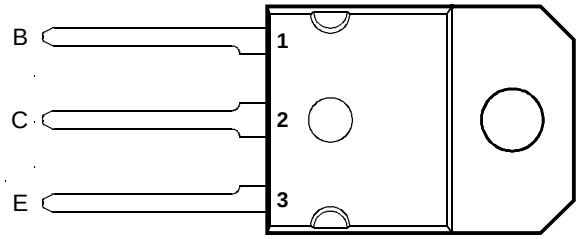
 JUNE 1973 - REVISED MARCH 1997

- **50 W at 25°C Case Temperature**
- **10 A Continuous Collector Current**
- **15 A Peak Collector Current**
- **Maximum $V_{CE(sat)}$ of 2.8 V at I_C = 6.5 A**
- **$I_{CEX(sus)}$ 7 A at rated $V_{(BR)CEO}$**

SOT-93 PACKAGE
(TOP VIEW)



Pin 2 is in electrical contact with the mounting base.

MDTRAA

absolute maximum ratings at 25°C case temperature (unless otherwise noted)

RATING		SYMBOL	VALUE	UNIT
Collector-base voltage (I_E = 0)	TIP160	V_{CBO}	320	V
	TIP161		350	
	TIP162		380	
Collector-emitter voltage (I_B = 0)	TIP160	V_{CEO}	320	V
	TIP161		350	
	TIP162		380	
Emitter-base voltage		V_{EBO}	5	V
Continuous collector current		I_C	10	A
Peak collector current (see Note 1)		I_{CM}	15	A
Peak commutating anti-parallel diode current (I_B = 0) (see Note 2)		I_{EM}	10	A
Continuous base current		I_B	1	A
Continuous device dissipation at (or below) 100°C case temperature (see Note 3)		P_{tot}	50	W
Continuous device dissipation at (or below) 25°C free air temperature (see Note 4)		P_{tot}	3	W
Operating junction temperature range		T_j	-65 to +150	°C
Storage temperature range		T_{stg}	-65 to +150	°C
Lead temperature 3.2 mm from case for 10 seconds		T_L	260	°C

NOTES: 1. This value applies for $t_p \leq 10$ ms, duty cycle $\leq 10\%$.
2. This value applies to the total collector-terminal current when the collector is at negative potential with respect to the emitter.
3. Derate linearly to 150°C case temperature at the rate of 0.4 W/°C.
4. Derate linearly to 150°C free air temperature at the rate of 24 mW/°C.

electrical characteristics at 25°C case temperature

PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT
I_{CEO}	Collector-emitter cut-off current	V_{CE} = 320 V V_{CE} = 350 V V_{CE} = 380 V	I_B = 0 I_B = 0 I_B = 0	TIP160 TIP161 TIP162			1	mA
$I_{CEX(sus)}$	Collector-emitter sustaining current	V_{CLAMP} = $V_{(BR)CEO}$			7			A
I_{EBO}	Emitter cut-off current	V_{EB} = 5 V	I_C = 0				100	mA
h_{FE}	Forward current transfer ratio	V_{CE} = 2.2 V	I_C = 4 A	(see Notes 5 and 6)	200			
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_B = 0.1A I_B = 1 A	I_C = 6.5 A I_C = 10 A	(see Notes 5 and 6)			2.8 2.9	V
$V_{BE(sat)}$	Base-emitter saturation voltage	I_B = 0.1A	I_C = 6.5 A	(see Notes 5 and 6)			2.2	V
V_{EC}	Parallel diode forward voltage	I_E = 10 A	I_B = 0	(see Notes 5 and 6)			3.5	V

NOTES: 5. These parameters must be measured using pulse techniques, t_p = 300 µs, duty cycle ≤ 2%.
6. These parameters must be measured using voltage-sensing contacts, separate from the current carrying contacts.

thermal characteristics

PARAMETER		MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to case thermal resistance			1	°C/W
$R_{\theta JA}$	Junction to free air thermal resistance			41.7	°C/W
$C_{\theta C}$	Thermal capacitance of case		1.4		J/°C

resistive-load-switching characteristics at 25°C case temperature

PARAMETER		TEST CONDITIONS †			MIN	TYP	MAX	UNIT
t_d	Delay time	I_C = 6.5 A $V_{BE(off)}$ = -5 V	$I_{B(on)}$ = 100 mA R_L = 5 Ω	$I_{B(off)}$ = -100 mA		40		ns
t_r	Rise time					1.5		µs
t_s	Storage time					2.2		µs
t_f	Fall time					2.6		µs

† Voltage and current values shown are nominal; exact values vary slightly with transistor parameters.

