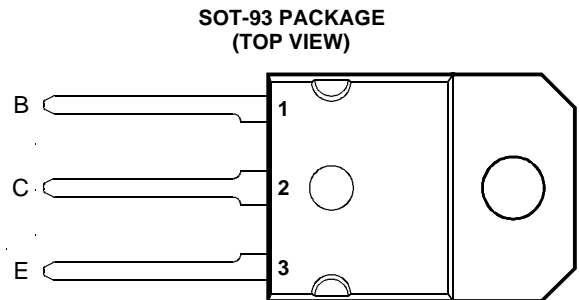


TIP160, TIP161, TIP162 NPN SILICON POWER DARLINGTONS

Copyright © 1997, Power Innovations Limited, UK

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 $V_{(BR)CEO}$



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.

PRODUCT INFORMATION

Information is current as of publication date. Products conform to specifications in accordance with the terms of Power Innovations standard warranty. Production processing does not necessarily include testing of all parameters.

TIP160, TIP161, TIP162

NPN SILICON POWER DARLINGTONS

JUNE 1973 - REVISED MARCH 1997

electrical characteristics at 25°C case temperature

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

NOTES: 5. These parameters must be measured using pulse techniques, $t_p = 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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	$I_C = 6.5\text{ A}$ $I_{B(on)} = 100\text{ mA}$ $I_{B(off)} = -100\text{ mA}$ $V_{BE(off)} = -5\text{ V}$ $R_L = 5\text{ }\Omega$		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

