

TIPL761B, TIPL761C NPN SILICON POWER TRANSISTORS

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MAY 1989 - REVISED MARCH 1997

- Rugged Triple-Diffused Planar Construction
- 4 A Continuous Collector Current
- Operating Characteristics Fully Guaranteed at 100°C
- 1200 Volt Blocking Capability
- 100 W at 25°C Case Temperature



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 ($I_E = 0$)	TIPL761B	V_{CBO}	1100	V
	TIPL761C		1200	
Collector-emitter voltage ($V_{BE} = 0$)	TIPL761B	V_{CES}	1100	V
	TIPL761C		1200	
Collector-emitter voltage ($I_B = 0$)	TIPL761B	V_{CEO}	500	V
	TIPL761C		550	
Emitter-base voltage		V_{EBO}	10	V
Continuous collector current		I_C	4	A
Peak collector current (see Note 1)		I_{CM}	8	A
Continuous device dissipation at (or below) 25°C case temperature		P_{tot}	100	W
Operating junction temperature range		T_j	-65 to +150	°C
Storage temperature range		T_{stg}	-65 to +150	°C

NOTE 1: This value applies for $t_p \leq 10$ ms, duty cycle $\leq 2\%$.

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.

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NPN SILICON POWER TRANSISTORS

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electrical characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS			MIN	TYP	MAX	UNIT
$V_{CEO(sus)}$ Collector-emitter sustaining voltage	$I_C = 10\text{ mA}$	$L = 25\text{ mH}$	(see Note 2)	500 550			V
I_{CES} Collector-emitter cut-off current	$V_{CE} = 1100\text{ V}$	$V_{BE} = 0$				50	μA
	$V_{CE} = 1200\text{ V}$	$V_{BE} = 0$				50	
	$V_{CE} = 1100\text{ V}$	$V_{BE} = 0$	$T_C = 100^\circ\text{C}$			200	
	$V_{CE} = 1200\text{ V}$	$V_{BE} = 0$	$T_C = 100^\circ\text{C}$			200	
I_{CEO} Collector cut-off current	$V_{CE} = 500\text{ V}$	$I_B = 0$				50	μA
	$V_{CE} = 550\text{ V}$	$I_B = 0$				50	
I_{EBO} Emitter cut-off current	$V_{EB} = 10\text{ V}$	$I_C = 0$				1	mA
h_{FE} Forward current transfer ratio	$V_{CE} = 5\text{ V}$	$I_C = 0.5\text{ A}$	(see Notes 3 and 4)	20		60	
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_B = 0.4\text{ A}$	$I_C = 2\text{ A}$				1.0	V
	$I_B = 0.6\text{ A}$	$I_C = 3\text{ A}$	(see Notes 3 and 4)			2.5	
	$I_B = 0.6\text{ A}$	$I_C = 3\text{ A}$	$T_C = 100^\circ\text{C}$			5.0	
$V_{BE(sat)}$ Base-emitter saturation voltage	$I_B = 0.4\text{ A}$	$I_C = 2\text{ A}$				1.2	V
	$I_B = 0.6\text{ A}$	$I_C = 3\text{ A}$	(see Notes 3 and 4)			1.4	
	$I_B = 0.6\text{ A}$	$I_C = 3\text{ A}$	$T_C = 100^\circ\text{C}$			1.3	
f_t Current gain bandwidth product	$V_{CE} = 10\text{ V}$	$I_C = 0.5\text{ A}$	$f = 1\text{ MHz}$		12		MHz
C_{ob} Output capacitance	$V_{CB} = 20\text{ V}$	$I_E = 0$	$f = 0.1\text{ MHz}$		110		pF

NOTES: 2. Inductive loop switching measurement.

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

4. 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			1.25	$^\circ\text{C}/\text{W}$

inductive-load-switching characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS †			MIN	TYP	MAX	UNIT
t_{sv} Voltage storage time	$I_C = 3\text{ A}$ $V_{BE(off)} = -5\text{ V}$	$I_{B(on)} = 0.6\text{ A}$	(see Figures 1 and 2)			2.5	μs
t_{rv} Voltage rise time						300	ns
t_{fi} Current fall time						250	ns
t_{ti} Current tail time						150	ns
t_{xo} Cross over time						400	ns
t_{sv} Voltage storage time	$I_C = 3\text{ A}$ $V_{BE(off)} = -5\text{ V}$	$I_{B(on)} = 0.6\text{ A}$	(see Figures 1 and 2)			3	μs
t_{rv} Voltage rise time						500	ns
t_{fi} Current fall time						250	ns
t_{ti} Current tail time						150	ns
t_{xo} Cross over time						750	ns

