

BUV48, BUV48A NPN SILICON POWER TRANSISTORS

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AUGUST 1978 - REVISED MARCH 1997

- Rugged Triple-Diffused Planar Construction
- 15 A Continuous Collector Current
- 1000 Volt Blocking Capability



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-emitter voltage ($V_{BE} = 0$ V)	BUV48	V_{CES}	850	V
	BUV48A		1000	
Collector-emitter voltage ($R_{BE} = 10 \Omega$)	BUV48	V_{CER}	850	V
	BUV48A		1000	
Collector-emitter voltage ($I_B = 0$)	BUV48	V_{CEO}	400	V
	BUV48A		450	
Continuous collector current		I_C	15	A
Peak collector current (see Note 1)		I_{CM}	30	A
Continuous base current		I_B	4	A
Peak base current		I_{BM}	20	A
Non repetitive accidental peak surge current		I_{CSM}	55	A
Continuous device dissipation at (or below) 25°C case temperature		P_{tot}	125	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 $t_p \leq 2$ 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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electrical characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS			MIN	TYP	MAX	UNIT
$V_{CEO(sus)}$ Collector-emitter sustaining voltage	$I_C = 200 \text{ mA}$	$L = 25 \text{ mH}$	(see Note 2)	400 450			V
I_{CES} Collector-emitter cut-off current	$V_{CE} = 850 \text{ V}$	$V_{BE} = 0$				0.2	mA
	$V_{CE} = 1000 \text{ V}$	$V_{BE} = 0$				0.2	
	$V_{CE} = 850 \text{ V}$	$V_{BE} = 0$	$T_C = 125^\circ\text{C}$			2.0	
	$V_{CE} = 1000 \text{ V}$	$V_{BE} = 0$	$T_C = 125^\circ\text{C}$			2.0	
I_{CER} Collector-emitter cut-off current	$V_{CE} = 850 \text{ V}$	$R_{BE} = 10 \Omega$				0.5	mA
	$V_{CE} = 1000 \text{ V}$	$R_{BE} = 10 \Omega$				0.5	
	$V_{CE} = 850 \text{ V}$	$R_{BE} = 10 \Omega$	$T_C = 125^\circ\text{C}$			4.0	
	$V_{CE} = 1000 \text{ V}$	$R_{BE} = 10 \Omega$	$T_C = 125^\circ\text{C}$			4.0	
I_{EBO} Emitter cut-off current	$V_{EB} = 5 \text{ V}$	$I_C = 0$				1	mA
V_{EBO} Emitter-base breakdown voltage	$I_E = 50 \text{ mA}$	$I_C = 0$		7		30	V
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_B = 2 \text{ A}$	$I_C = 10 \text{ A}$				1.5	V
	$I_B = 3 \text{ A}$	$I_C = 15 \text{ A}$	(see Notes 3 and 4)			5.0	
	$I_B = 1.6 \text{ A}$	$I_C = 8 \text{ A}$				1.5	
	$I_B = 2.4 \text{ A}$	$I_C = 12 \text{ A}$				5.0	
$V_{BE(sat)}$ Base-emitter saturation voltage	$I_B = 2 \text{ A}$	$I_C = 10 \text{ A}$	(see Notes 3 and 4)			1.6	V
	$I_B = 1.6 \text{ A}$	$I_C = 8 \text{ A}$				1.6	
f_t Current gain bandwidth product	$V_{CE} = 10 \text{ V}$	$I_C = 0.5 \text{ A}$	$f = 1 \text{ MHz}$		10		MHz
C_{ob} Output capacitance	$V_{CB} = 20 \text{ V}$	$I_C = 0$	$f = 1 \text{ MHz}$		150		pF

NOTES: 2. Inductive loop switching measurement.

3. These parameters must be measured using pulse techniques, $t_p = 300 \mu\text{s}$, 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	$^\circ\text{C/W}$

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

PARAMETER	TEST CONDITIONS †			MIN	TYP	MAX	UNIT
t_{on} Turn on time	$I_C = 10 \text{ A}$	$V_{CC} = 150 \text{ V}$	BUV48 (see Figures 1 and 2)			1.0	μs
t_s Storage time						3.0	μs
t_f Fall time				$I_{B(on)} = 2 \text{ A}$	$I_{B(off)} = -2 \text{ A}$		0.8
t_{on} Turn on time	$I_C = 8 \text{ A}$	$V_{CC} = 150 \text{ V}$	BUV48A (see Figures 1 and 2)			1.0	μs
t_s Storage time						3.0	μs
t_f Fall time				$I_{B(on)} = 1.6 \text{ A}$	$I_{B(off)} = -1.6 \text{ A}$		0.8

