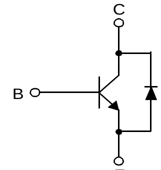
FAIRCHILD SEMICONDUCTOR®

KSC5504D/KSC5504DT

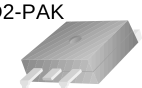
High Voltage High Speed Power Switch Application

- 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

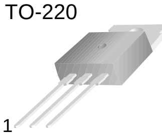
Equivalent Circuit



D2-PAK



TO-220



1.Base 2.Collector 3.Emitter

NPN Triple Diffused Planar Silicon Transistor

Absolute Maximum Ratings T_C=25°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°C)	75	W
T_J	Junction Temperature	150	°C
T_{STG}	Storage Temperature	- 65 ~ 150	°C
E_{AS}	Avalanche Energy(T_j=25°C)	3	mJ

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

Thermal Characteristics T_C=25°C unless otherwise noted

Symbol	Characteristics		Rating	Unit
$R_{\theta jc}$	Thermal Resistance	Junction to Case	1.65	°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	°C

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Electrical Characteristics T_C=25°C unless otherwise noted

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

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Electrical Characteristics T_C=25°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			770		ns
		I_F=1A			870		ns
		I_F=2A			1.2		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 $\leq$ 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

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Typical Characteristics

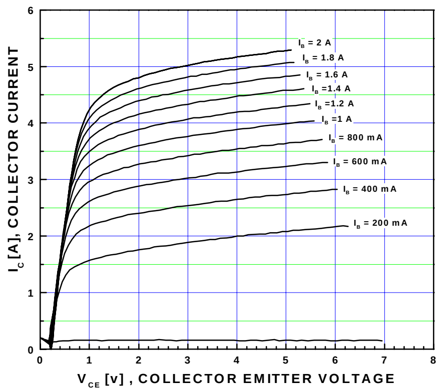

Figure 1. Static Characteristic

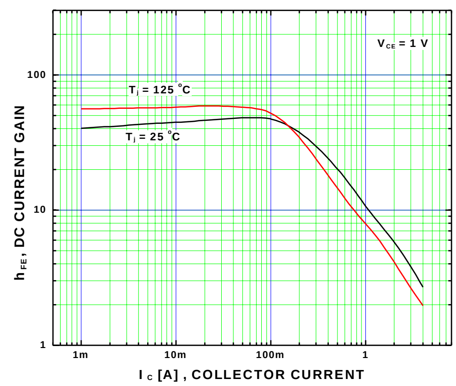

Figure 2. DC current Gain

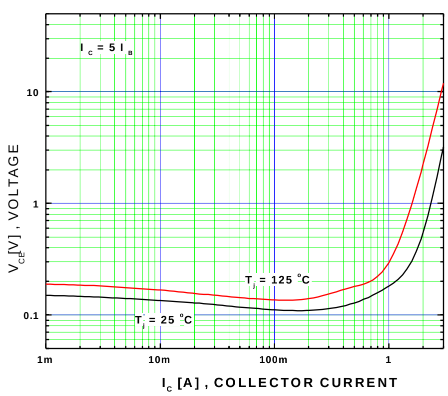

Figure 3. Collector-Emitter Saturation Voltage

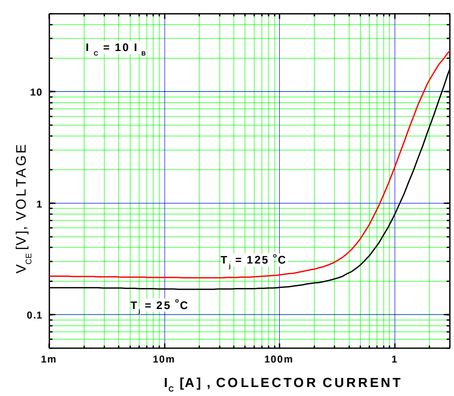

Figure 4. Collector-Emitter Saturation Voltage

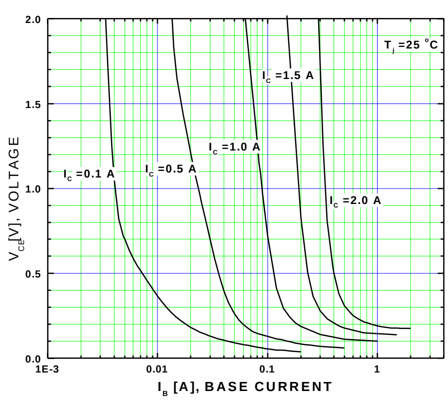

Figure 5. Typical Collector Saturation Voltage

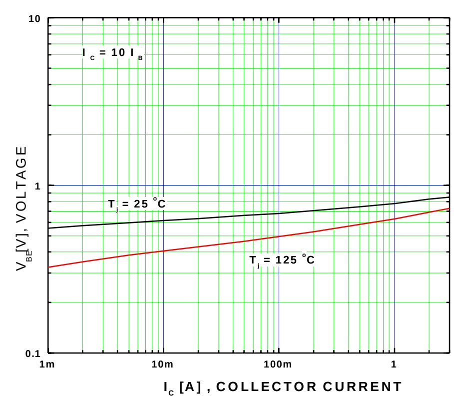

Figure 6. Base-Emitter Saturation Voltage

Typical Characteristics (Continued)

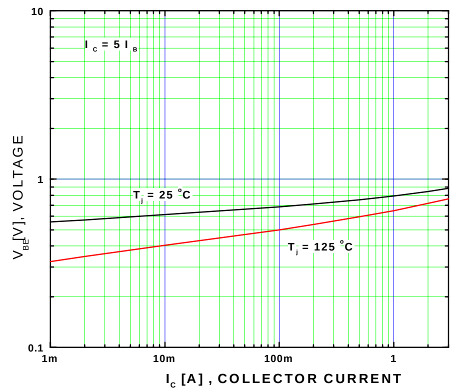

Figure 7. Base-Emitter Saturation Voltage

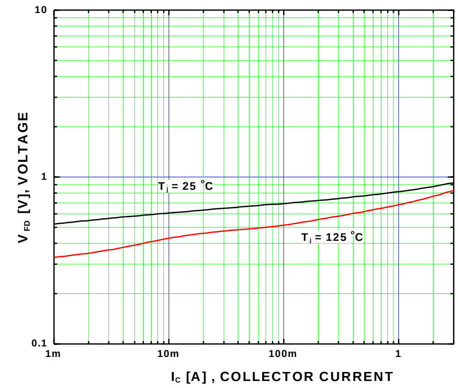

Figure 8. Diode Forward Voltage

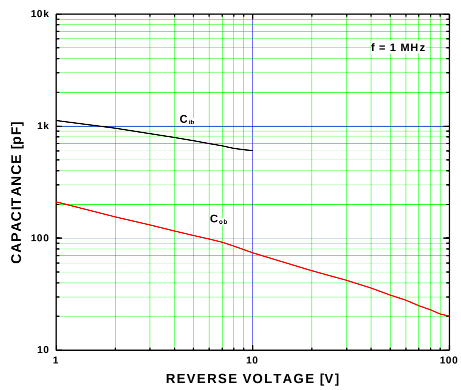

Figure 9. Collector Output Capacitance

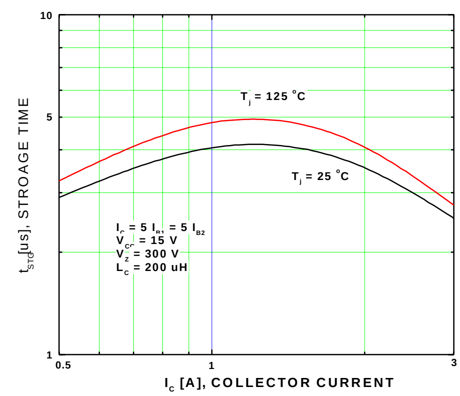

Figure 10. Inductive Switching Time, t_{si}

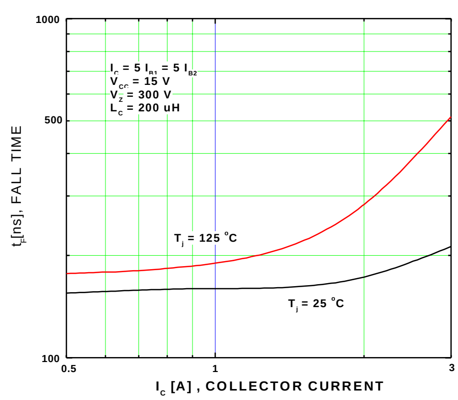

Figure 11. Inductive Switching Time, t_{fi}

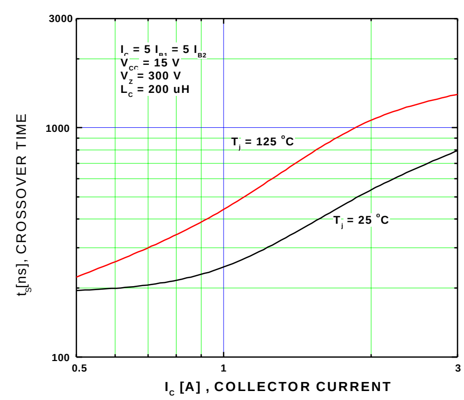

Figure 12. Inductive Switching Time, t_c

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Typical Characteristics (Continued)