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

PARAMETER MEASUREMENT INFORMATION

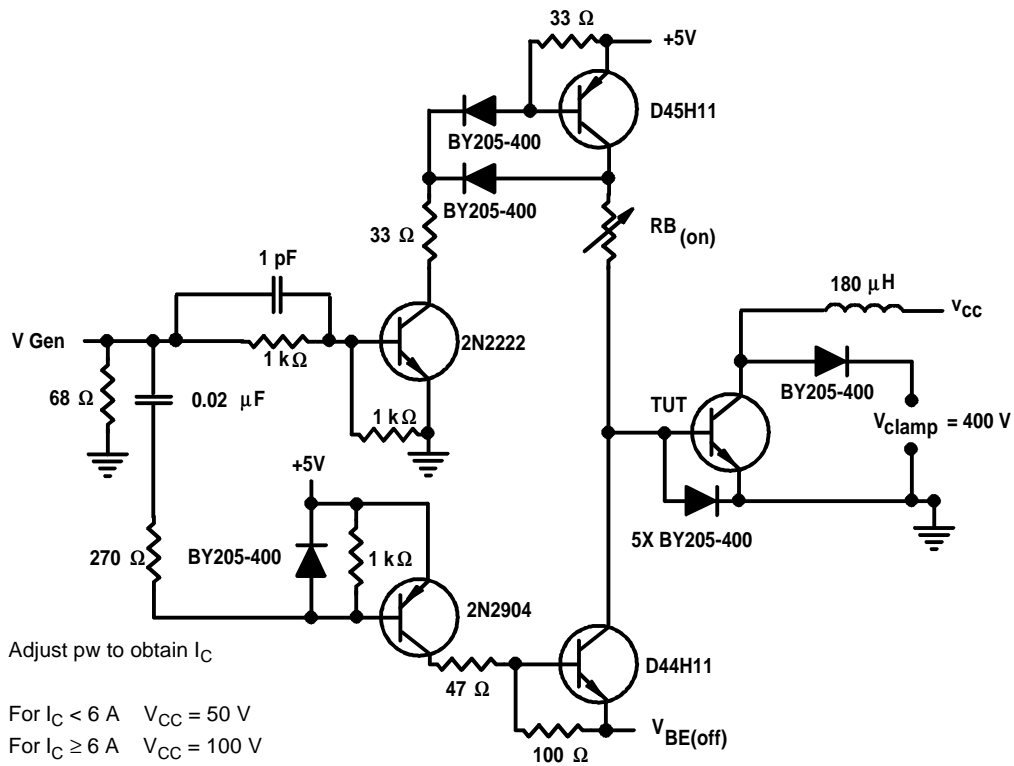
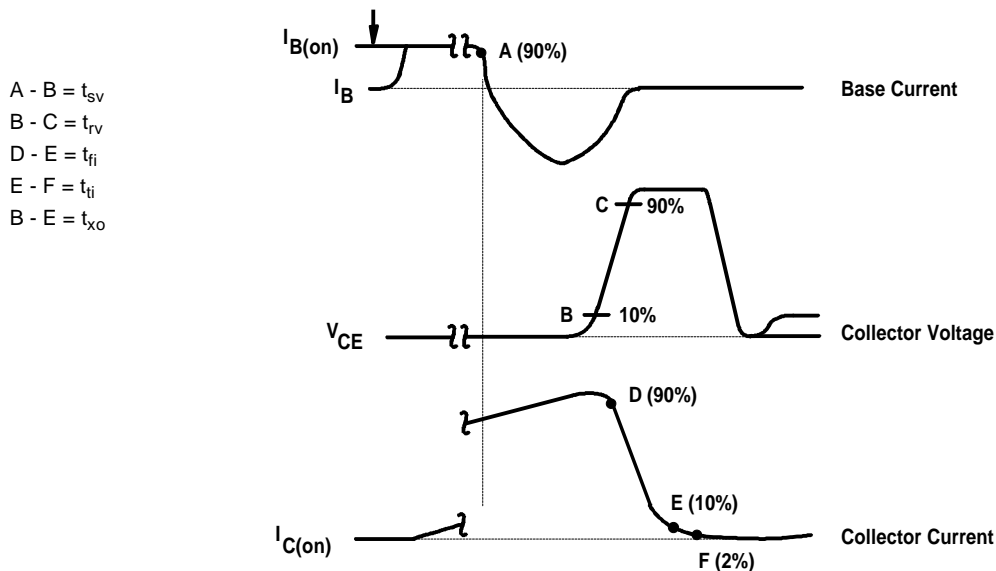


Figure 1. Inductive-Load Switching Test Circuit



NOTES: A. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r < 15$ ns, $R_{in} > 10 \Omega$, $C_{in} < 11.5$ pF.
B. Resistors must be noninductive types.

