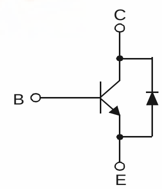
FAIRCHILD SEMICONDUCTOR™

KSC5338D/KSC5338DW

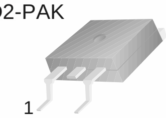
High Voltage Power Switch Switching Application

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

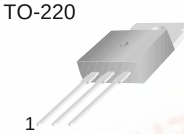
Equivalent Circuit



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	1000	V
V_{CEO}	Collector-Emitter Voltage	450	V
V_{EBO}	Emitter-Base Voltage	12	V
I_C	Collector Current (DC)	5	A
I_{CP}	*Collector Current (Pulse)	10	A
I_B	Base Current (DC)	2	A
I_{BP}	*Base Current (Pulse)	4	A
P_C	Power Dissipation(T_C=25°C)	75	W
T_J	Junction Temperature	150	°C
T_{STG}	Storage Temperature	- 55 ~ 150	°C

* 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		270	°C

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		1000			V
BV_{CEO}	Collector-Emitter Breakdown Voltage	I_C=5mA, I_B=0		450			V
BV_{EBO}	Emitter-Base Breakdown Voltage	I_E=1mA, I_C=0		12			V
I_{CBO}	Collector Cut-off Current	V_{CB}=800V, I_E=0				10	µA
I_{CES}	Collector Cut-off Current	V_{CES}=1000V, I_{EB}=0	T_C=25°C			100	µA
			T_C=125°C			500	µA
I_{CEO}	Collector Cut-off Current	V_{CE}=450V, I_B=0	T_C=25°C			100	µA
			T_C=125°C			500	µA
I_{EBO}	Emitter Cut-off Current	V_{EB}=10V, I_C=0				10	µA
h_{FE}	DC Current Gain	V_{CE}=1V, I_C=0.8A	T_C=25°C	15	25		
			T_C=125°C	10	14		
		V_{CE}=1V, I_C=2A	T_C=25°C	6	9		
			T_C=125°C	4	6		
		V_{CE}=2.5V, I_C=1A	T_C=25°C	18	25		
			T_C=125°C	14	18		
V_{CE}(sat)	Collector-Emitter Saturation Voltage	I_C=0.8A, I_B=0.08A	T_C=25°C		0.35	0.5	V
			T_C=125°C		0.55	0.75	V
		I_C=2A, I_B=0.4A	T_C=25°C		0.47	0.75	V
			T_C=125°C		0.9	1.1	V
		I_C=0.8A, I_B=0.04A	T_C=25°C		0.9	1.5	V
			T_C=125°C		1.8	2.5	V
		I_C=1A, I_B=0.2A	T_C=25°C		0.22	0.5	V
			T_C=125°C		0.3	0.6	V
V_{BE}(sat)	Base-Emitter Saturation Voltage	I_{CS}=0.8A, I_B=0.08A	T_C=25°C		0.8	1.0	V
			T_C=125°C		0.65	0.9	V
		I_C=2A, I_B=0.4A	T_C=25°C		0.9	1.0	V
			T_C=125°C		0.8	0.9	V
C_{ib}	Input Capacitance	V_{EB}=10V, I_C=0.5A, f=1MHz			550	750	pF
C_{ob}	Output Capacitance	V_{CB}=10V, I_E=0, f=1MHz			60	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, I_C=1mA, I_E=0	T_C=25°C		0.86	1.3	V
			T_C=125°C		0.79		V
		I_F=2A	T_C=25°C		0.95	1.5	V
			T_C=125°C		0.88		V
t_{fr}	Diode Froward Recvery Time (di/dt=10A/µs)	I_F=0.4A I_F=1A I_F=2A			460 360 325		ns ns ns
$V_{CE(DSAT)}$	Dynamic Saturation Voltage	I_C=1A, I_{B1}=100mA V_{CC}=300V at 1 µs	T_C=25°C		8		V
			T_C=125°C		15		V
		I_C=1A, I_{B1}=100mA V_{CC}=300V at 3 µs	T_C=25°C		2.9		V
			T_C=125°C		8		V
		I_C=2A, I_{B1}=400mA V_{CC}=300V at 1 µs	T_C=25°C		9		V
			T_C=125°C		17		V
		I_C=2A, I_{B1}=400mA V_{CC}=300V at 3 µs	T_C=25°C		1.9		V
			T_C=125°C		8.5		V