PARAMETER MEASUREMENT INFORMATION

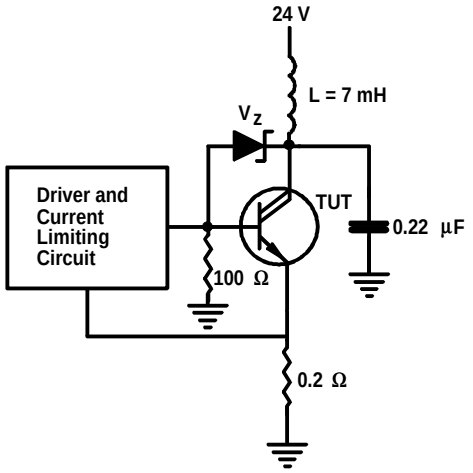


Figure 1. Functional Test Circuit

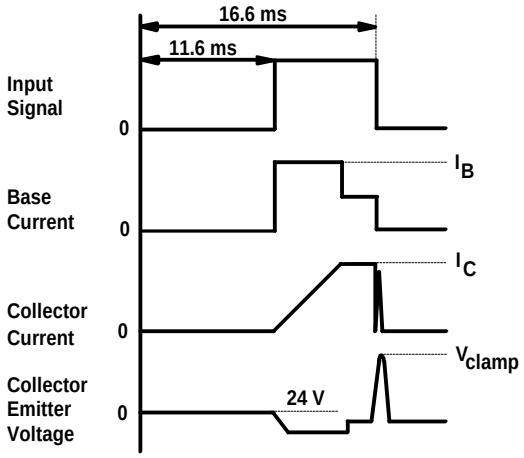


Figure 2. Functional Test Waveforms

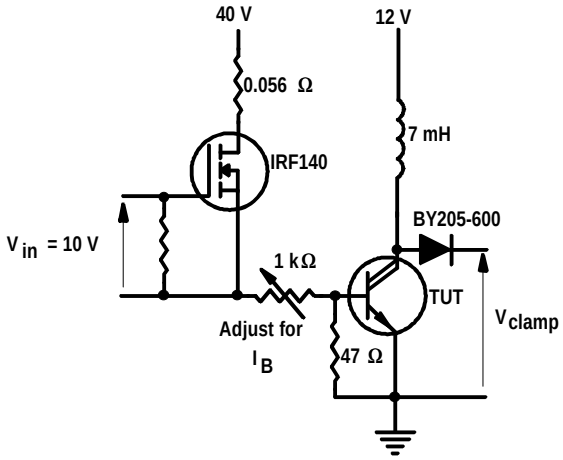


Figure 3. Switching Test Circuit

TYPICAL CHARACTERISTICS

TYPICAL DC CURRENT GAIN vs COLLECTOR CURRENT

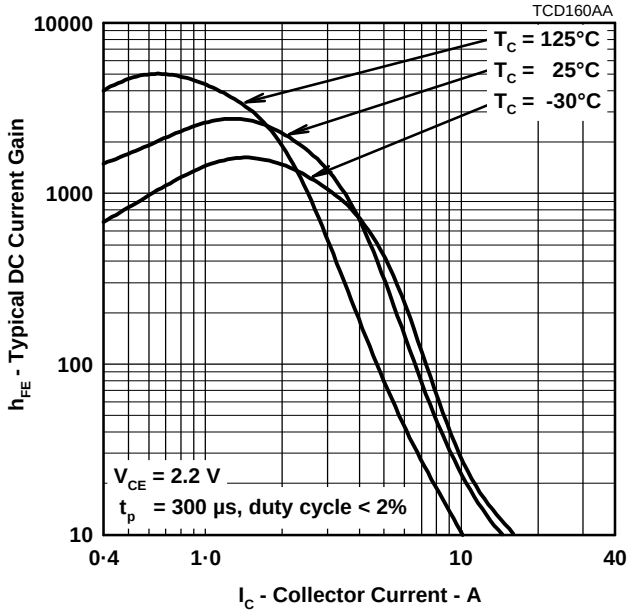


Figure 4.