Figure 2. Inductive-Load Switching Waveforms

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TYPICAL CHARACTERISTICS

**TYPICAL DC CURRENT GAIN
VS
COLLECTOR CURRENT**

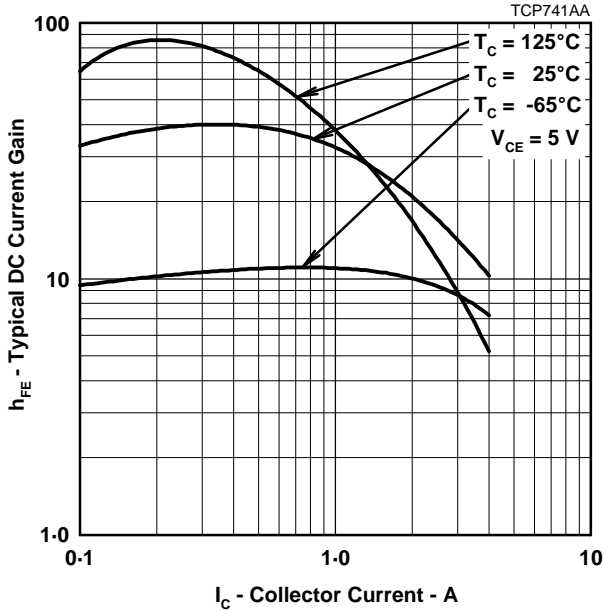


Figure 3.

**COLLECTOR-EMITTER SATURATION VOLTAGE
VS
BASE CURRENT**

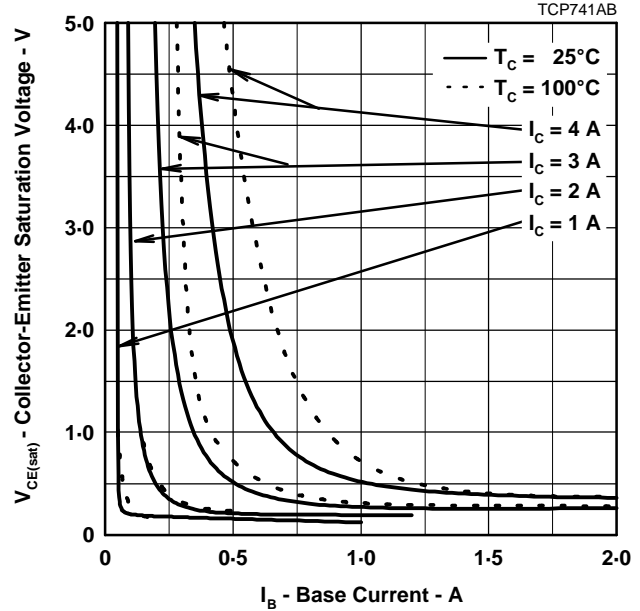


Figure 4.

**BASE-EMITTER SATURATION VOLTAGE
VS
BASE CURRENT**

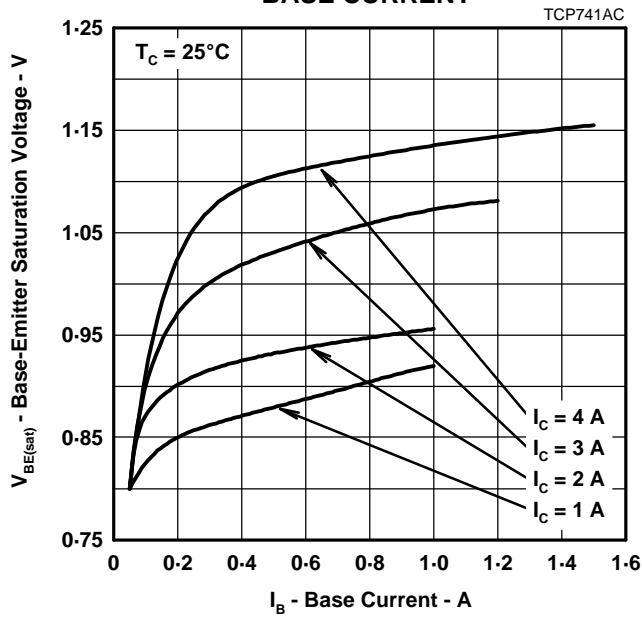


Figure 5.