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

inductive-load-switching characteristics at 100°C case temperature

PARAMETER	TEST CONDITIONS †			MIN	TYP	MAX	UNIT
t_{sv} Voltage storage time	$I_C = 10 \text{ A}$	$I_{B(on)} = 2 \text{ A}$	BUV48 (see Figures 3 and 4)			4.0	μs
t_{fi} Current fall time				$V_{BE(off)} = -5 \text{ V}$		0.4	μs
t_{sv} Voltage storage time	$I_C = 8 \text{ A}$	$I_{B(on)} = 1.6 \text{ A}$	BUV48A (see Figures 3 and 4)			4.0	μs
t_{fi} Current fall time				$V_{BE(off)} = -5 \text{ V}$		0.4	μs

PRODUCT INFORMATION

PARAMETER MEASUREMENT INFORMATION

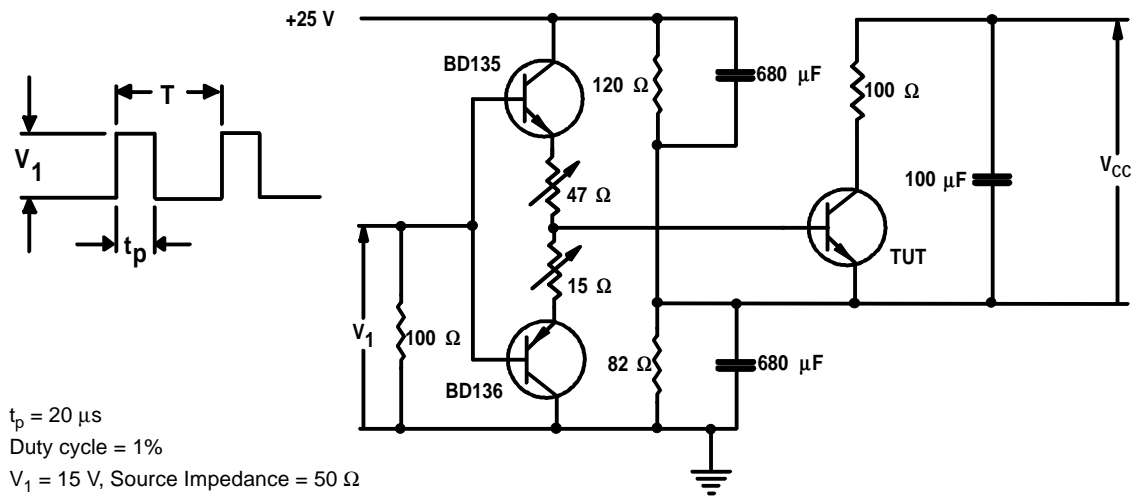


Figure 1. Resistive-Load Switching Test Circuit

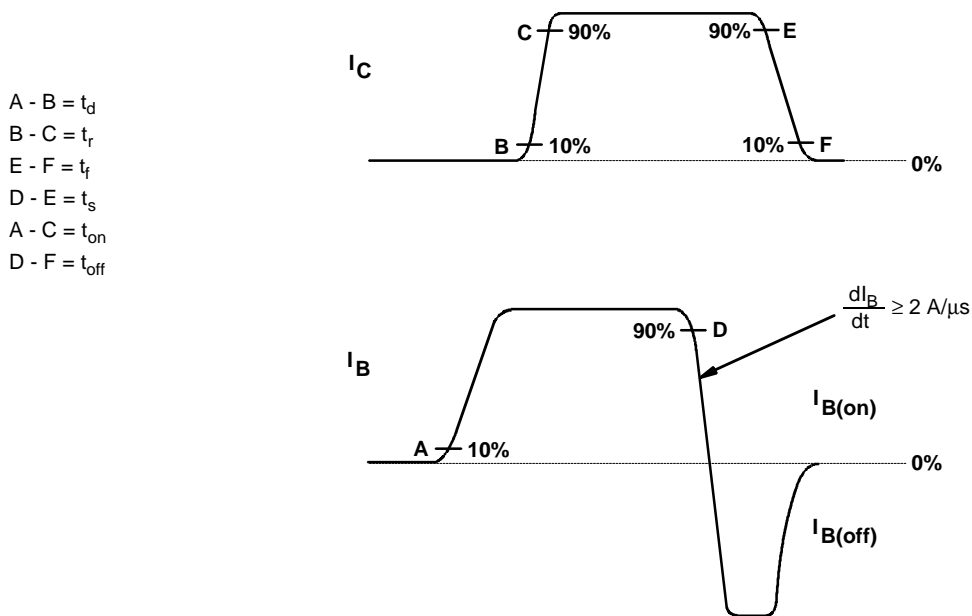


Figure 2. Resistive-Load Switching Waveforms

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PARAMETER MEASUREMENT INFORMATION