Electrical Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Condition		Min	Typ.	Max.	Units
RESISTIVE LOAD SWITCHING (D.C ≤ 10%, Pulse Width=40µs)							
t_{ON}	Turn ON Time	I_C=2.5A, I_{B1}=500mA I_{B2}=1A, V_{CC}=250V, R_L = 100Ω			500	750	ns
t_{STG}	Storage Time			1.2		1.5	µs
t_F	Fall Time				100	200	ns
t_{ON}	Turn ON Time	I_C=2A, I_{B1}=400mA I_{B2}=1A, V_{CC}=300V R_L = 150Ω	T_C=25°C		100	150	ns
			T_C=125°C		150		ns
t_{STG}	Storage Time		T_C=25°C		1.4	2.2	µs
			T_C=125°C		1.7		µs
t_F	Fall Time		T_C=25°C		90	150	ns
			T_C=125°C		150		ns
t_{ON}	Turn ON Time	I_C=2.5A, I_{B1}=500mA I_{B2}=5mA, V_{CC}=300V R_L = 120Ω	T_C=25°C		120	150	ns
			T_C=125°C		150		ns
t_{STG}	Storage Time		T_C=25°C	1.8		2.1	µs
			T_C=125°C		2.6		µs
t_F	Fall Time		T_C=25°C		110	150	ns
			T_C=125°C		160		ns
INDUCTIVE LOAD SWITCHING (V_{CC}=15V)							
t_{STG}	Storage Time	I_C=2.5A, I_{B1}=500mA I_{B2}=0.5A, V_Z=350V L_C=300µH	T_C=25°C		1.9	2.2	µs
			T_C=125°C		2.4		µs
t_F	Fall Time		T_C=25°C		160	200	ns
			T_C=125°C		330		ns
t_C	Cross-over Time		T_C=25°C		350	500	ns
			T_C=125°C		750		ns
t_{STG}	Storage Time	I_C=2A, I_{B1}=400mA I_{B2}=0.4A, V_Z=300V L_C=200µH	T_C=25°C	1.95		2.25	µs
			T_C=125°C		2.9		µs
t_F	Fall Time		T_C=25°C		120	150	ns
			T_C=125°C		270		ns
t_C	Cross-over Time		T_C=25°C		300	450	ns
			T_C=125°C		700		ns
t_{STG}	Storage Time	I_C=1A, I_{B1}=100mA I_{B2}=0.5A, V_Z=300V L_C=200µH	T_C=25°C		0.6	0.8	µs
			T_C=125°C		1.0		µs
t_F	Fall Time		T_C=25°C		70		ns
			T_C=125°C		110		ns
t_C	Cross-over Time		T_C=25°C		80	130	ns
			T_C=125°C		170		ns