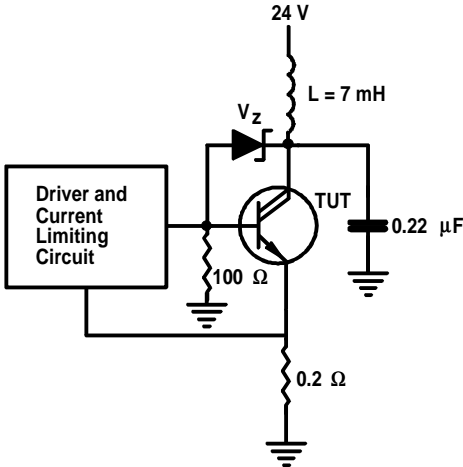


Figure 1. Functional Test Circuit

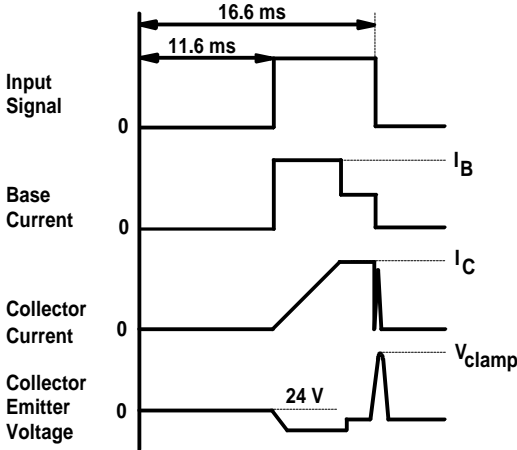


Figure 2. Functional Test Waveforms

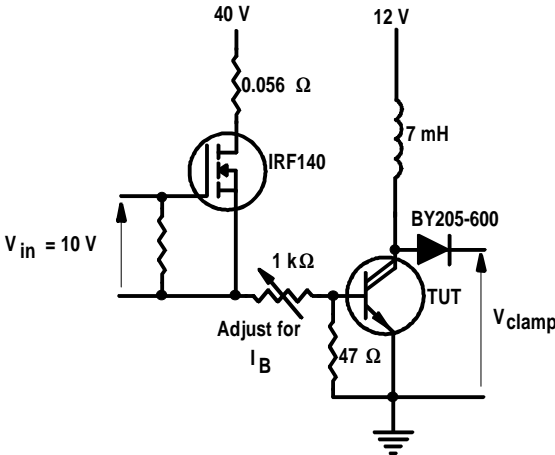


Figure 3. Switching Test Circuit

TIP160, TIP161, TIP162 NPN SILICON POWER DARLINGTONS

JUNE 1973 - REVISED MARCH 1997

TYPICAL CHARACTERISTICS

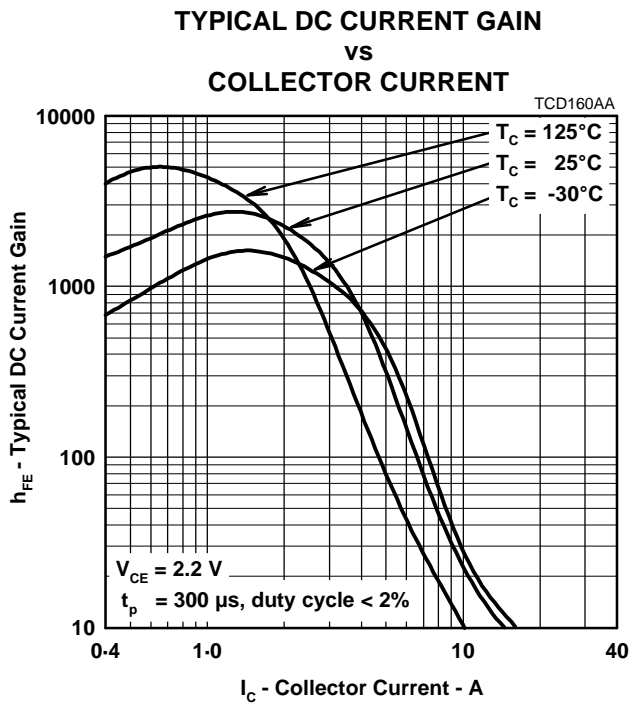


Figure 4.

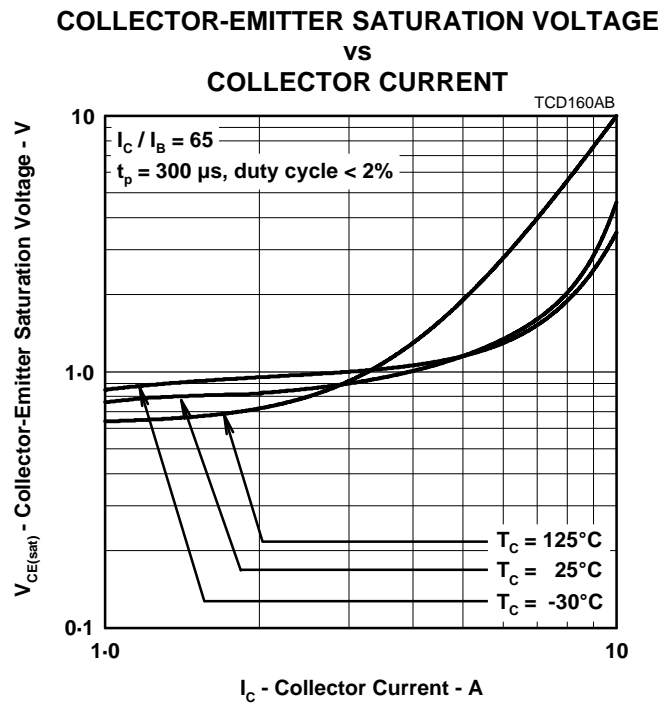


Figure 5.