**COLLECTOR CUT-OFF CURRENT
VS
CASE TEMPERATURE**

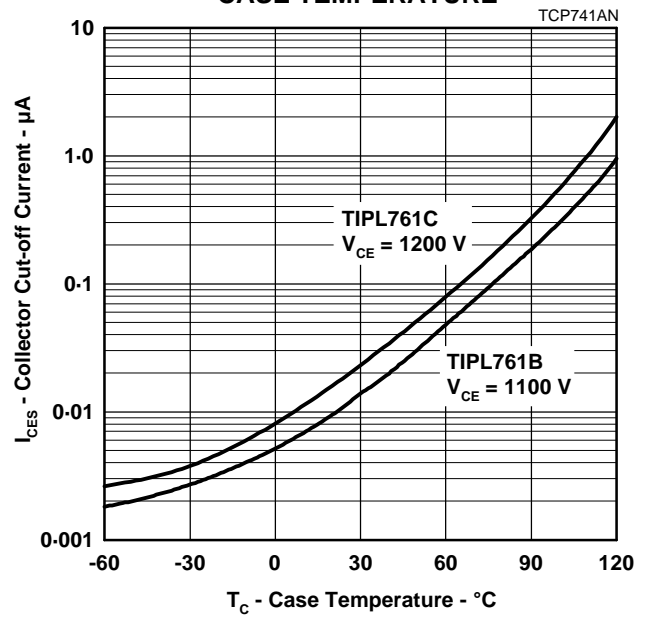


Figure 6.

MAXIMUM SAFE OPERATING REGIONS

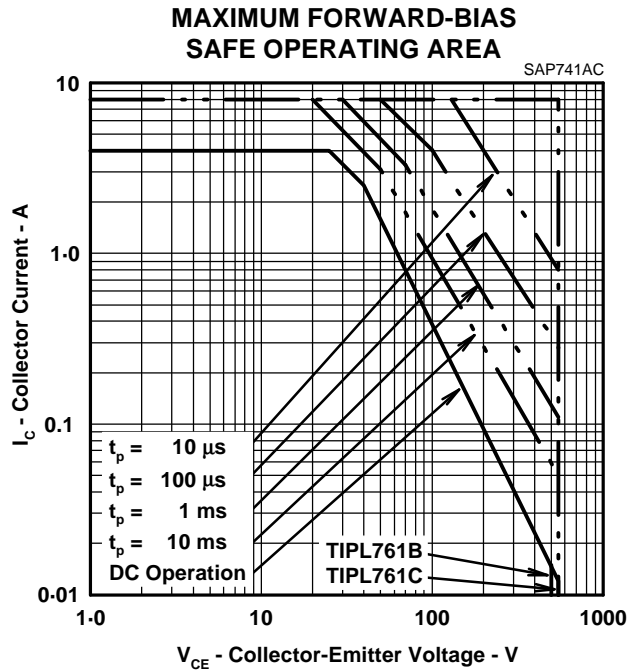


Figure 7.

THERMAL INFORMATION

THERMAL RESPONSE JUNCTION TO CASE
VS
POWER PULSE DURATION

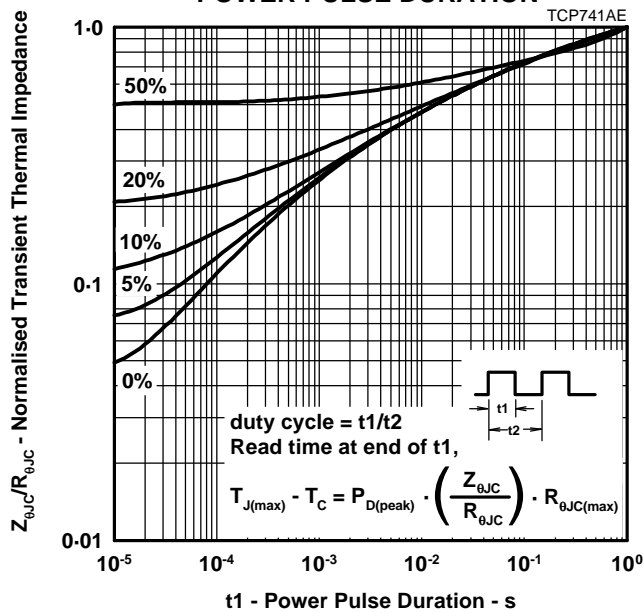


Figure 8.

