

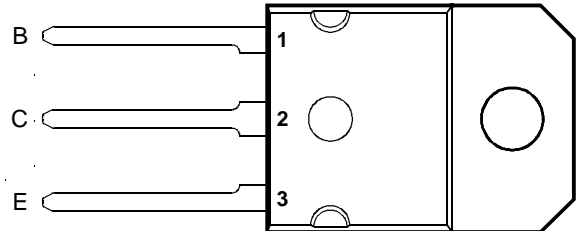
# BD745, BD745A, BD745B, BD745C NPN SILICON POWER TRANSISTORS

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AUGUST 1978 - REVISED MARCH 1997

- Designed for Complementary Use with the BD746 Series
- 115 W at 25°C Case Temperature
- 20 A Continuous Collector Current
- 25 A Peak Collector Current
- Customer-Specified Selections Available

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 ( $I_E = 0$ )	BD745	$V_{CBO}$	50	V
	BD745A		70	
	BD745B		90	
	BD745C		110	
Collector-emitter voltage ( $I_B = 0$ )	BD745	$V_{CEO}$	45	V
	BD745A		60	
	BD745B		80	
	BD745C		100	
Emitter-base voltage		$V_{EBO}$	5	V
Continuous collector current		$I_C$	20	A
Peak collector current (see Note 1)		$I_{CM}$	25	A
Continuous base current		$I_B$	7	A
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)		$P_{tot}$	115	W
Continuous device dissipation at (or below) 25°C free air temperature (see Note 3)		$P_{tot}$	3.5	W
Unclamped inductive load energy (see Note 4)		$\frac{1}{2}LI_C^2$	90	mJ
Operating free air temperature range		$T_A$	-65 to +150	°C
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  $t_p \leq 0.3$  ms, duty cycle  $\leq 10\%$ .  
 2. Derate linearly to 150°C case temperature at the rate of 0.92 W/°C.  
 3. Derate linearly to 150°C free air temperature at the rate of 28 mW/°C.  
 4. This rating is based on the capability of the transistor to operate safely in a circuit of:  $L = 20$  mH,  $I_{B(on)} = 0.4$  A,  $R_{BE} = 100 \Omega$ ,  $V_{BE(off)} = 0$ ,  $R_S = 0.1 \Omega$ ,  $V_{CC} = 20$  V.

## 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.

# BD745, BD745A, BD745B, BD745C

## 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
$V_{(BR)CEO}$ Collector-emitter breakdown voltage	$I_C = 30 \text{ mA}$	$I_B = 0$	(see Note 5)	45 60 80 100			V
$I_{CBO}$ Collector cut-off current	$V_{CE} = 50 \text{ V}$	$V_{BE} = 0$				0.1	mA
	$V_{CE} = 70 \text{ V}$	$V_{BE} = 0$				0.1	
	$V_{CE} = 90 \text{ V}$	$V_{BE} = 0$				0.1	
	$V_{CE} = 110 \text{ V}$	$V_{BE} = 0$				0.1	
	$V_{CE} = 50 \text{ V}$	$V_{BE} = 0$	$T_C = 125^\circ\text{C}$			5	
	$V_{CE} = 70 \text{ V}$	$V_{BE} = 0$	$T_C = 125^\circ\text{C}$			5	
	$V_{CE} = 90 \text{ V}$	$V_{BE} = 0$	$T_C = 125^\circ\text{C}$			5	
$I_{CEO}$ Collector cut-off current	$V_{CE} = 30 \text{ V}$	$I_B = 0$				0.1	mA
	$V_{CE} = 60 \text{ V}$	$I_B = 0$				0.1	
$I_{EBO}$ Emitter cut-off current	$V_{EB} = 5 \text{ V}$	$I_C = 0$				0.5	mA
$h_{FE}$ Forward current transfer ratio	$V_{CE} = 4 \text{ V}$	$I_C = 1 \text{ A}$		40			
	$V_{CE} = 4 \text{ V}$	$I_C = 5 \text{ A}$	(see Notes 5 and 6)	20		150	
	$V_{CE} = 4 \text{ V}$	$I_C = 20 \text{ A}$		5			
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_B = 0.5 \text{ A}$	$I_C = 5 \text{ A}$	(see Notes 5 and 6)			1	V
	$I_B = 5 \text{ A}$	$I_C = 20 \text{ A}$				3	
$V_{BE}$ Base-emitter voltage	$V_{CE} = 4 \text{ V}$	$I_C = 5 \text{ A}$	(see Notes 5 and 6)			1	V
	$V_{CE} = 4 \text{ V}$	$I_C = 20 \text{ A}$				3	
$h_{fe}$ Small signal forward current transfer ratio	$V_{CE} = 10 \text{ V}$	$I_C = 1 \text{ A}$	$f = 1 \text{ kHz}$	25			
$ h_{fe} $ Small signal forward current transfer ratio	$V_{CE} = 10 \text{ V}$	$I_C = 1 \text{ A}$	$f = 1 \text{ MHz}$	5			

