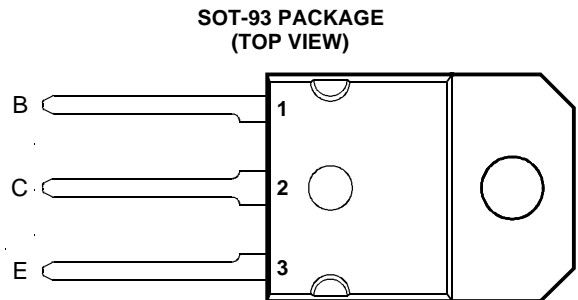


# TIPL765, TIPL765A NPN SILICON POWER TRANSISTORS

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AUGUST 1978 - REVISED MARCH 1997

- Rugged Triple-Diffused Planar Construction
- 10 A Continuous Collector Current
- Operating Characteristics Fully Guaranteed at 100°C
- 1000 Volt Blocking Capability
- 125 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 ( $I_E = 0$ )	TIPL765	$V_{CBO}$	850	V
	TIPL765A		1000	
Collector-emitter voltage ( $V_{BE} = 0$ )	TIPL765	$V_{CES}$	850	V
	TIPL765A		1000	
Collector-emitter voltage ( $I_B = 0$ )	TIPL765	$V_{CEO}$	400	V
	TIPL765A		450	
Emitter-base voltage		$V_{EBO}$	10	V
Continuous collector current		$I_C$	10	A
Peak collector current (see Note 1)		$I_{CM}$	15	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  $t_p \leq 10$  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.

# TIPL765, TIPL765A

## 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	$I_C = 100 \text{ mA}$	$L = 25 \text{ mH}$	(see Note 2)	TIPL765 400 TIPL765A 450			V
$I_{CES}$ Collector-emitter cut-off current	$V_{CE} = 850 \text{ V}$	$V_{BE} = 0$		TIPL765		50	$\mu\text{A}$
	$V_{CE} = 1000 \text{ V}$	$V_{BE} = 0$		TIPL765A		50	
	$V_{CE} = 850 \text{ V}$	$V_{BE} = 0$	$T_C = 100^\circ\text{C}$	TIPL765		200	
	$V_{CE} = 1000 \text{ V}$	$V_{BE} = 0$	$T_C = 100^\circ\text{C}$	TIPL765A		200	
$I_{CEO}$ Collector cut-off current	$V_{CE} = 400 \text{ V}$	$I_B = 0$		TIPL765		50	$\mu\text{A}$
	$V_{CE} = 450 \text{ V}$	$I_B = 0$		TIPL765A		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)	15		60	
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_B = 0.4 \text{ A}$	$I_C = 2 \text{ A}$	(see Notes 3 and 4)			0.5	V
	$I_B = 1 \text{ A}$	$I_C = 5 \text{ A}$				1.0	
	$I_B = 2 \text{ A}$	$I_C = 10 \text{ A}$				2.5	
	$I_B = 2 \text{ A}$	$I_C = 10 \text{ A}$				$T_C = 100^\circ\text{C}$	
$V_{BE(sat)}$ Base-emitter saturation voltage	$I_B = 0.4 \text{ A}$	$I_C = 2 \text{ A}$	(see Notes 3 and 4)			1.1	V
	$I_B = 1 \text{ A}$	$I_C = 5 \text{ A}$				1.3	
	$I_B = 2 \text{ A}$	$I_C = 10 \text{ A}$				1.7	
	$I_B = 2 \text{ A}$	$I_C = 10 \text{ A}$				$T_C = 100^\circ\text{C}$	
$f_t$ Current gain bandwidth product	$V_{CE} = 10 \text{ V}$	$I_C = 0.5 \text{ A}$	$f = 1 \text{ MHz}$		8		MHz
$C_{ob}$ Output capacitance	$V_{CB} = 20 \text{ V}$	$I_E = 0$	$f = 0.1 \text{ MHz}$		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	$^\circ\text{C}/\text{W}$

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

PARAMETER	TEST CONDITIONS †			MIN	TYP	MAX	UNIT
$t_{sv}$ Voltage storage time	$I_C = 10 \text{ A}$ $V_{BE(off)} = -5 \text{ V}$	$I_{B(on)} = 2 \text{ A}$	(see Figures 1 and 2)			2	$\mu\text{s}$
$t_{rv}$ Voltage rise time						300	ns
$t_{fi}$ Current fall time						200	ns
$t_{ti}$ Current tail time						50	ns
$t_{xo}$ Cross over time						400	ns
$t_{sv}$ Voltage storage time	$I_C = 10 \text{ A}$ $V_{BE(off)} = -5 \text{ V}$	$I_{B(on)} = 2 \text{ A}$ $T_C = 100^\circ\text{C}$	(see Figures 1 and 2)			3.5	$\mu\text{s}$
$t_{rv}$ Voltage rise time						400	ns
$t_{fi}$ Current fall time						300	ns
$t_{ti}$ Current tail time						80	ns
$t_{xo}$ Cross over time						500	ns