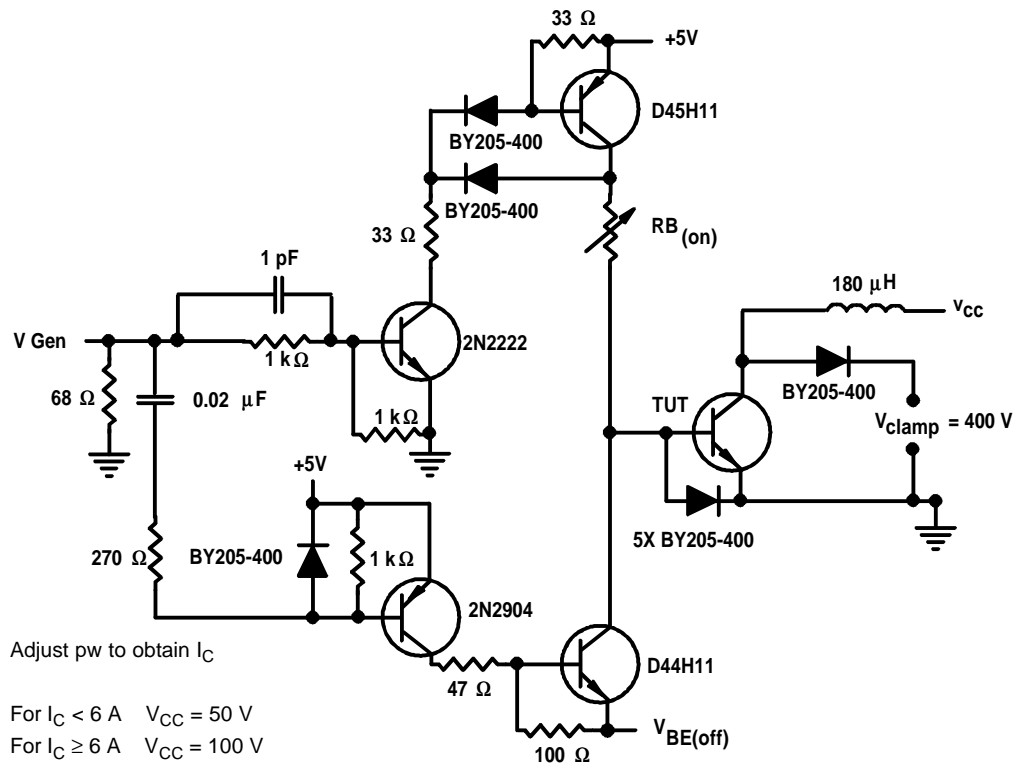
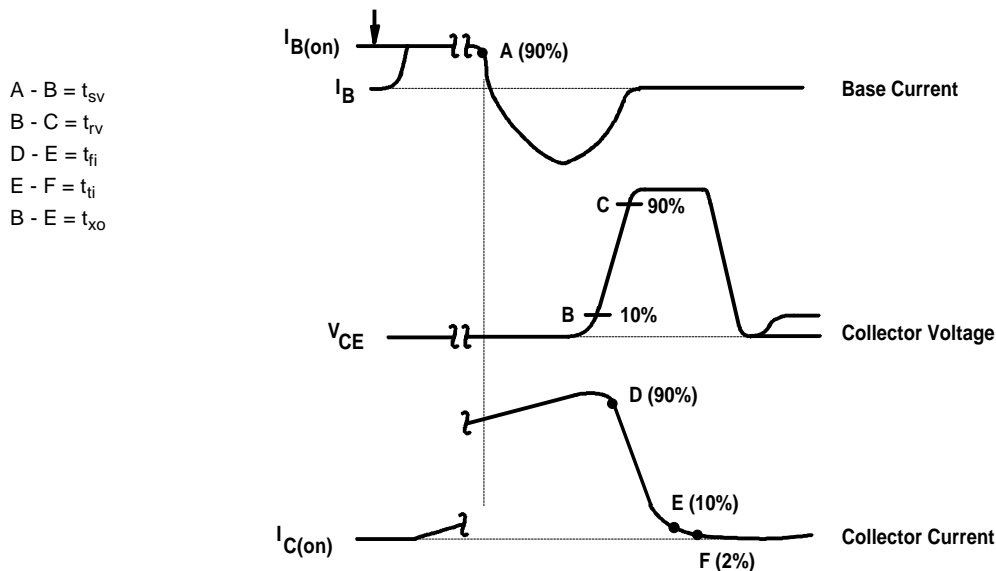