COLLECTOR-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

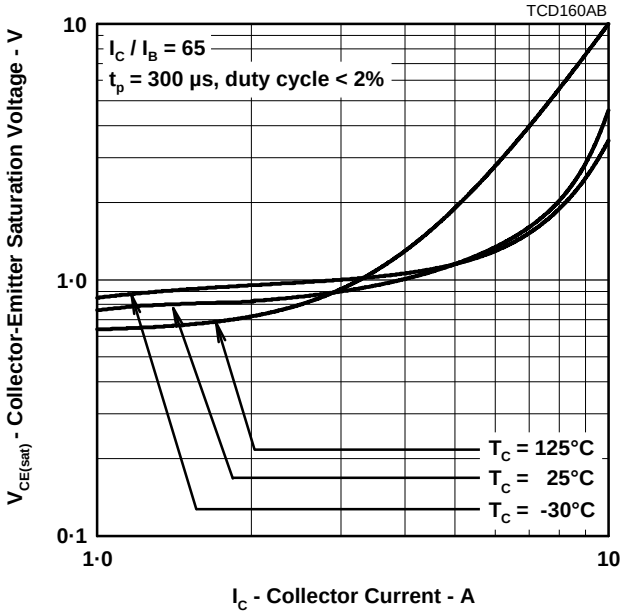


Figure 5.

COLLECTOR-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

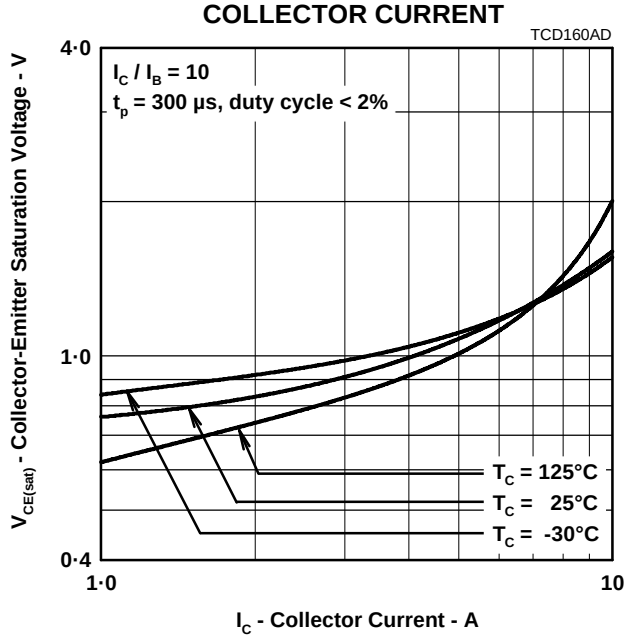


Figure 6.

BASE-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

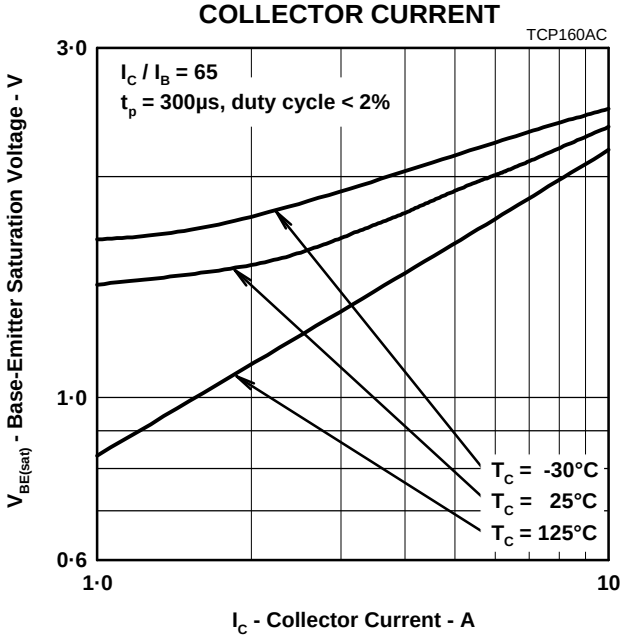


Figure 7.