NOTES: 5. These parameters must be measured using pulse techniques,  $t_p = 300 \mu\text{s}$ , 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			1.1	$^\circ\text{C/W}$
$R_{\theta JA}$ Junction to free air thermal resistance			35.7	$^\circ\text{C/W}$

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

PARAMETER	TEST CONDITIONS †			MIN	TYP	MAX	UNIT		
$t_d$ Delay time	$I_C = 5 \text{ A}$	$I_{B(on)} = 0.5 \text{ A}$	$I_{B(off)} = -0.5 \text{ A}$		20		ns		
$t_r$ Rise time					350		ns		
$t_s$ Storage time				$V_{BE(off)} = -4.2 \text{ V}$	$R_L = 6 \Omega$	$t_p = 20 \mu\text{s}$ , dc $\leq 2\%$	500		ns
$t_f$ Fall time							400		ns

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

TYPICAL CHARACTERISTICS

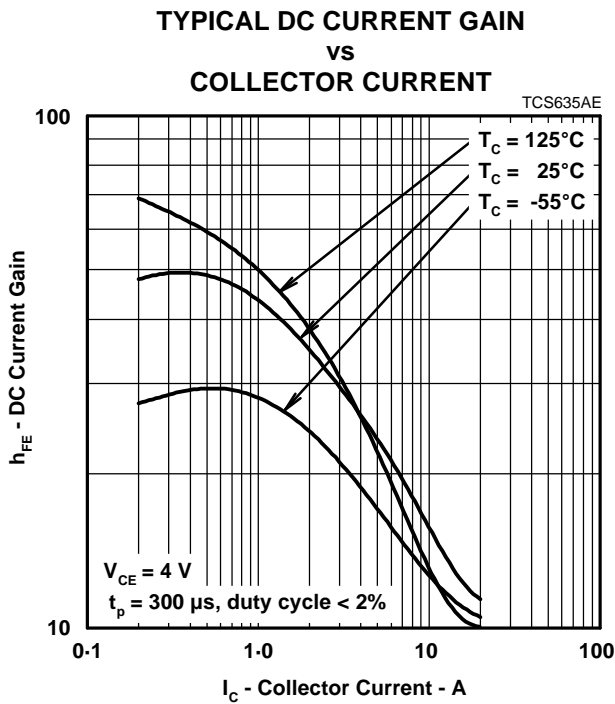


Figure 1.