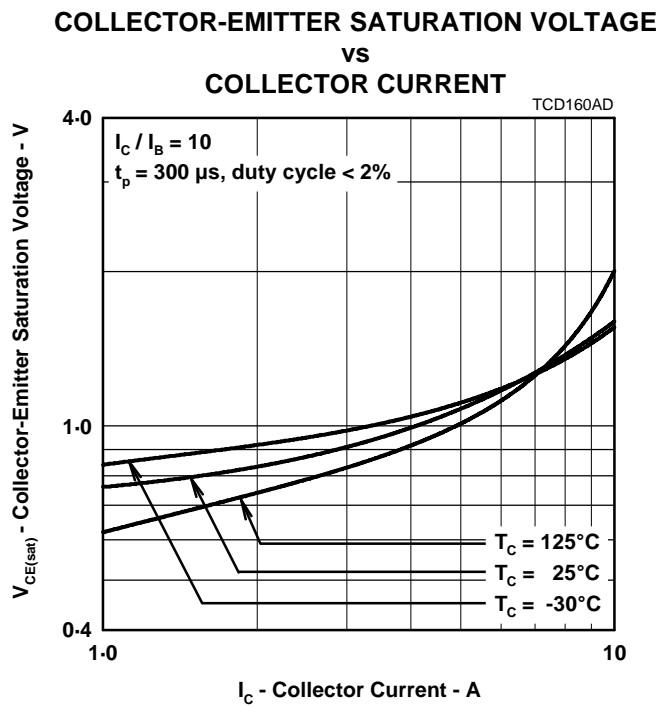


Figure 6.

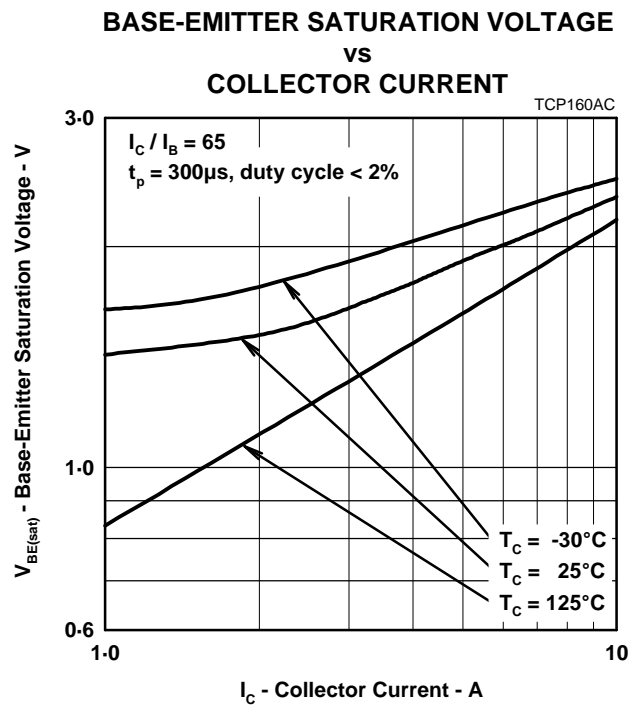


Figure 7.

MAXIMUM SAFE OPERATING REGIONS

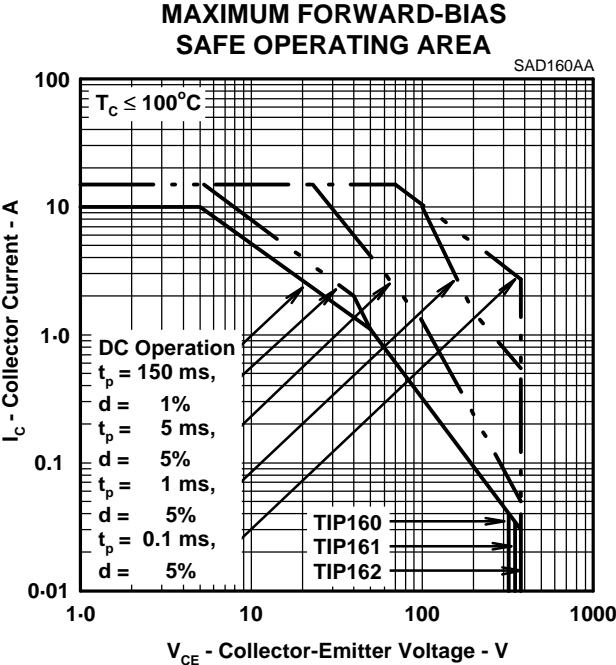


Figure 8.