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

## PRODUCT INFORMATION



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## TYPICAL CHARACTERISTICS

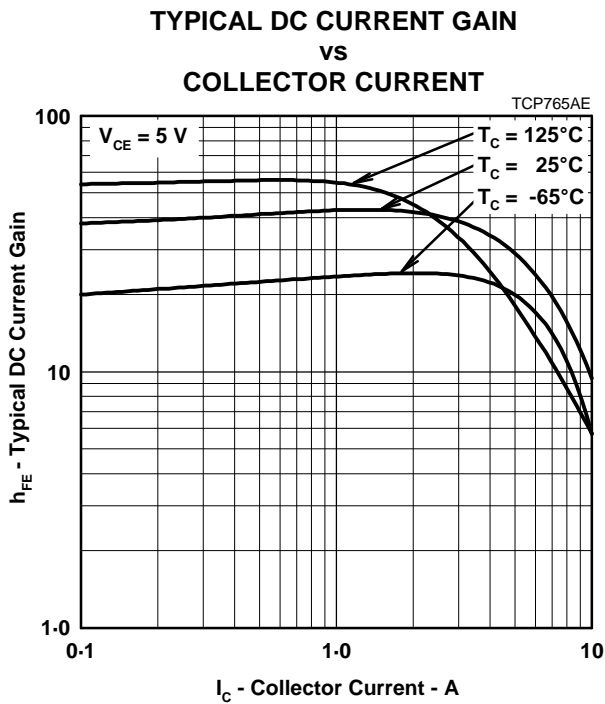


Figure 3.

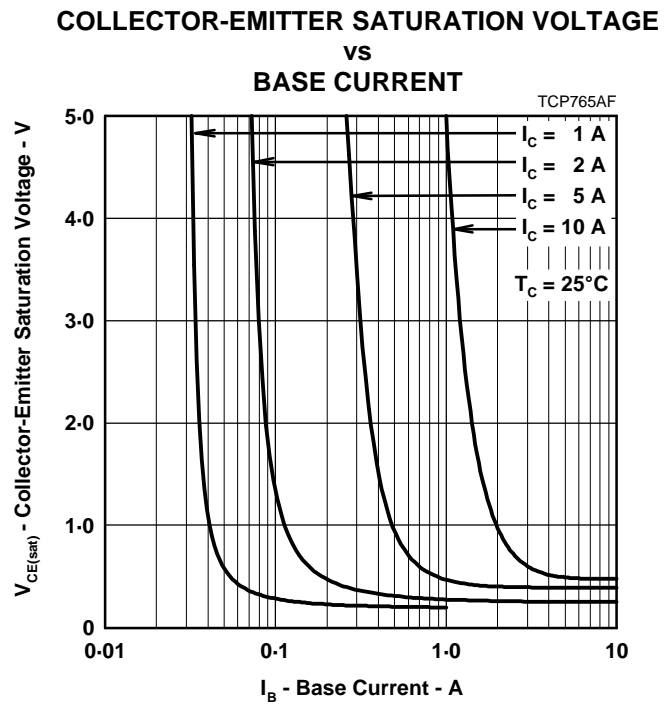


Figure 4.

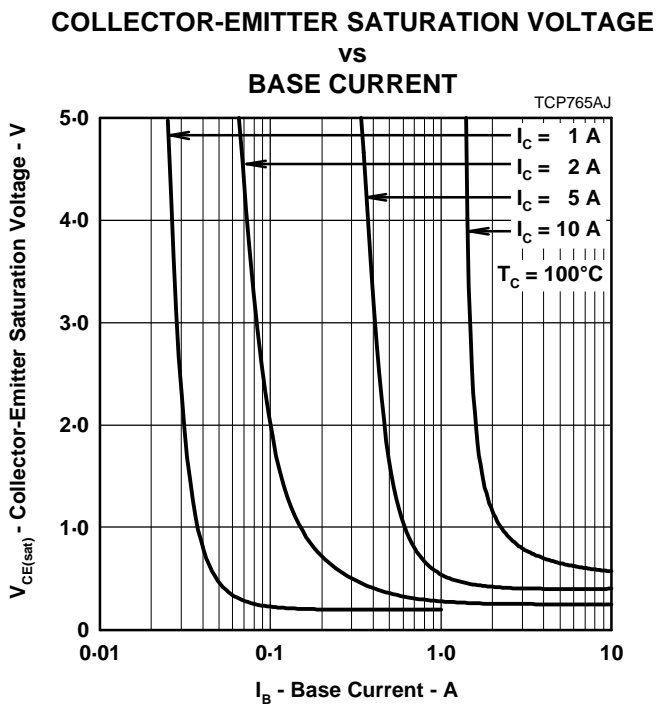


Figure 5.