Typical Characteristics

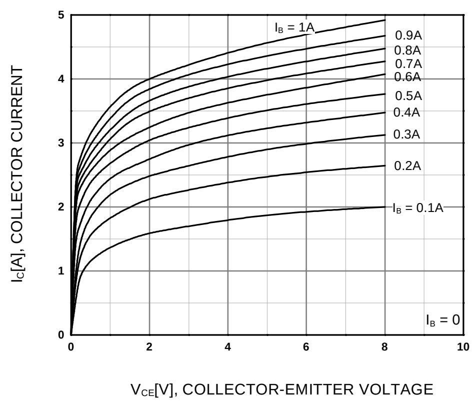


Figure 1. Static Characteristic

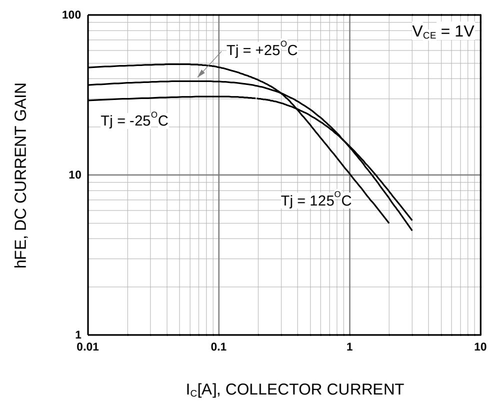


Figure 2. DC current Gain

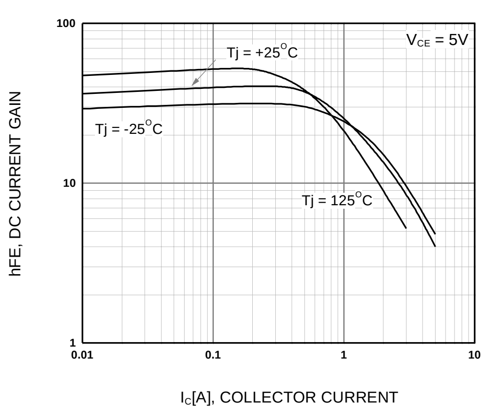


Figure 3. DC current Gain

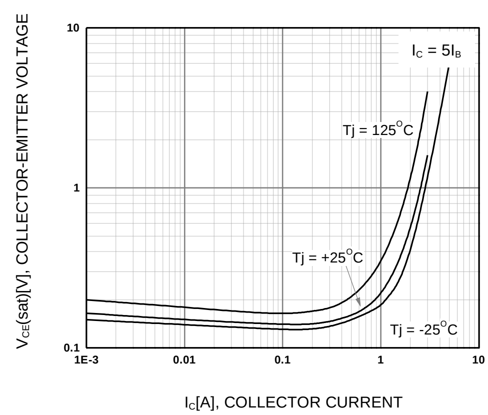


Figure 4. Collector-Emitter Saturation Voltage

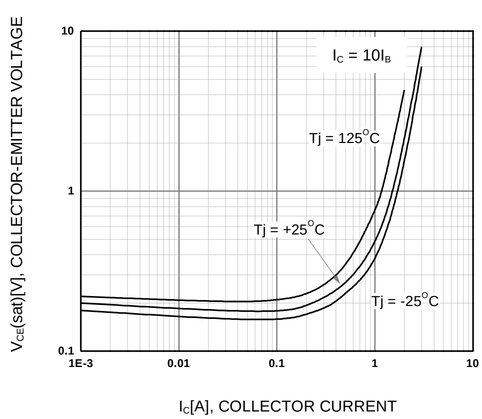


Figure 5. Collector-Emitter Saturation Voltage

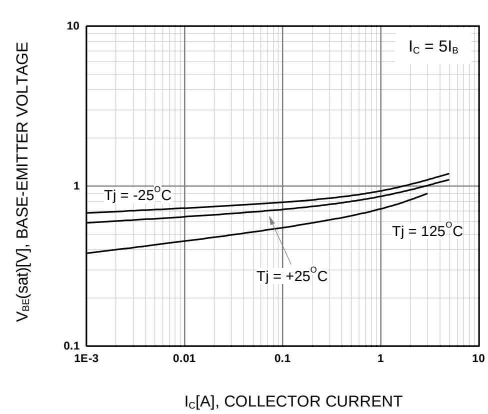


Figure 6. Base-Emitter Saturation Voltage

Typical Characteristics (Continued)