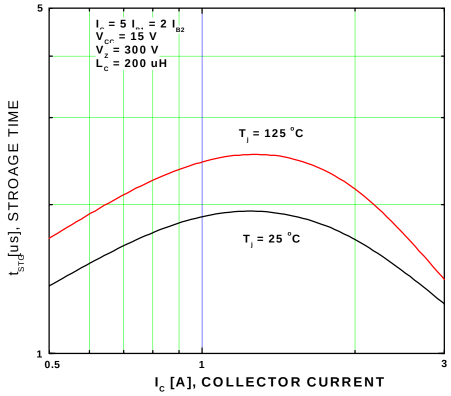

Figure 13. Inductive Switching Time, t_{si}

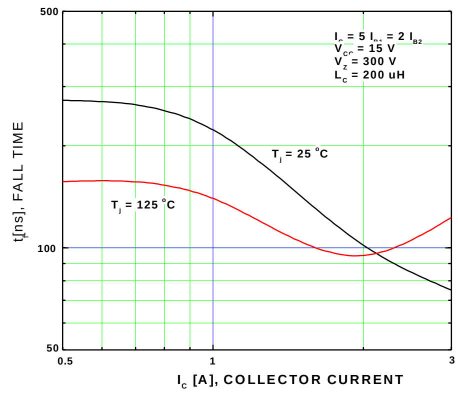

Figure 14. Inductive Switching Time, t_{fi}

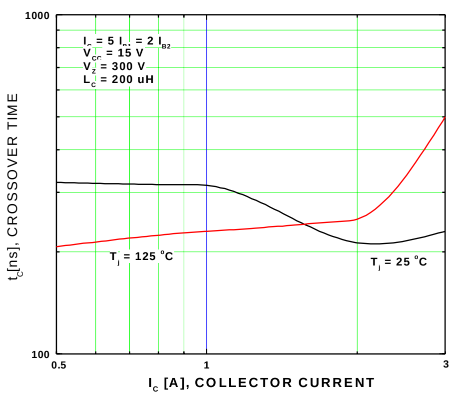

Figure 15. Inductive Switching Time, t_c

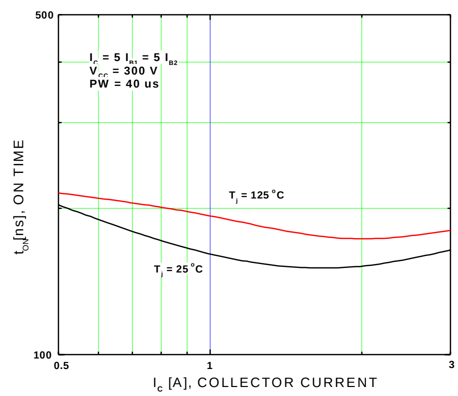

Figure 16. Resistive Switching Time, t_{on}

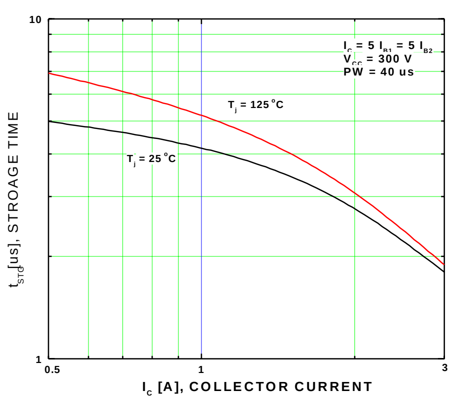

Figure 17. Resistive Switching Time, t_{si}

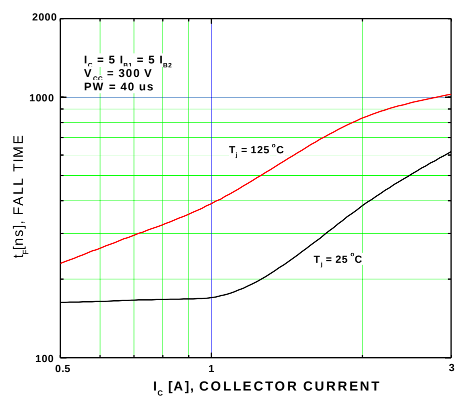

Figure 18. Resistive Switching Time, t_{fi}

Typical Characteristics (Continued)

