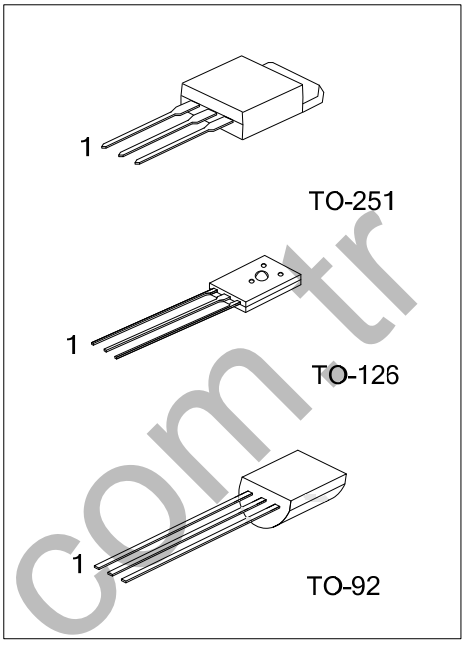
NPN SILICON POWER TRANSISTOR



■ 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.

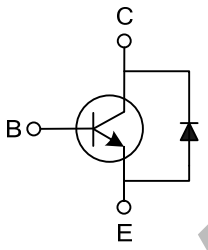
■ FEATURES

* Reverse biased SOA with inductive load @ T_C=100°C
* Inductive switching matrix 0.5 ~ 1.5 Amp, 25 and 100°C
  Typical t_C = 290ns @ 1A, 100°C.
* 900V blocking capability

■ APPLICATIONS

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

■ EQUIVALENT CIRCUIT



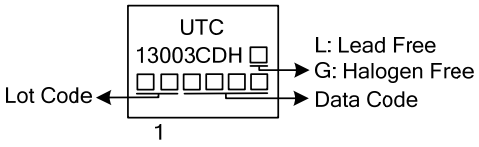
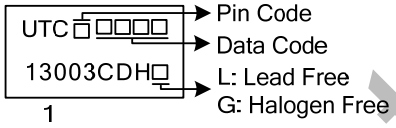
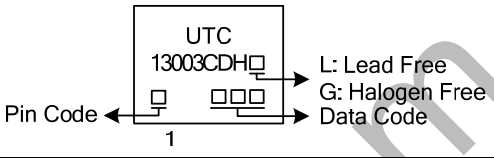
■ ORDERING INFORMATION

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

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

■ MARKING

PACKAGE	MARKING
TO-251	
TO-126	
TO-92	

■ 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°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	T_C=25°C	I_{CEO}	V_{CEO}=Rated Value, $V_{BE(OFF)}$=1.5 V			1	mA
	T_C=100°C					5	
Emitter Cutoff Current		I_{EBO}	V_{EB}=9V, I_C=0			1	mA
SECOND BREAKDOWN							
Second Breakdown Collector Current with bass forward biased		Is/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%