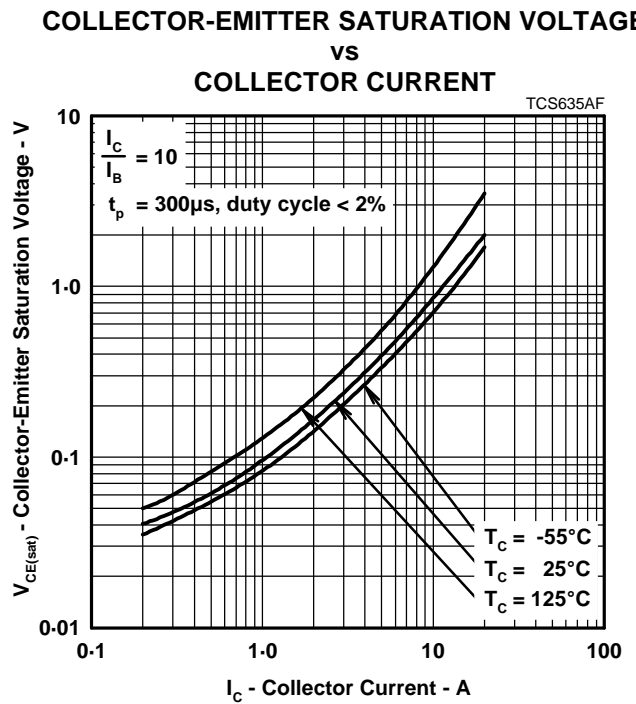


Figure 2.

MAXIMUM SAFE OPERATING REGIONS

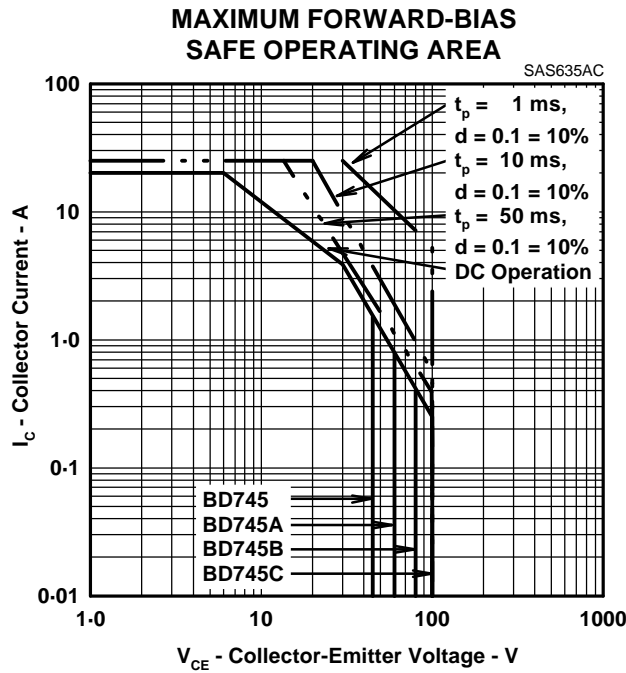


Figure 3.

