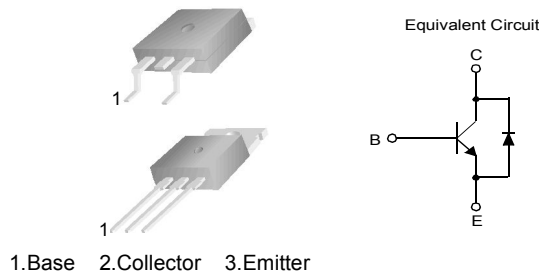


KSC5338D/KSC5338DW

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



Absolute Maximum Ratings* $T_a = 25^\circ\text{C}$ 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($T_C=25^\circ\text{C}$)	75	W
T_J	Junction Temperature	150	$^\circ\text{C}$
T_{STG}	Storage Temperature	- 55 ~ 150	$^\circ\text{C}$

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

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	Maximun Lead Temperature for Soldering		270	$^\circ\text{C}$

Electrical Characteristics* $T_a=25^\circ\text{C}$ unless otherwise noted

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

Electrical Characteristics (Continued) $T_C=25^\circ\text{C}$ unless otherwise noted

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

* Pulse Test: Pulse Width \leq 300 μ s, Duty Cycle \leq 2%

Typical Characteristics

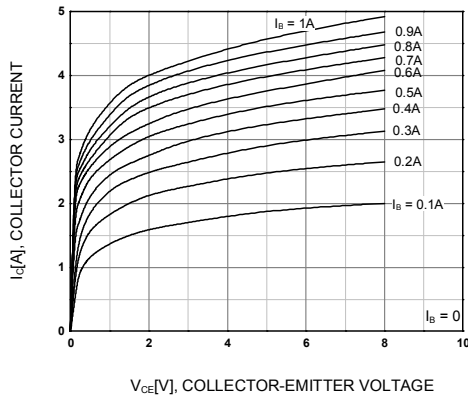


Figure 1. Static Characteristic

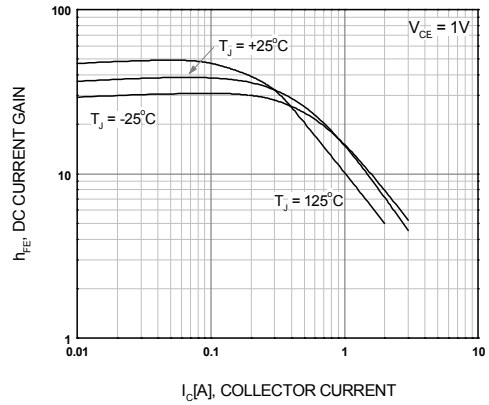


Figure 2. DC current Gain

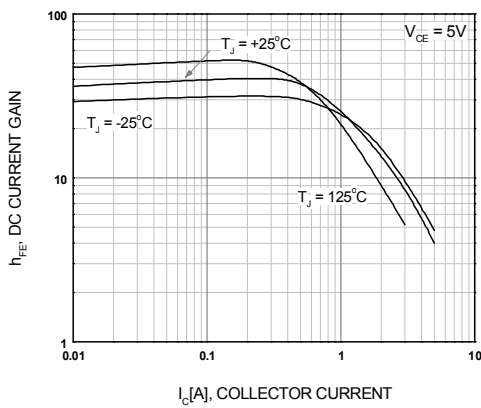


Figure 3. DC current Gain

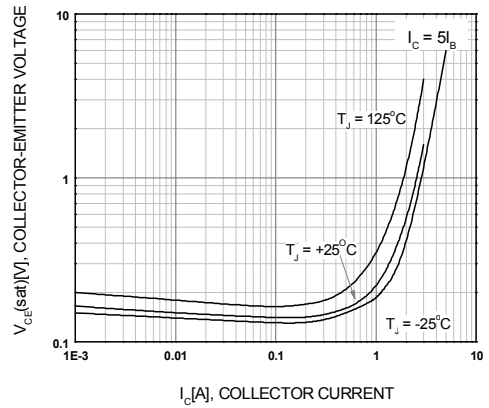


Figure 4. Collector-Emitter Saturation Voltage

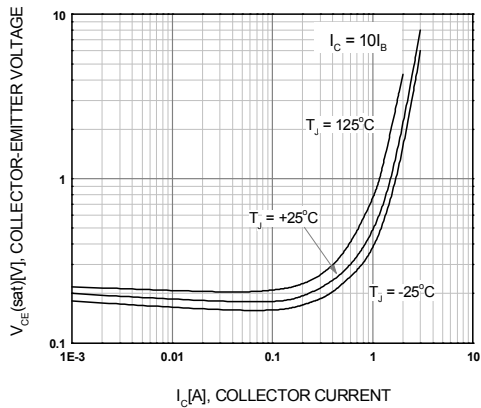


Figure 5. Collector-Emitter Saturation Voltage

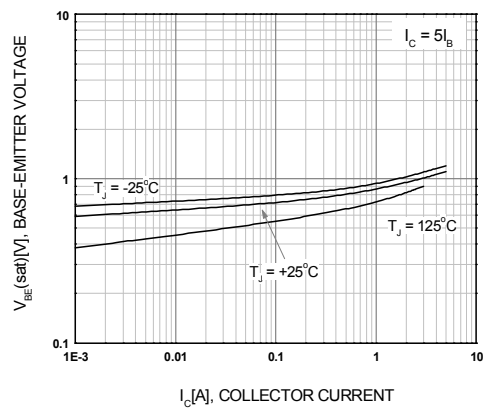
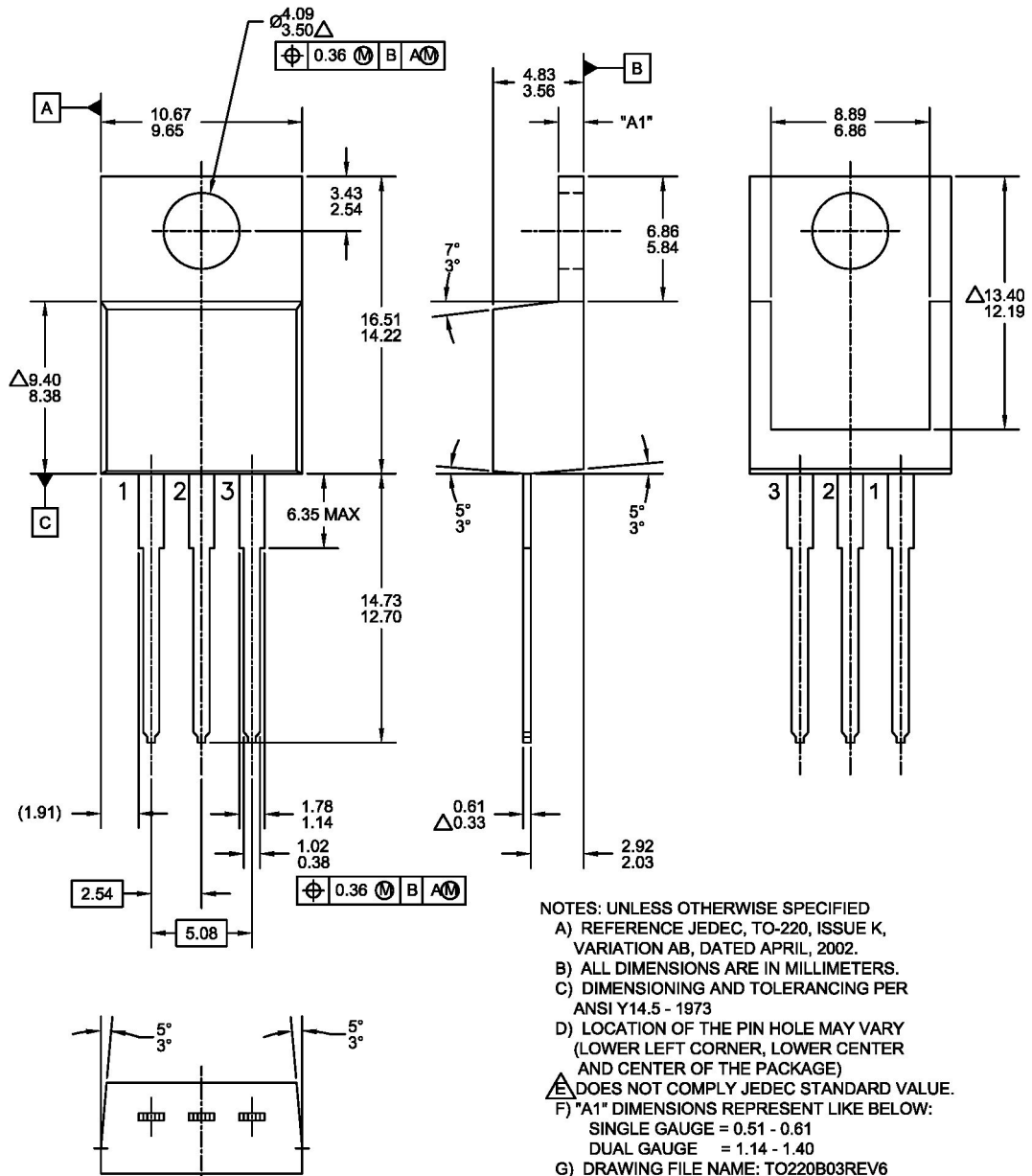


Figure 6. Base-Emitter Saturation Voltage

Mechanical Dimensions

TO220





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