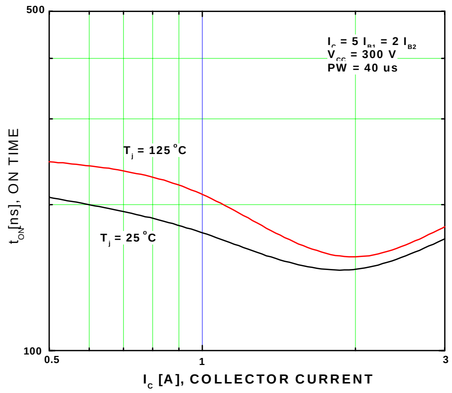

Figure 19. Resistive Switching Time, t_{on}

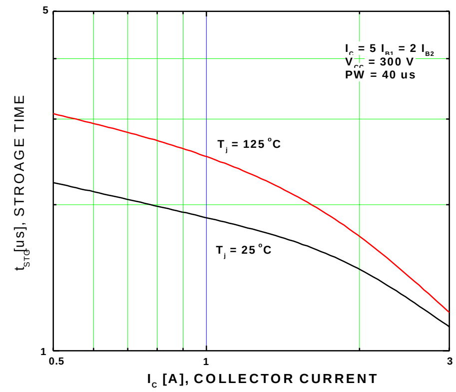

Figure 20. Resistive Switching Time, t_{si}

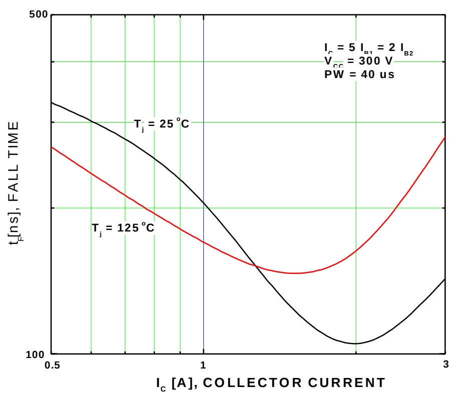

Figure 21. Resistive Switching Time, t_{fi}

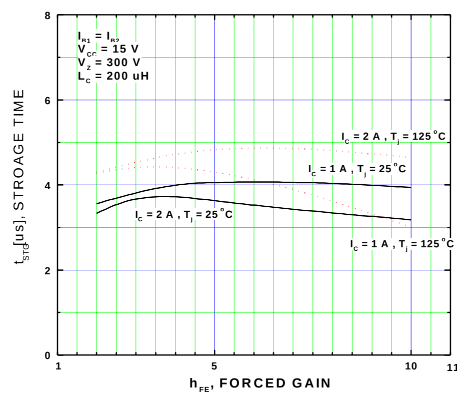

Figure 22. Inductive Switching Time, t_{si}

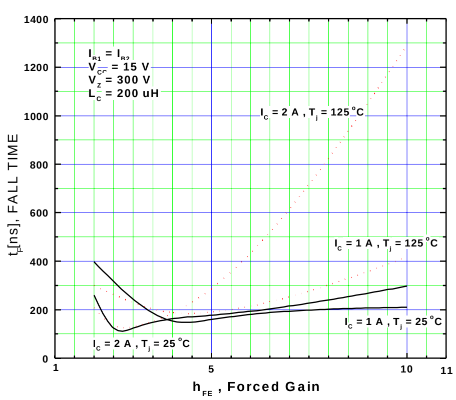

Figure 23. Inductive Switching Time, t_{fi}

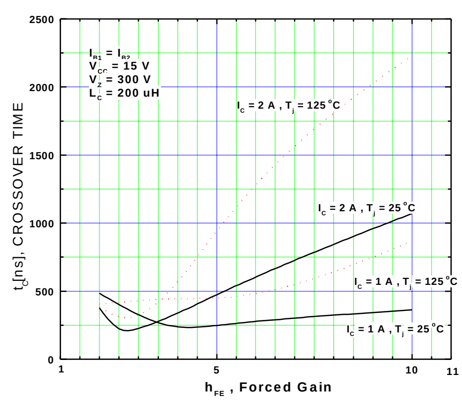

Figure 24. Inductive Switching Time, t_c

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Typical Characteristics (Continued)