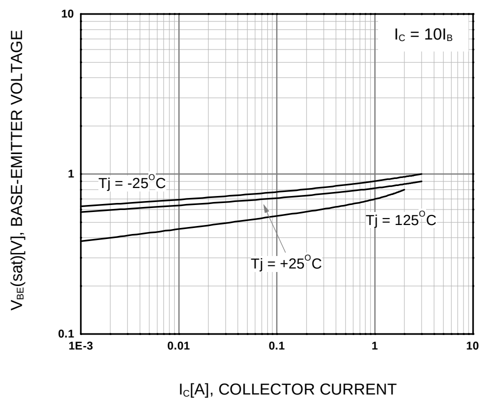


Figure 7. Base-Emitter Saturation Voltage

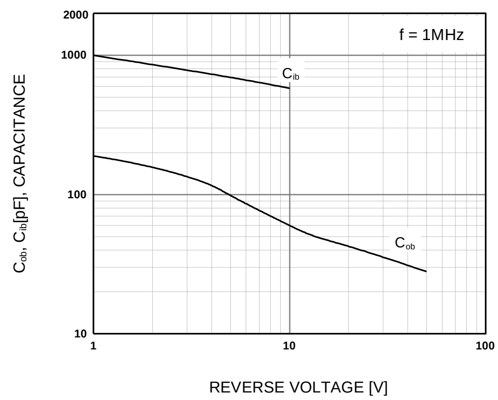


Figure 8. Collector Output Capacitance

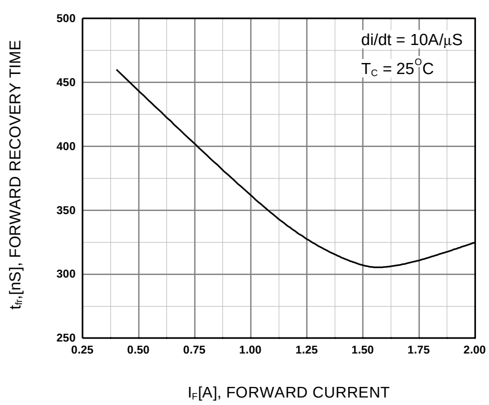


Figure 9. Forward Recovery Time

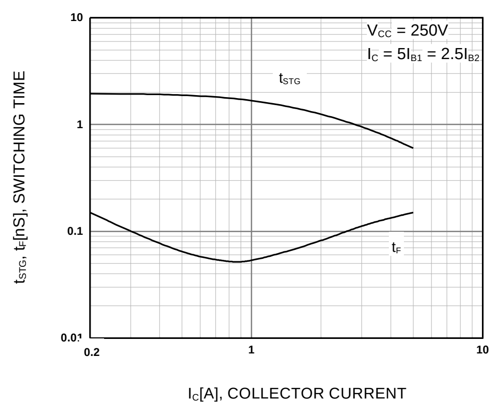


Figure 10. Switching Time

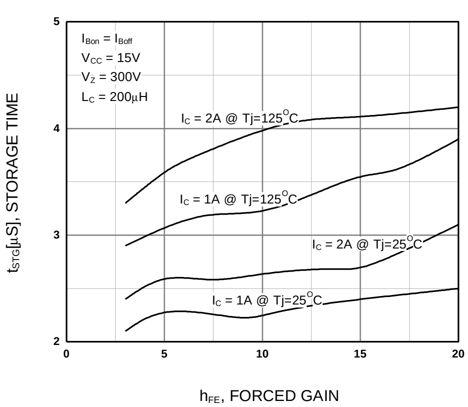


Figure 11. Induction Storage Time

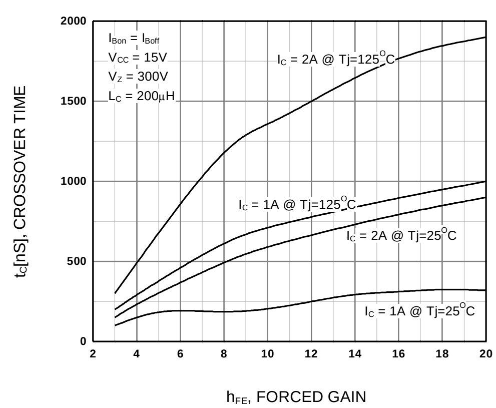


Figure 12. Inductive Crossover Time

Typical Characteristics (Continued)

