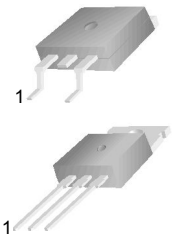
FAIRCHILD SEMICONDUCTOR®

October 2008

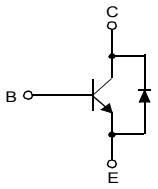
KSC5338D/KSC5338DW

NPN Triple Diffused Planar Silicon Transistor

- 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



1.Base 2.Collector 3.Emitter

Absolute Maximum Ratings* T_a = 25°C unless otherwise noted

Symbol	Parameter	Ratings	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

* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

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_a=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 (Continued) 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

* Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

Typical Characteristics

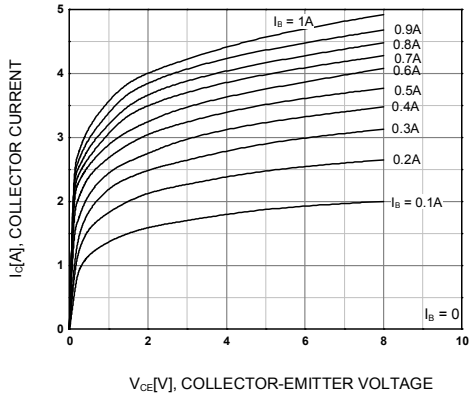


Figure 1. Static Characteristic

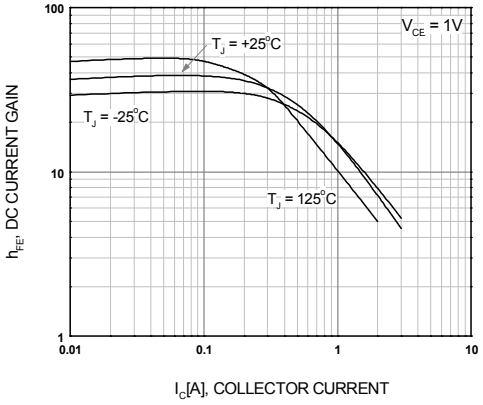


Figure 2. DC current Gain

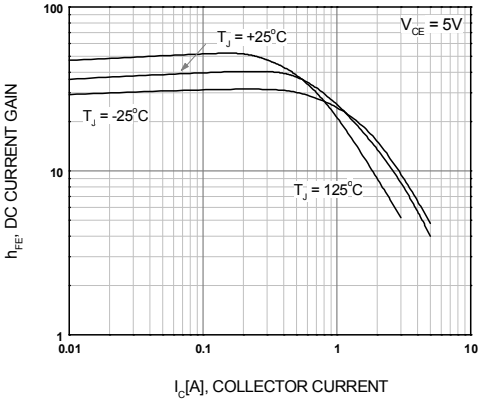


Figure 3. DC current Gain

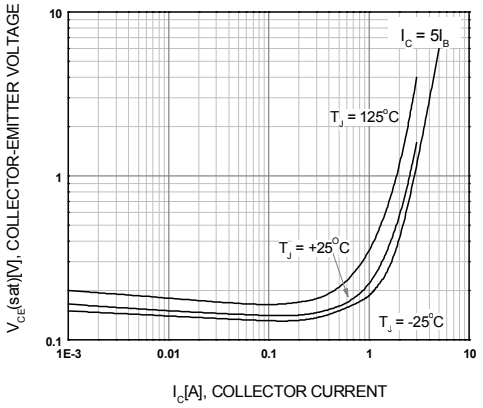


Figure 4. Collector-Emitter Saturation Voltage