Figure 3. Inductive-Load Switching Test Circuit



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

Figure 4. Inductive-Load Switching Waveforms

TYPICAL CHARACTERISTICS

TYPICAL DC CURRENT GAIN
VS
COLLECTOR CURRENT

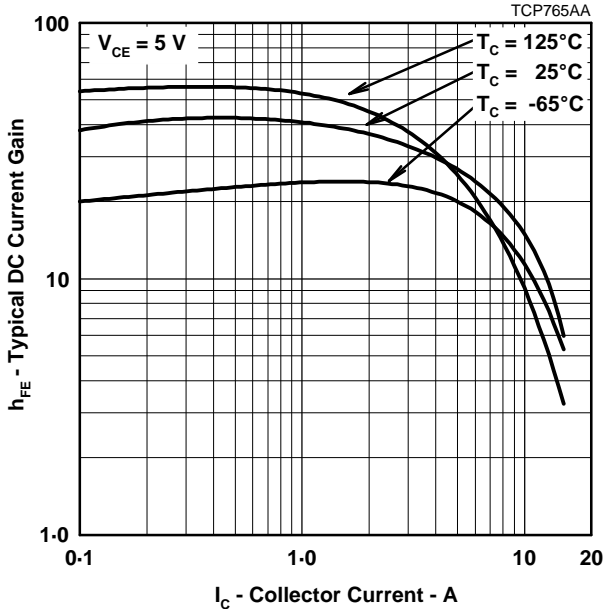


Figure 5.

COLLECTOR-EMITTER SATURATION VOLTAGE
VS
BASE CURRENT

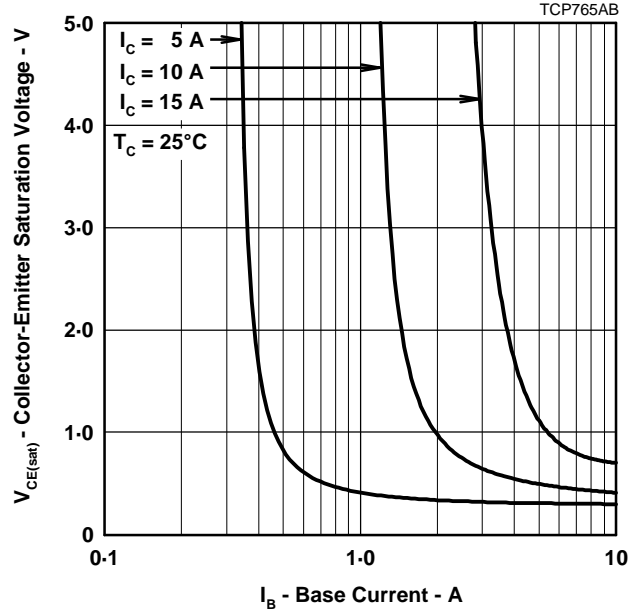


Figure 6.

COLLECTOR-EMITTER SATURATION VOLTAGE
VS
BASE CURRENT

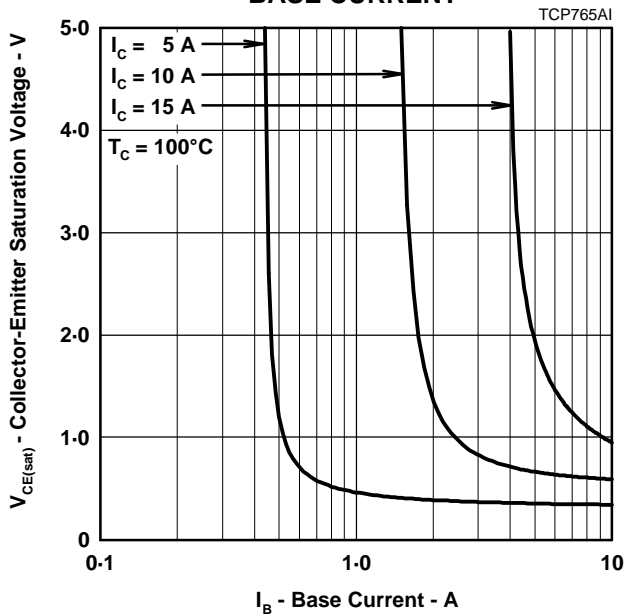


Figure 7.

