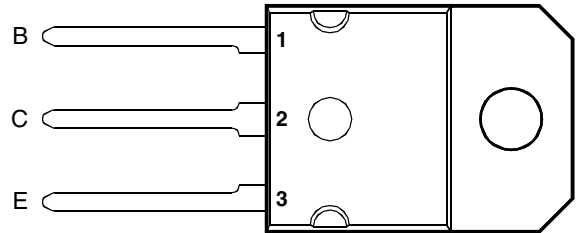


- **Designed for Complementary Use with TIP140, TIP141 and TIP142**
- **125 W at 25°C Case Temperature**
- **10 A Continuous Collector Current**
- **Minimum  $h_{FE}$  of 1000 at 4 V, 5 A**

**SOT-93 PACKAGE  
(TOP VIEW)**



Pin 2 is in electrical contact with the mounting base.

MDTRAAA

**absolute maximum ratings at 25°C case temperature (unless otherwise noted)**

RATING		SYMBOL	VALUE	UNIT
Collector-base voltage ( $I_E = 0$ )	TIP145	$V_{CBO}$	-60	V
	TIP146		-80	
	TIP147		-100	
Collector-emitter voltage ( $I_B = 0$ )	TIP145	$V_{CEO}$	-60	V
	TIP146		-80	
	TIP147		-100	
Emitter-base voltage		$V_{EBO}$	-5	V
Continuous collector current		$I_C$	-10	A
Peak collector current (see Note 1)		$I_{CM}$	-15	A
Continuous base current		$I_B$	-0.5	A
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)		$P_{tot}$	125	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)		$\frac{1}{2}LI_C^2$	100	mJ
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 1 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,  $I_{B(on)} = -5$  mA,  $R_{BE} = 100 \Omega$ ,  $V_{BE(off)} = 0$ ,  $R_S = 0.1 \Omega$ ,  $V_{CC} = -20$  V.

**PRODUCT INFORMATION**

DECEMBER 1971 - REVISED SEPTEMBER 2002  
 Specifications are subject to change without notice.

**electrical characteristics at 25°C case temperature**

PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	$I_C = -30 \text{ mA}$ (see Note 5)	$I_B = 0$	TIP145 TIP146 TIP147	-60 -80 -100			V
$I_{CEO}$	Collector-emitter cut-off current	$V_{CE} = -30 \text{ V}$ $V_{CE} = -40 \text{ V}$ $V_{CE} = -50 \text{ V}$	$I_B = 0$ $I_B = 0$ $I_B = 0$	TIP145 TIP146 TIP147			-2 -2 -2	mA
$I_{CBO}$	Collector cut-off current	$V_{CB} = -60 \text{ V}$ $V_{CB} = -80 \text{ V}$ $V_{CB} = -100 \text{ V}$	$I_E = 0$ $I_E = 0$ $I_E = 0$	TIP145 TIP146 TIP147			-1 -1 -1	mA
$I_{EBO}$	Emitter cut-off current	$V_{EB} = -5 \text{ V}$	$I_C = 0$				-2	mA
$h_{FE}$	Forward current transfer ratio	$V_{CE} = -4 \text{ V}$ $V_{CE} = -4 \text{ V}$	$I_C = -5 \text{ A}$ $I_C = -10 \text{ A}$	(see Notes 5 and 6)	1000 500			
$V_{CE(sat)}$	Collector-emitter saturation voltage	$I_B = -10 \text{ mA}$ $I_B = -40 \text{ mA}$	$I_C = -5 \text{ A}$ $I_C = -10 \text{ A}$	(see Notes 5 and 6)			-2 -3	V
$V_{BE}$	Base-emitter voltage	$V_{CE} = -4 \text{ V}$	$I_C = -10 \text{ A}$	(see Notes 5 and 6)			-3	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,  $t_p = 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .  
6. These parameters must be measured using voltage-sensing contacts, separate from the current carrying contacts.

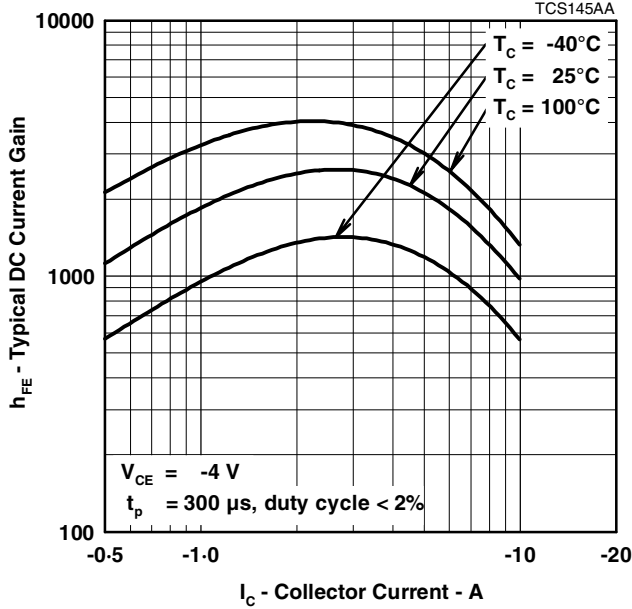
**resistive-load-switching characteristics at 25°C case temperature**