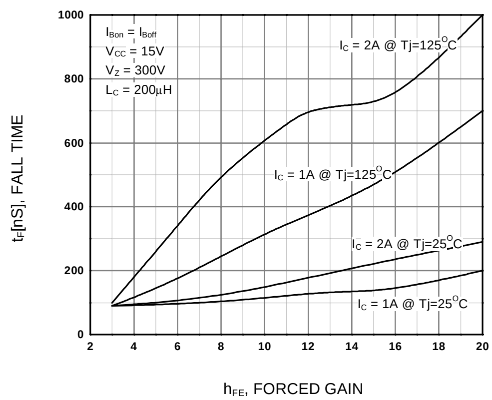


Figure 13. Inductive Fall Time

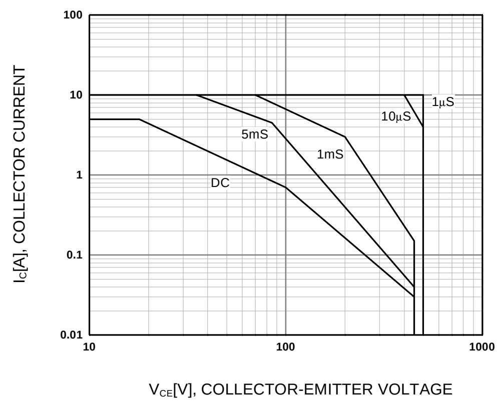


Figure 14. Safe Operating Area

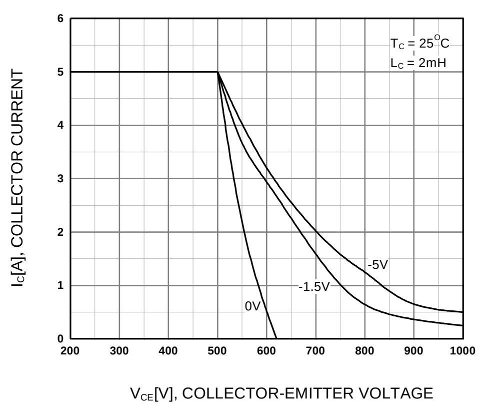


Figure 15. Reverse Bias Safe Operating

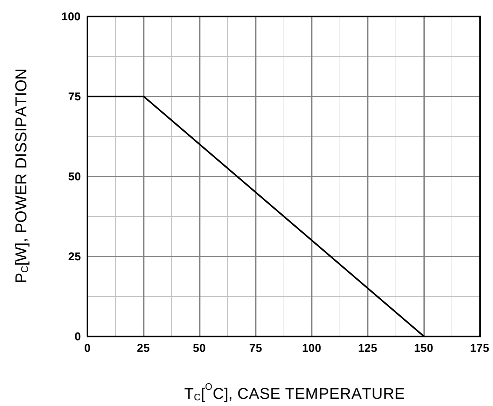


Figure 16. Power Derating

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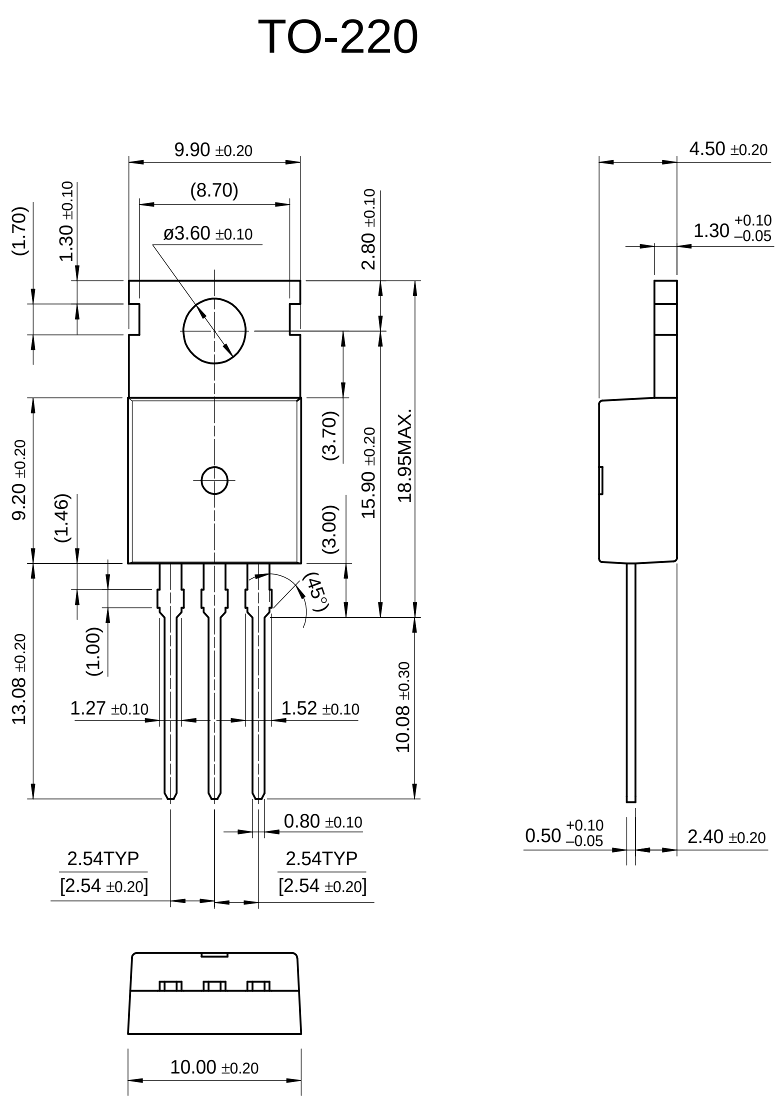
Package Demensions



Dimensions in Millimeters

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E^2CMOS™	PowerTrench®	VCX™
FACT™	QFET™	
FACT Quiet Series™	QS™	
FAST®	Quiet Series™	
FASTr™	SuperSOT™-3	
GTO™	SuperSOT™-6	

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PRODUCT STATUS DEFINITIONS

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