BASE-EMITTER SATURATION VOLTAGE
VS
BASE CURRENT

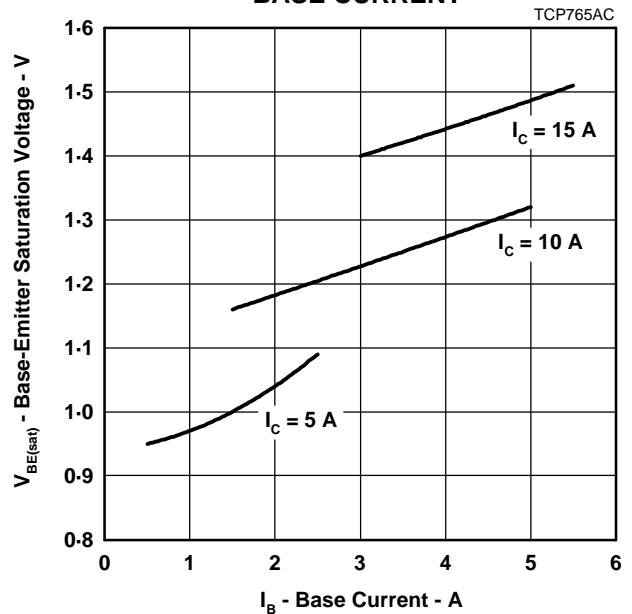


Figure 8.

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TYPICAL CHARACTERISTICS

COLLECTOR CUT-OFF CURRENT VS CASE TEMPERATURE

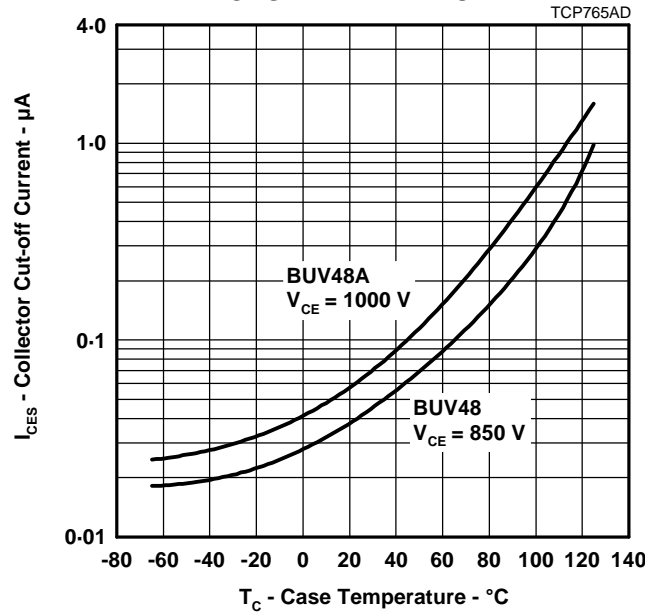


Figure 9.

