

**13003CDH**

Preliminary

NPN SILICON TRANSISTOR**NPN SILICON POWER TRANSISTOR****DESCRIPTION**

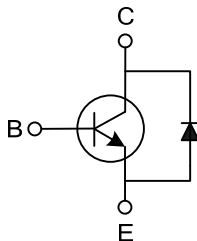
These devices are designed for high-voltage, high-speed power switching inductive circuits where fall time is critical. They are particularly suited for 115 and 220V applications in switch mode.

FEATURES

- * Reverse biased SOA with inductive load @ $T_C=100^{\circ}\text{C}$
- * Inductive switching matrix 0.5 ~ 1.5 Amp, 25 and 100°C
Typical $t_c = 290\text{ns}$ @ 1A, 100°C .
- * 900V blocking capability

APPLICATIONS

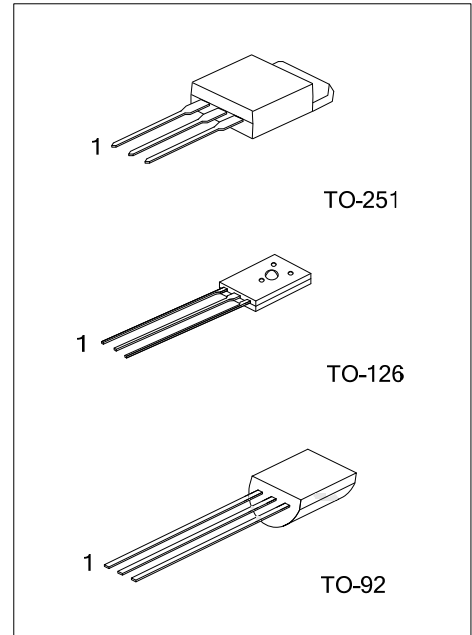
- * Switching regulator's, inverters
- * Motor controls
- * Solenoid/relay drivers
- * Deflection circuits

EQUIVALENT CIRCUIT**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
13003CDHL-TM3-T	13003CDHG-TM3-T	TO-251	B	C	E	Tube
13003CDHL-T60-K	13003CDHG-T60-K	TO-126	B	C	E	Bulk
13003CDHL-T92-B	13003CDHG-T92-B	TO-92	B	C	E	Tape Box
13003CDHL-T92-K	13003CDHG-T92-K	TO-92	B	C	E	Bulk
13003CDHL-T92-R	13003CDHG-T92-R	TO-92	B	C	E	Tape Reel

Note: Pin Assignment: B: Base C: Collector E: Emitter

13003CDHL-TM3-T	(1)Packing Type (2)Package Type (3)Lead Free	(1) T: Tube, B: Bulk, K: Bulk, R: Tape Reel (2) TM3: TO-251, T60: TO-126, T92: TO-92 (3) L: Lead Free, G: Halogen Free
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■ ABSOLUTE MAXIMUM RATINGS

PARAMETER			SYMBOL	RATINGS	UNIT
Collector-Emitter Voltage			V _{CEO(SUS)}	400	V
Collector-Base Voltage			V _{CBO}	900	V
Emitter Base Voltage			V _{EBO}	9	V
Collector Current		Continuous	I _C	1.5	A
		Peak (1)	I _{CM}	3	
Base Current		Continuous	I _B	0.75	A
		Peak (1)	I _{BM}	1.5	
Emitter Current		Continuous	I _E	2.25	A
		Peak (1)	I _{EM}	4.5	
Power Dissipation	T _A =25°C	TO-126	P _D	1.4	W
		TO-92		1.1	W
		TO-251		1.56	W
	T _C =25°C	TO-126		20	W
		TO-92		1.5	W
		TO-251		25	W
Junction Temperature			T _J	+150	°C
Storage Temperature			T _{STG}	-55 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.
 Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ **ELECTRICAL CHARACTERISTICS** ($T_C=25^\circ\text{C}$, unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS (Note)						
Collector-Emitter Sustaining Voltage	$V_{CEO(SUS)}$	$I_C=10mA$, $I_B=0$	400			V
Collector Cutoff Current	I_{CEO}	$V_{CEO}=\text{Rated Value}$, $V_{BE(OFF)}=1.5\text{ V}$			1	mA
					5	
Emitter Cutoff Current	I_{EBO}	$V_{EB}=9V$, $I_C=0$			1	mA
SECOND BREAKDOWN						
Second Breakdown Collector Current with bass forward biased	$I_{s/b}$		See Fig.5			
Clamped Inductive SOA with base reverse biased	RB_{SOA}		See Fig.6			
ON CHARACTERISTICS (Note)						
DC Current Gain	h_{FE1}	$I_C=0.5A$, $V_{CE}=5V$	14		57	
	h_{FE2}	$I_C=1A$, $V_{CE}=5V$	5		30	
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C=0.5A$, $I_B=0.1A$			0.5	V
		$I_C=1A$, $I_B=0.25A$			1	
		$I_C=1.5A$, $I_B=0.5A$			3	
		$I_C=1A$, $I_B=0.25A$, $T_C=100^{\circ}C$			1	
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	$I_C=0.5A$, $I_B=0.1A$			1	V
		$I_C=1A$, $I_B=0.25A$			1.2	
		$I_C=1A$, $I_B=0.25A$, $T_C=100^{\circ}C$			1.1	
DYNAMIC CHARACTERISTICS						
Current-Gain-Bandwidth Product	f_T	$I_C=100mA$, $V_{CE}=10V$, $f=1MHz$	4	10		MHz
Output Capacitance	C_{OB}	$V_{CB}=10V$, $I_E=0$, $f=0.1MHz$		21		pF
SWITCHING CHARACTERISTICS						
Resistive Load (Table 1)						
Delay Time	t_D	$V_{CC}=125V$, $I_C=1A$, $I_{B1}=I_{B2}=0.2A$, $t_P=25\mu s$, Duty Cycles $\leq 1\%$		0.05	0.1	μs
Rise Time	t_R			0.5	1	μs
Storage Time	t_S			2	4	μs
Fall Time	t_F			0.4	0.7	μs
Inductive Load, Clamped (Table 1)						
Storage Time	t_{STG}	$I_C=1A$, $V_{CLAMP}=300V$, $I_{B1}=0.2A$, $V_{BE(OFF)}=5V_{DC}$, $T_C=100^{\circ}C$		1.7	4	μs
Crossover Time	t_C			0.29	0.75	μs
Fall Time	t_F			0.15		μs
Diode Forward Voltage	V_F	$I_F=0.5A$			1.5	V

Note: Pulse Test: $PW=300\mu\text{s}$, Duty Cycle $\leq 2\%$

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