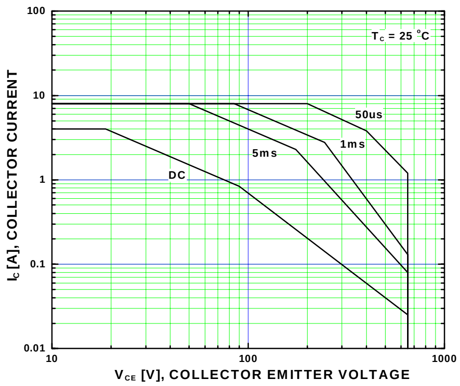


Figure 25. Forward Bias Safe Operating Area

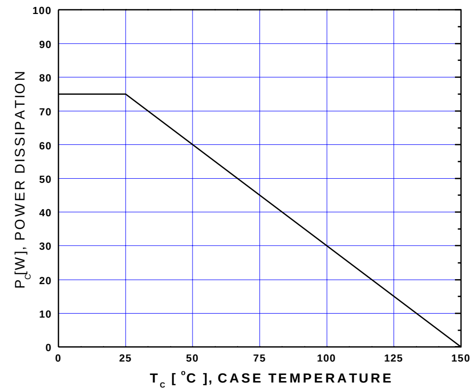
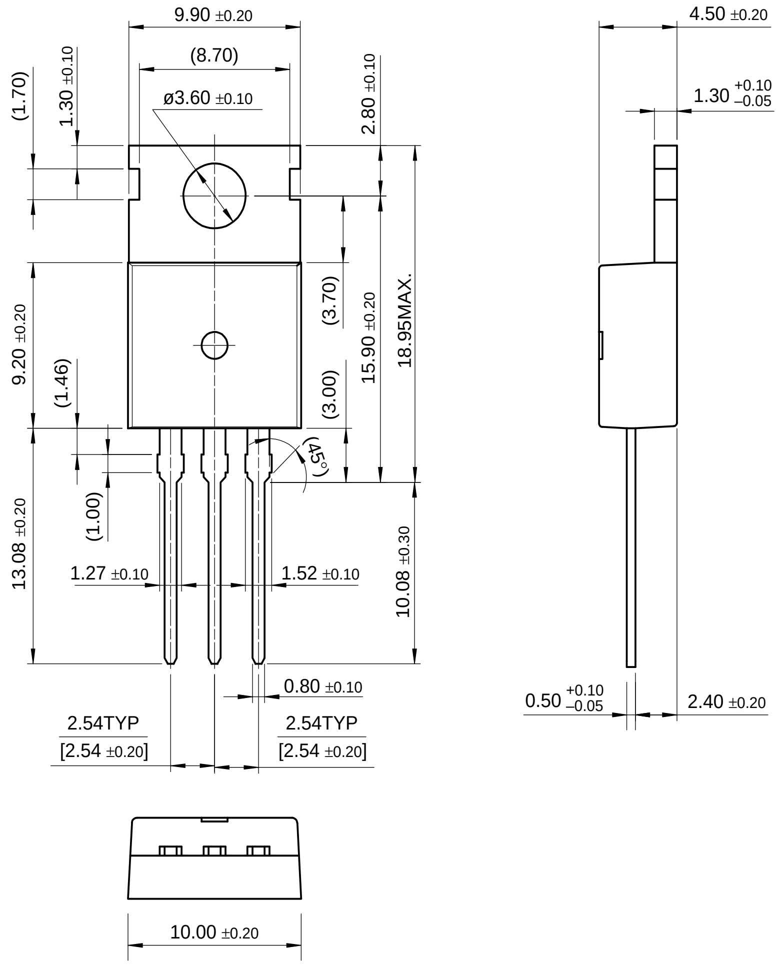


Figure 26. Power Derating

Package Demensions

TO-220



Dimensions in Millimeters

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DenseTrench™	GTO™	PowerTrench®	SuperSOT™-8
DOME™	HiSeC™	QFET™	SyncFET™
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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.

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Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
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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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