MAXIMUM SAFE OPERATING REGIONS

MAXIMUM FORWARD-BIAS SAFE OPERATING AREA

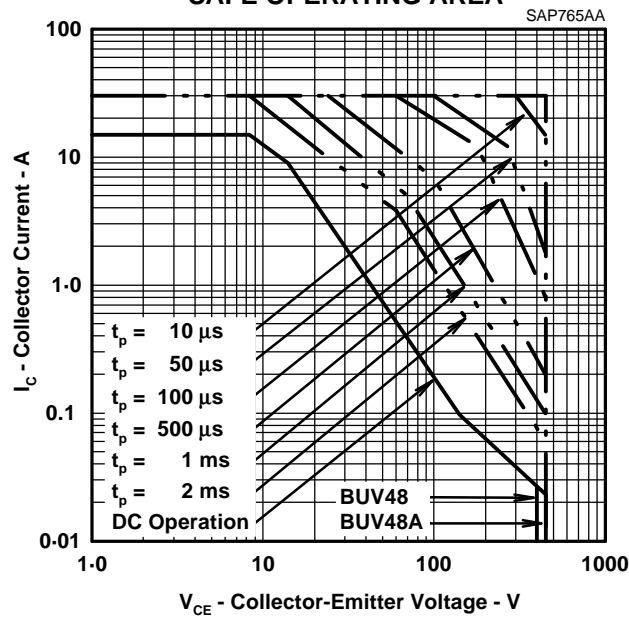


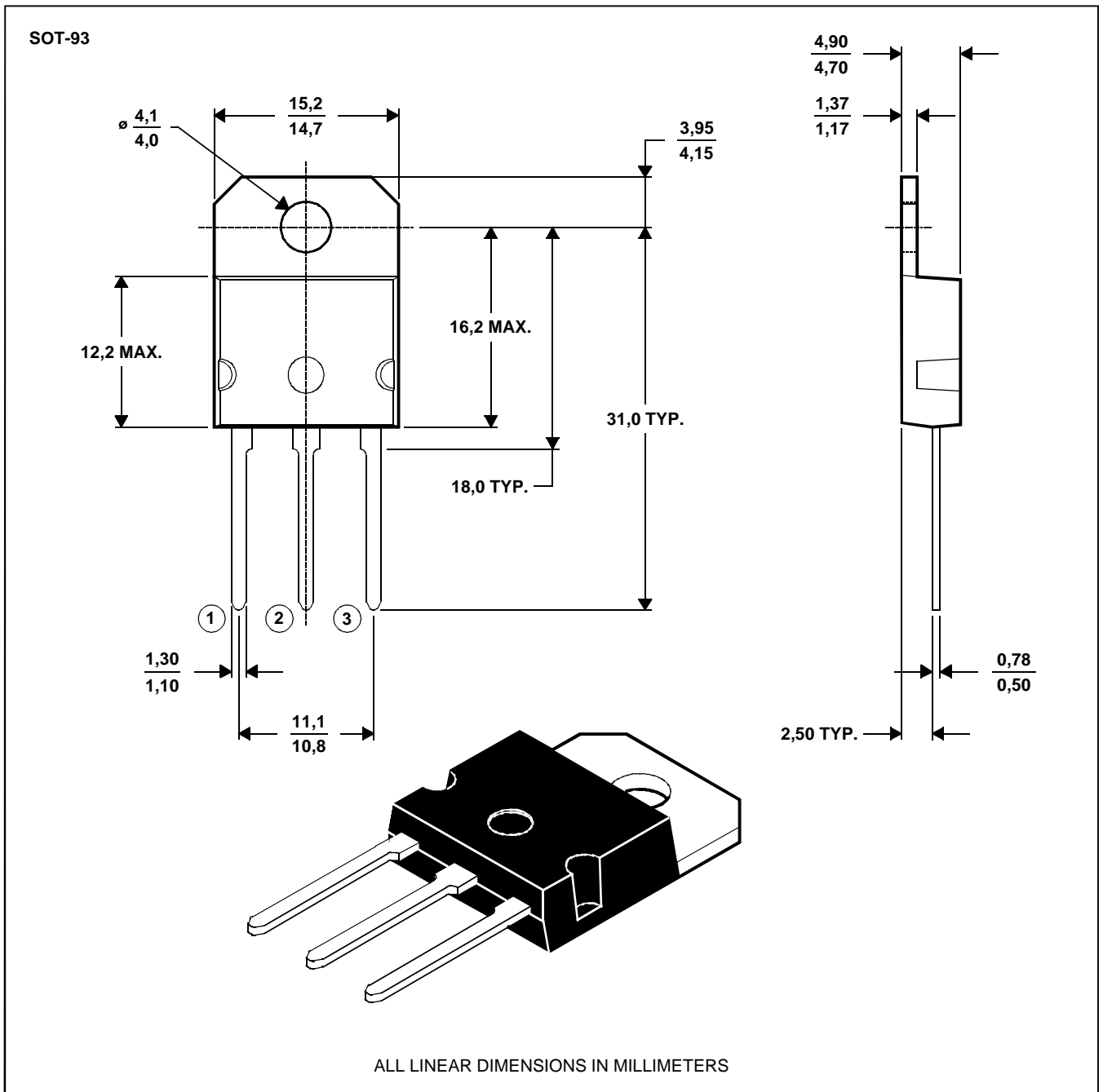
Figure 10.

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

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