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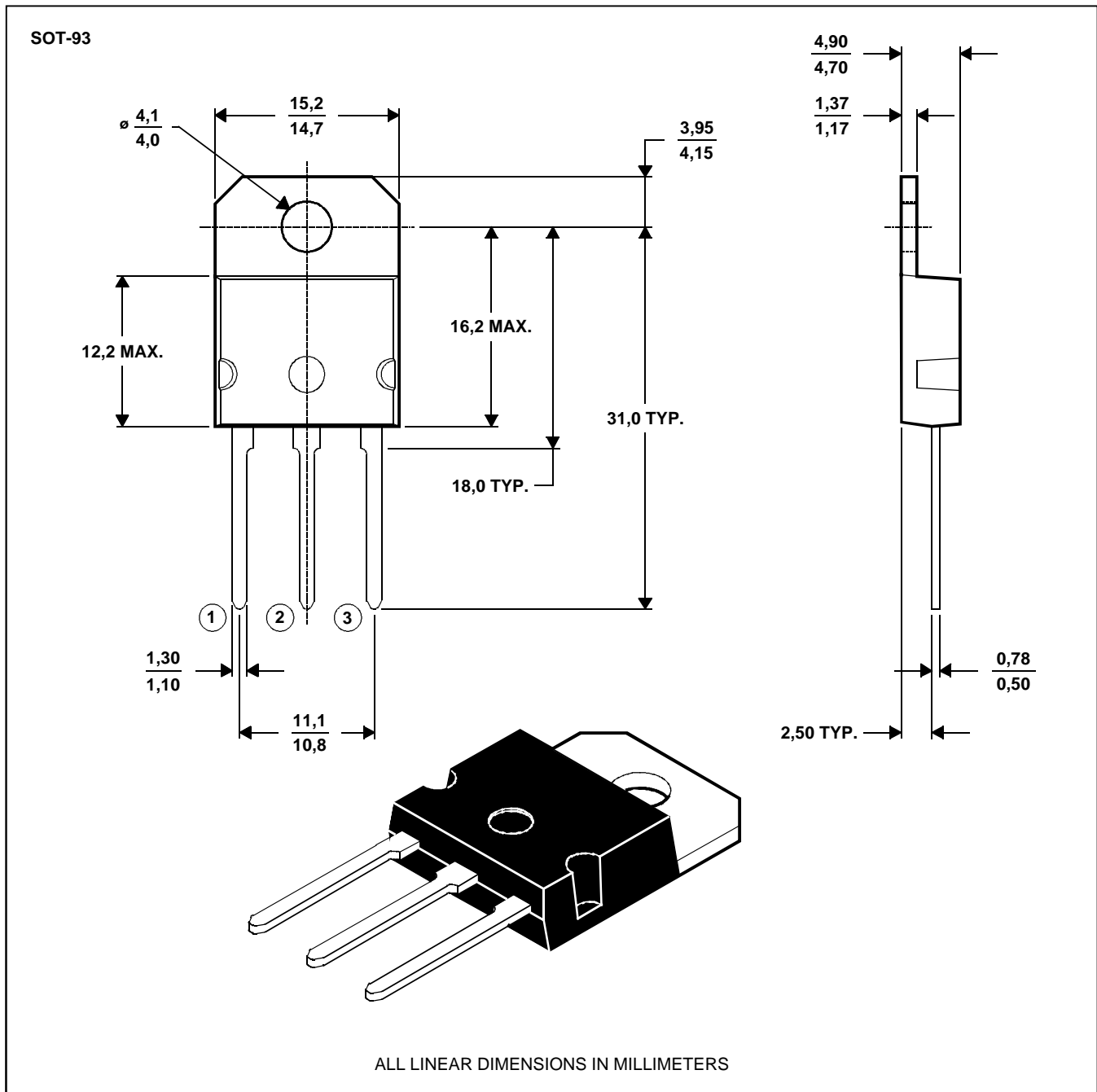
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MECHANICAL DATA

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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