# BD745, BD745A, BD745B, BD745C NPN SILICON POWER TRANSISTORS

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## THERMAL INFORMATION

### MAXIMUM POWER DISSIPATION VS CASE TEMPERATURE

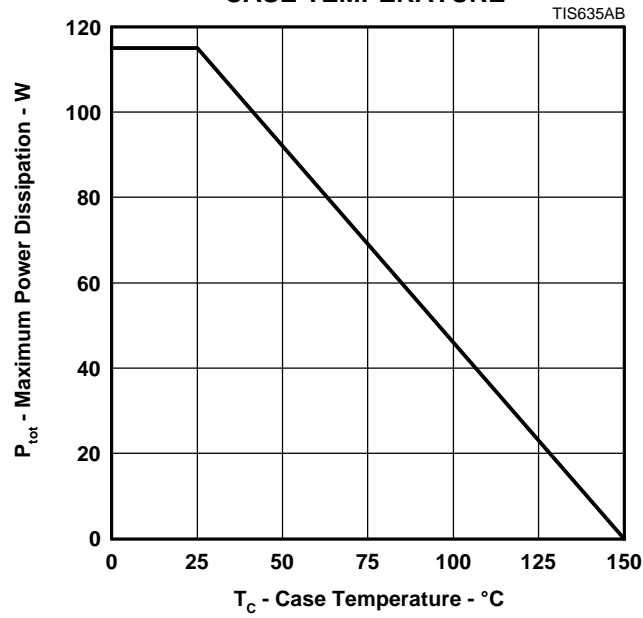


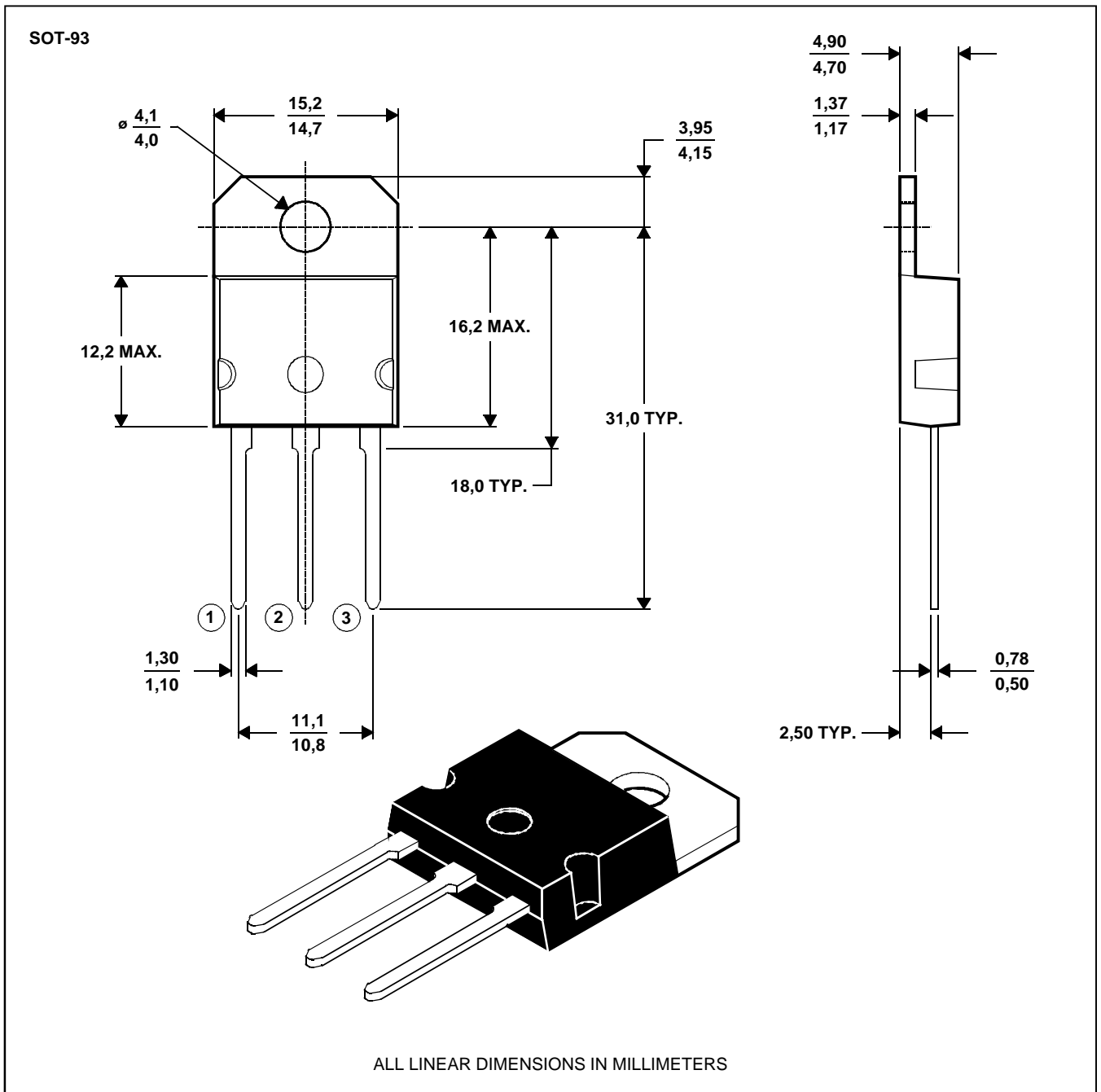
Figure 4.

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

# **BD745, BD745A, BD745B, BD745C**

## **NPN SILICON POWER TRANSISTORS**

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