MAXIMUM SAFE OPERATING REGIONS

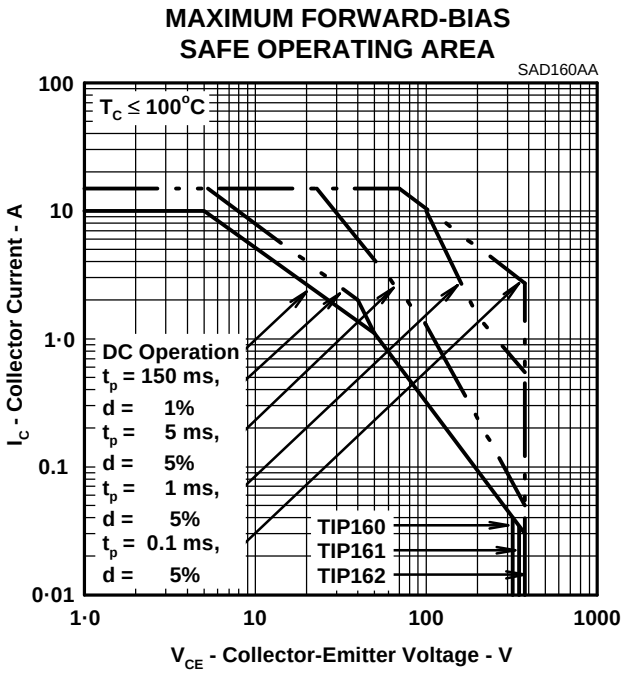
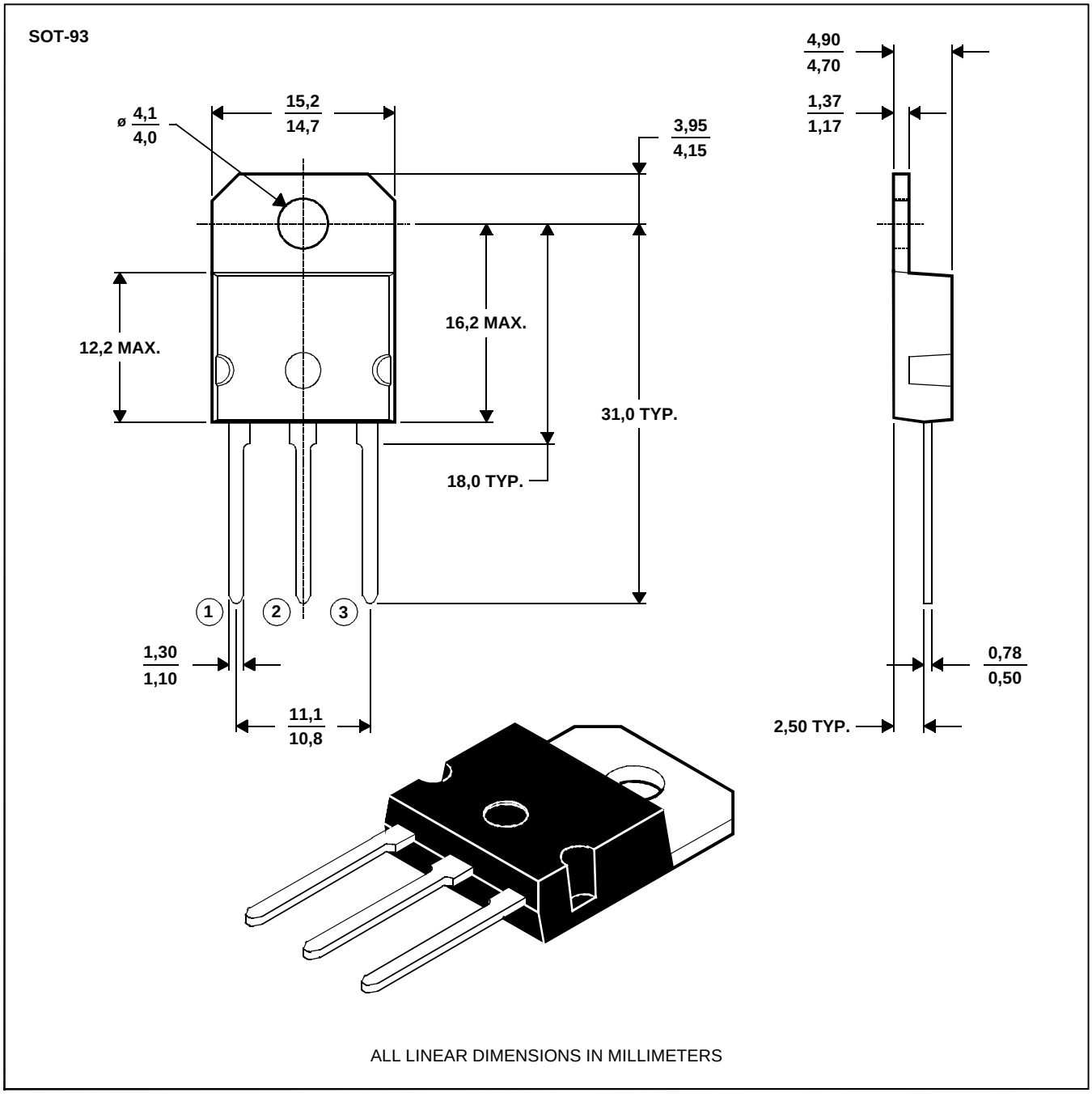


Figure 8.

MECHANICAL DATA

SOT-93
3-pin plastic flange-mount package

This single-in-line package consists of a circuit mounted on a lead frame and encapsulated within a plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics will remain stable when operated in high humidity conditions. Leads require no additional cleaning or processing when used in soldered assembly.



NOTE A: The centre pin is in electrical contact with the mounting tab.

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