions in Millimeters

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