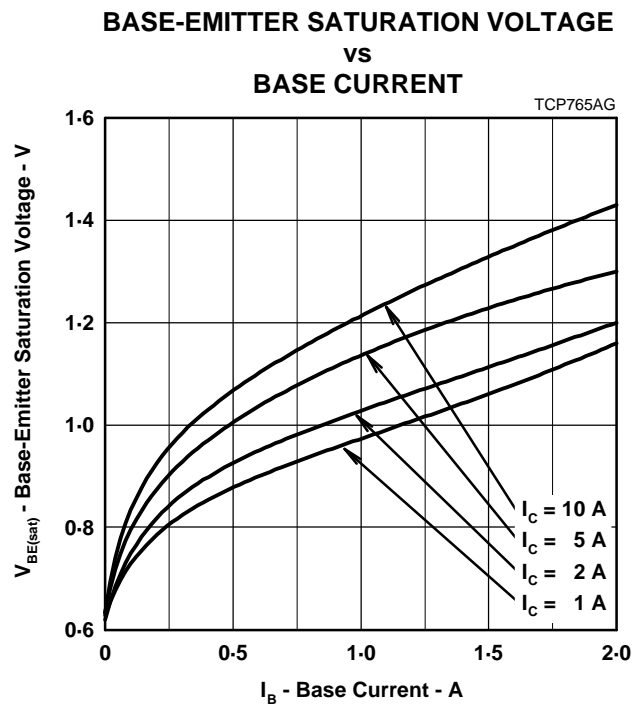


Figure 6.

TYPICAL CHARACTERISTICS

COLLECTOR CUT-OFF CURRENT  
vs  
CASE TEMPERATURE

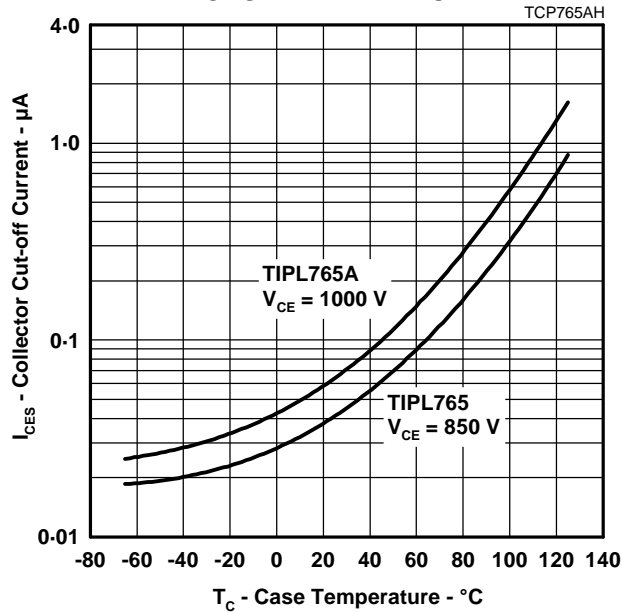


Figure 7.

MAXIMUM SAFE OPERATING REGIONS

MAXIMUM FORWARD-BIAS  
SAFE OPERATING AREA

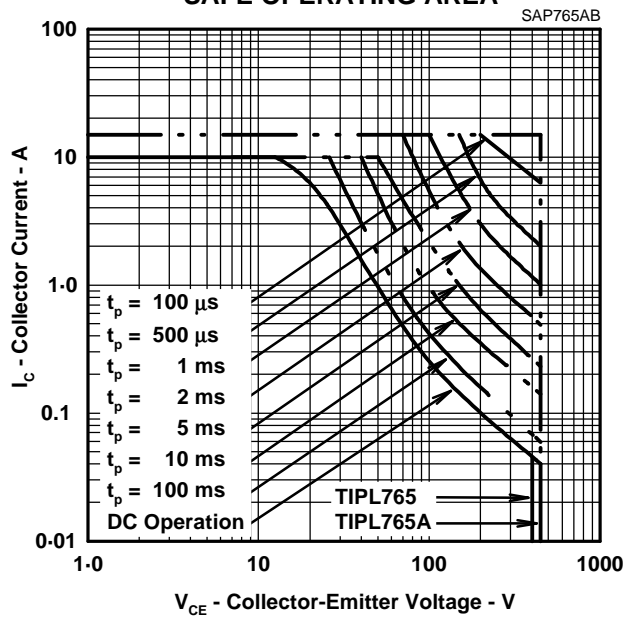


Figure 8.

