



13005EC

Preliminary

NPN SILICON TRANSISTOR

NPN SILICON POWER TRANSISTORS

■ 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 220 V SWITCHMODE.

■ FEATURES

- * $V_{CES} = 850\text{ V}$
- * Reverse bias SOA with inductive loads @ $T_C = 100^\circ\text{C}$
- * Inductive switching matrix 2 to 4 Amp, 25 and 100°C
 $t_c @ 3\text{A}, 100^\circ\text{C}$ is 180 ns (Typ)
- * 850V blocking capability
- * SOA and switching applications information

■ APPLICATIONS

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

■ ORDERING INFORMATION

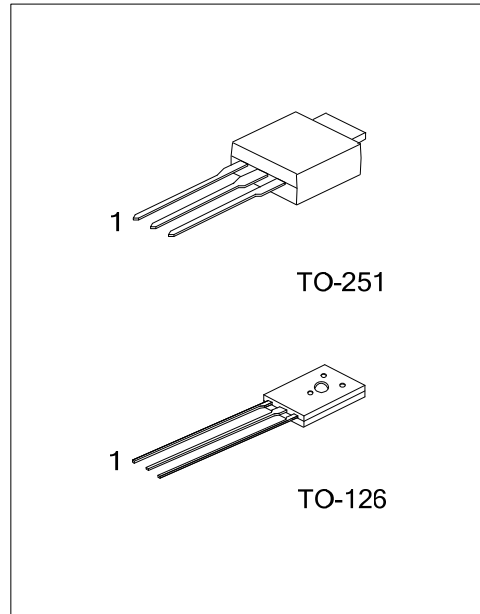
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
13005ECL-x-TM3-T	13005ECG-x-TM3-T	TO-251	B	C	E	Tube
13005ECL-x-T60-F-K	13005ECG-x-T60-F-K	TO-126	B	C	E	Bulk

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

<p>13005ECL-T60-F-B</p>	<p>(1) T: Tube, B: Bluk (2) refer to Pin Assignment (3) TM3: TO-251, T60: TO-126 (4) L: Lead Free, G: Halogen Free and Lead Free</p>
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■ MARKING INFORMATION

TO-251	TO-126



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Collector-Emitter Voltage		$V_{CEO(SUS)}$	400	V
Collector-Emitter Voltage ($V_{BE}=0$)		V_{CES}	850	V
Collector-Base Voltage		V_{CBO}	850	V
Emitter Base Voltage		V_{EBO}	9	V
Collector Current	Continuous	I_C	4	A
	Peak (1)	I_{CM}	8	A
Base Current	Continuous	I_B	2	A
	Peak (1)	I_{BM}	4	A
Emitter Current	Continuous	I_E	6	A
	Peak (1)	I_{EM}	12	A
Power Dissipation at $T_C=25^\circ\text{C}$	TO-251	P_D	10	W
	TO-126		8	W
Junction Temperature		T_J	-65 ~ +150	$^\circ\text{C}$
Storage Temperature Range		T_{STG}	-65 ~ +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.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-251	θ_{JA}	95	$^\circ\text{C/W}$
	TO-126		100	
Junction to Case	TO-251	θ_{JC}	13	$^\circ\text{C/W}$
	TO-126		16.25	

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS (Note 1)						
Collector-Emitter Voltage	V_{CES}	$I_C=10\text{mA}$, $V_{BE}=0$	850			V
Collector Cutoff Current	I_{CBO}	$V_{CBO}=\text{Rated Value}$, $V_{BE(\text{OFF})}=1.5\text{V}$			1	mA
		$V_{CBO}=\text{Rated Value}$, $V_{BE(\text{OFF})}=1.5\text{V}$, $T_C=100^\circ\text{C}$			5	
Emitter Cutoff Current	I_{EBO}	$V_{EB}=9\text{V}$, $I_C=0$			1	mA
ON CHARACTERISTICS (Note 1)						
DC Current Gain	h_{FE1}	$I_C=0.5\text{A}$, $V_{CE}=5\text{V}$	15		50	
	h_{FE2}	$I_C=1\text{A}$, $V_{CE}=5\text{V}$	10		60	
	h_{FE3}	$I_C=2\text{A}$, $V_{CE}=5\text{V}$	8		40	
Collector-Emitter Saturation Voltage	$V_{CE(\text{SAT})}$	$I_C=1\text{A}$, $I_B=0.2\text{A}$			0.5	V
		$I_C=2\text{A}$, $I_B=0.5\text{A}$			0.6	V
		$I_C=4\text{A}$, $I_B=1\text{A}$			1	V
		$I_C=2\text{A}$, $I_B=0.5\text{A}$, $T_A=100^\circ\text{C}$			1	V
Base-Emitter Saturation Voltage	$V_{BE(\text{SAT})}$	$I_C=1\text{A}$, $I_B=0.2\text{A}$			1.2	V
		$I_C=2\text{A}$, $I_B=0.5\text{A}$			1.6	V
		$I_C=2\text{A}$, $I_B=0.5\text{A}$, $T_C=100^\circ\text{C}$			1.5	V
DYNAMIC CHARACTERISTICS						
Current-Gain-Bandwidth Product	f_T	$I_C=500\text{mA}$, $V_{CE}=10\text{V}$, $f=1\text{MHz}$	4			MHz
Output Capacitance	C_{OB}	$V_{CB}=10\text{V}$, $I_E=0$, $f=0.1\text{MHz}$		65		pF
SWITCHING CHARACTERISTICS						
Resistive Load (Table 1)						
Delay Time	t_D	$V_{CC}=125\text{V}$, $I_C=2\text{A}$, $I_{B1}=I_{B2}=0.4\text{A}$, $t_p=25\mu\text{s}$, Duty Cycle $\leq 1\%$		0.025	0.1	μs
Rise Time	t_R			0.3	0.7	μs
Storage Time	t_S			1.7	4	μs
Fall Time	t_F			0.4	0.9	μs

Note: 1. Pulse Test: Pulse Width=5ms, Duty Cycle $\leq 10\%$

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

■ CLASSIFICATION OF h_{FE1}

RANK	A	B	C	D	E
RANGE	15 ~ 20	20 ~ 25	25 ~ 30	30 ~ 40	40 ~ 50

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