TIP160, TIP161, TIP162 NPN SILICON POWER DARLINGTONS

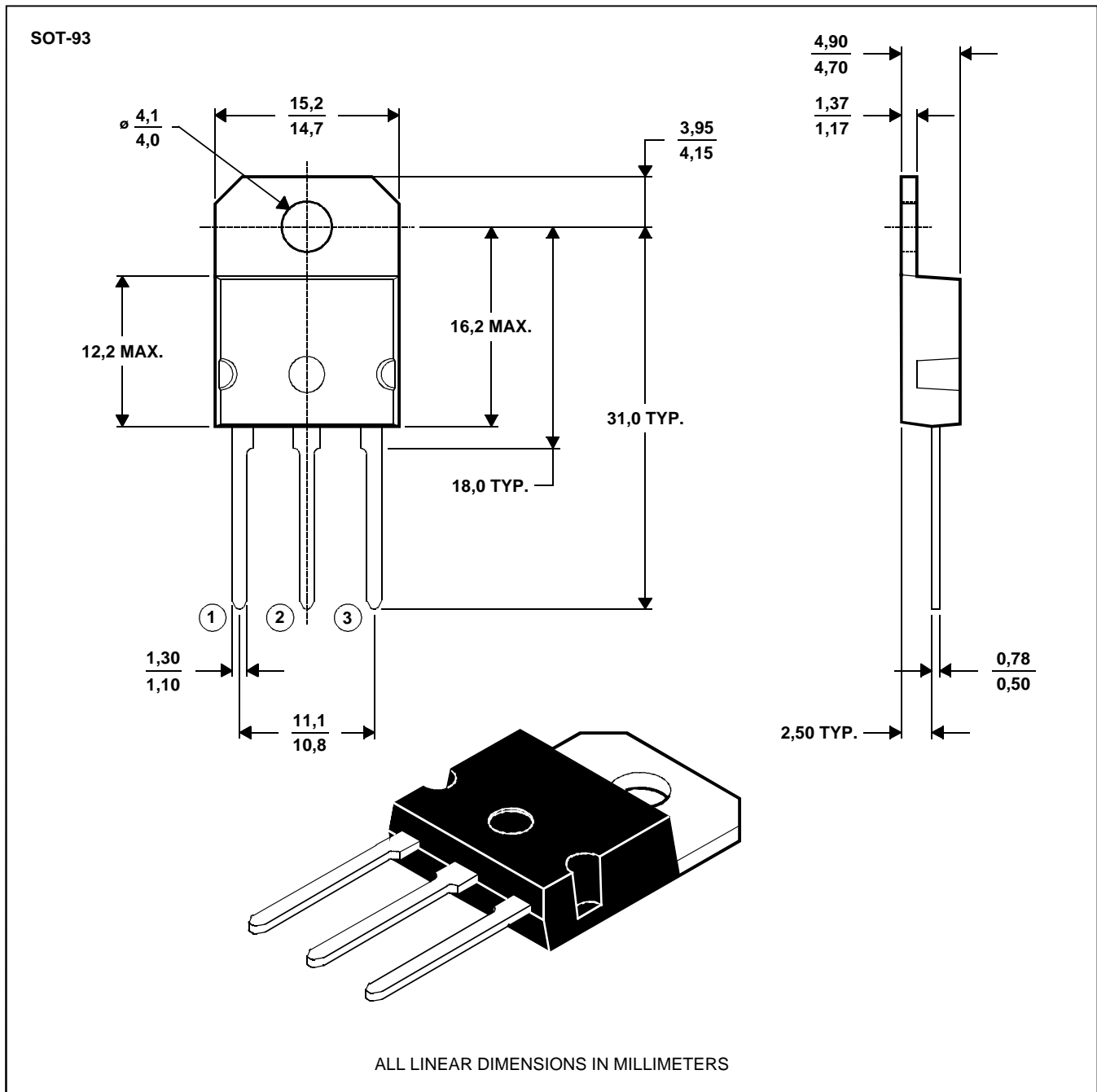
JUNE 1973 - REVISED MARCH 1997

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.

MDXXAW

PRODUCT INFORMATION

IMPORTANT NOTICE

Power Innovations Limited (PI) reserves the right to make changes to its products or to discontinue any semiconductor product or service without notice, and advises its customers to verify, before placing orders, that the information being relied on is current.

PI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with PI's standard warranty. Testing and other quality control techniques are utilized to the extent PI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except as mandated by government requirements.

PI accepts no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein. Nor is any license, either express or implied, granted under any patent right, copyright, design right, or other intellectual property right of PI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used.

PI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, INTENDED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS.

Copyright © 1997, Power Innovations Limited