# TIPL765, TIPL765A NPN SILICON POWER TRANSISTORS

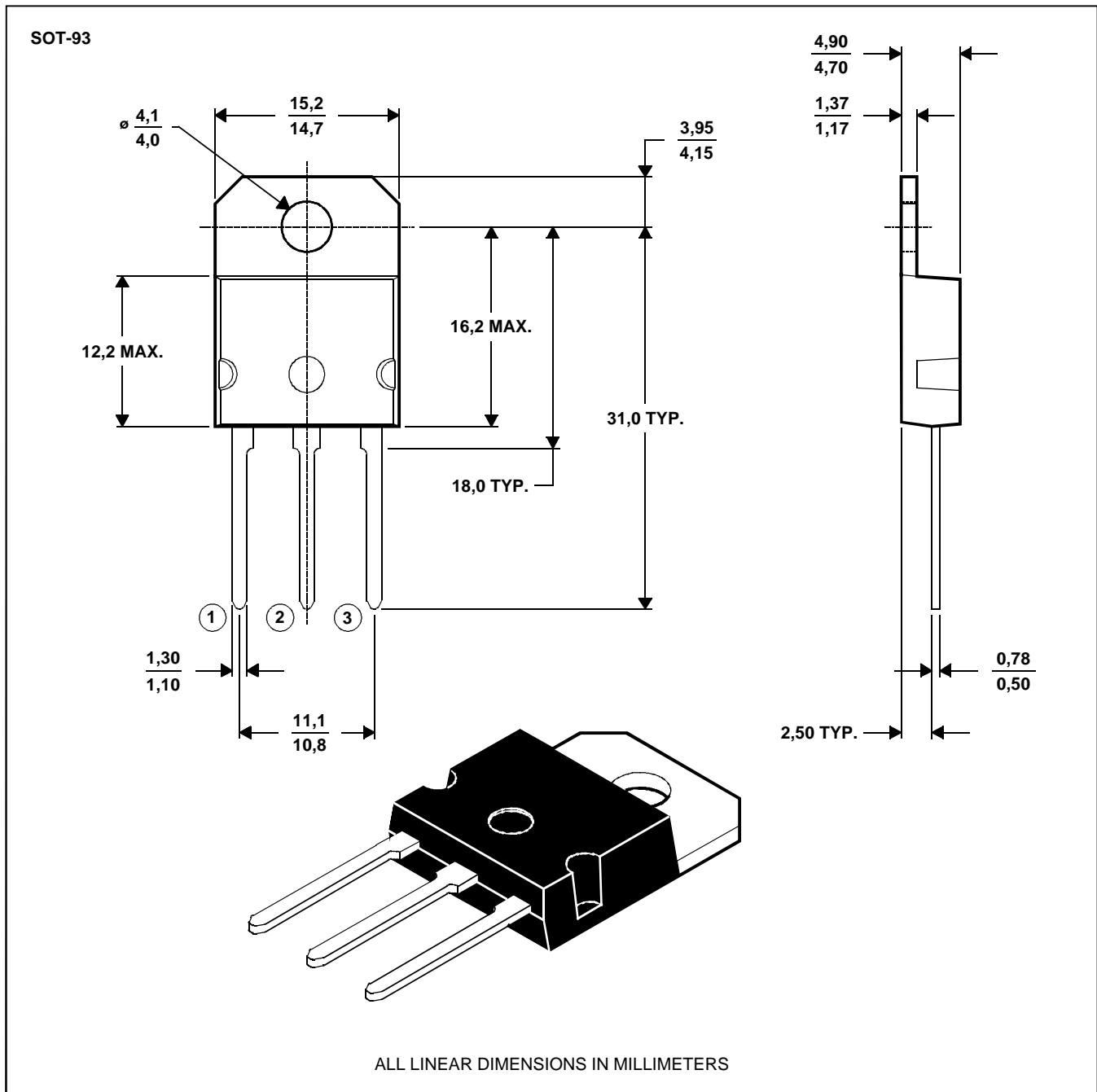
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## MECHANICAL DATA

### 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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