



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.

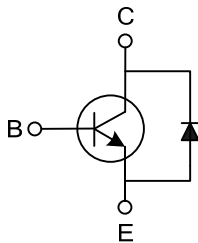
FEATURES

- * 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

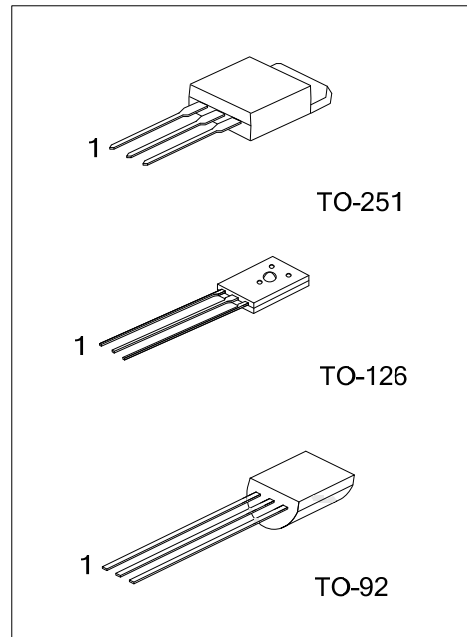


ORDERING INFORMATION

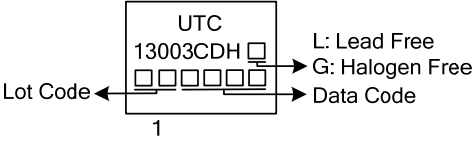
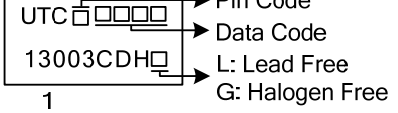
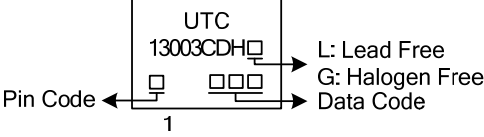
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
13003CDHL-TM3-T	13003CDHG-TM3-T	TO-251	B	C	E	Tube
13003CDHL-T60-F-K	13003CDHG-T60-F-K	TO-126	B	C	E	Bulk
13003CDHL-T92-F-B	13003CDHG-T92-F-B	TO-92	B	C	E	Tape Box
13003CDHL-T92-F-K	13003CDHG-T92-F-K	TO-92	B	C	E	Bulk

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

<p>13003CDHL-T60-F-B</p>	<p>(1) Packing Type</p> <p>(2) Pin Assignment</p> <p>(3) Package Type</p> <p>(4) Lead Free</p>	<p>(1) T: Tube, B: Bulk, K: Bulk</p> <p>(2) refer to Pin Assignment</p> <p>(3) TM3: TO-251, T60: TO-126, T92: TO-92</p> <p>(4) L: Lead Free, G: Halogen Free</p>
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MARKING

PACKAGE	MARKING
TO-251	 <p>Diagram showing marking on a TO-251 package. The marking includes 'UTC', '13003CDH', and a lot code '1'. Arrows point to 'L: Lead Free', 'G: Halogen Free', and 'Data Code'.</p>
TO-126	 <p>Diagram showing marking on a TO-126 package. The marking includes 'UTC', '13003CDH', and a pin code '1'. Arrows point to 'Pin Code', 'Data Code', 'L: Lead Free', and 'G: Halogen Free'.</p>
TO-92	 <p>Diagram showing marking on a TO-92 package. The marking includes 'UTC', '13003CDH', and a pin code '1'. Arrows point to 'L: Lead Free', 'G: Halogen Free', and 'Data Code'.</p>

■ 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	$T_A=25^\circ\text{C}$	TO-126	P_D	1.4	W
		TO-92		1.1	W
		TO-251		1.56	W
	$T_C=25^\circ\text{C}$	TO-126		20	W
		TO-92		1.5	W
		TO-251		25	W
Junction Temperature		T_J	+150	$^\circ\text{C}$	
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$	

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°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} =Rated Value, V _{BE(OFF)} =1.5 V			1	mA
			T _C =25°C			
Emitter Cutoff Current	I _{EBO}	V _{EB} =9V, I _C =0			1	mA
SECOND BREAKDOWN						
Second Breakdown Collector Current with base 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°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°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 =25μs, Duty Cycle≤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°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=300μs, Duty Cycle≤2%

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