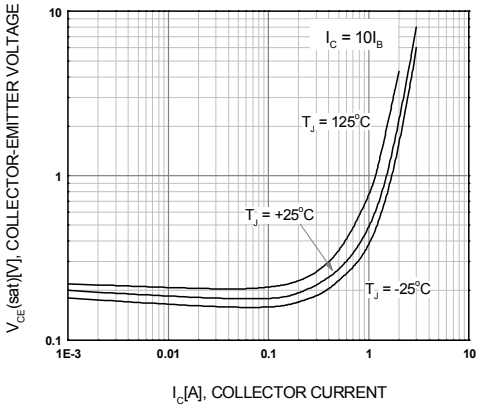


Figure 5. Collector-Emitter Saturation Voltage

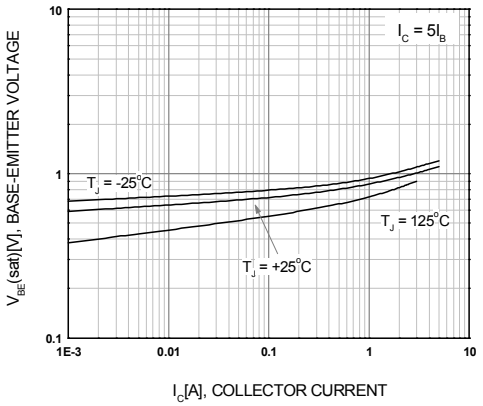
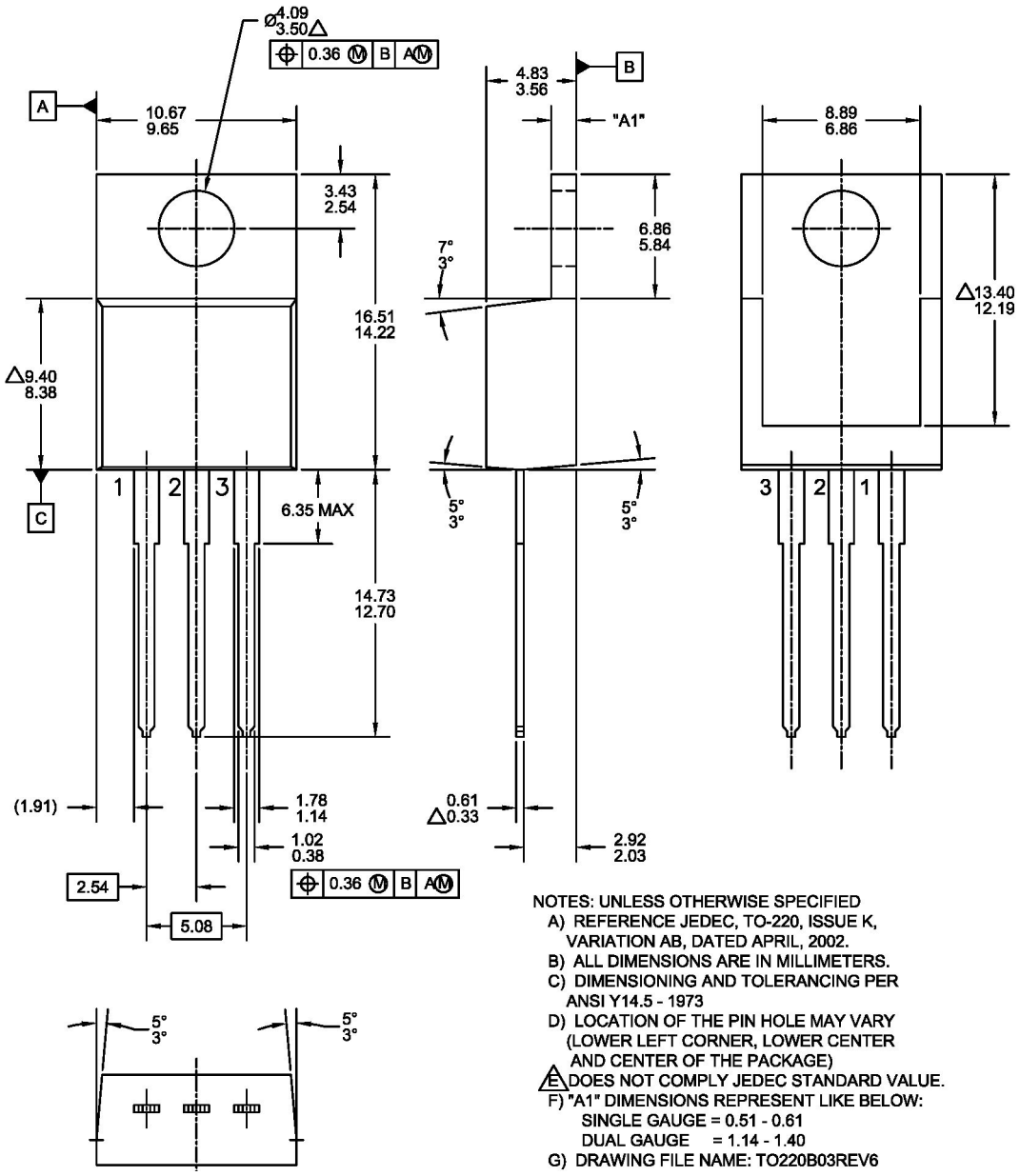


Figure 6. Base-Emitter Saturation Voltage

Mechanical Dimensions

TO220



NOTES: UNLESS OTHERWISE SPECIFIED

A) REFERENCE JEDEC, TO-220, ISSUE K, VARIATION AB, DATED APRIL, 2002.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONING AND TOLERANCING PER ANSI Y14.5 - 1973
D) LOCATION OF THE PIN HOLE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE)
△E DOES NOT COMPLY JEDEC STANDARD VALUE.
F) "A1" DIMENSIONS REPRESENT LIKE BELOW:
SINGLE GAUGE = 0.51 - 0.61
DUAL GAUGE = 1.14 - 1.40
G) DRAWING FILE NAME: TO220B03REV6

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FRFET®	PDP-SPM™	SuperSOT™-6	VCX™
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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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No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
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