PARAMETER		TEST CONDITIONS †			MIN	TYP	MAX	UNIT
$t_{on}$	Turn-on time	$I_C = -10 \text{ A}$	$I_{B(on)} = -40 \text{ mA}$	$I_{B(off)} = 40 \text{ mA}$		0.9		$\mu\text{s}$
$t_{off}$	Turn-off time	$V_{BE(off)} = 4.2 \text{ V}$	$R_L = 3 \Omega$	$t_p = 20 \mu\text{s}$ , dc $\leq 2\%$		11		$\mu\text{s}$

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

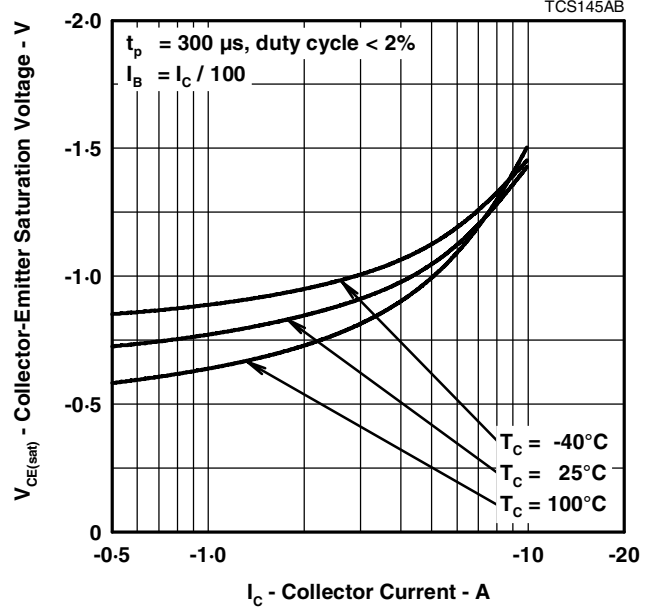
**TYPICAL CHARACTERISTICS**

**TYPICAL DC CURRENT GAIN  
vs  
COLLECTOR CURRENT**



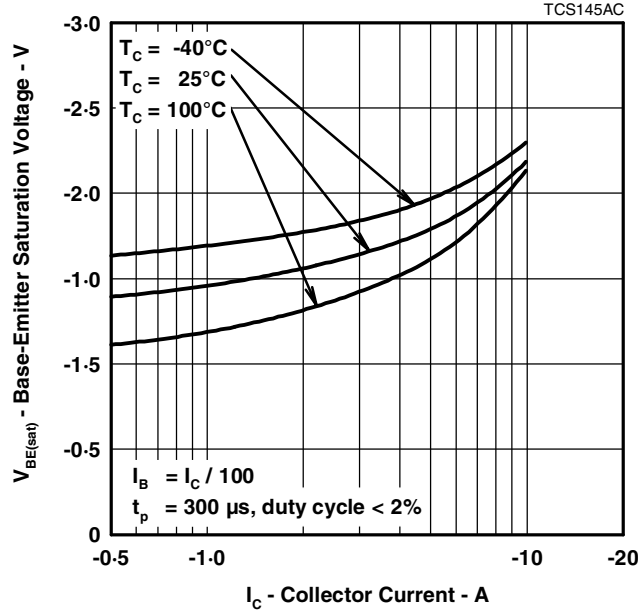
**Figure 1.**

**COLLECTOR-EMITTER SATURATION VOLTAGE  
vs  
COLLECTOR CURRENT**



**Figure 2.**

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



**Figure 3.**

**PRODUCT INFORMATION**

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**MAXIMUM SAFE OPERATING REGIONS**

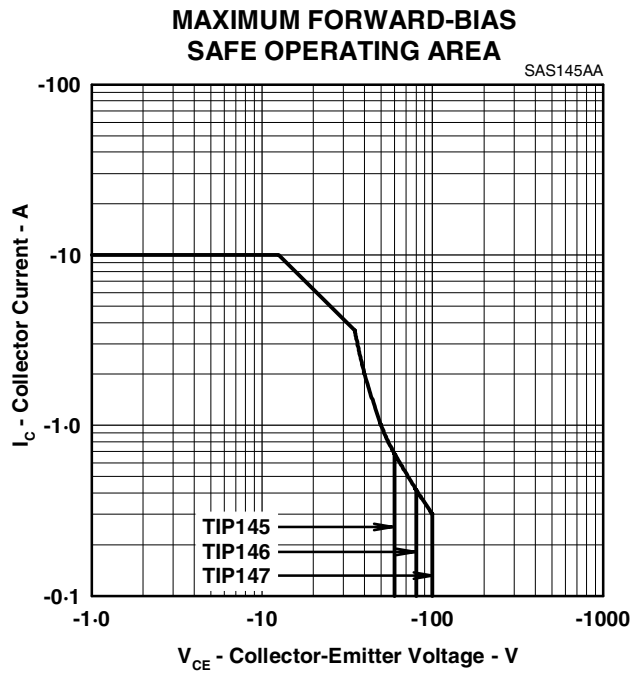


Figure 4.

**THERMAL INFORMATION**

**MAXIMUM POWER DISSIPATION  
vs  
CASE TEMPERATURE**

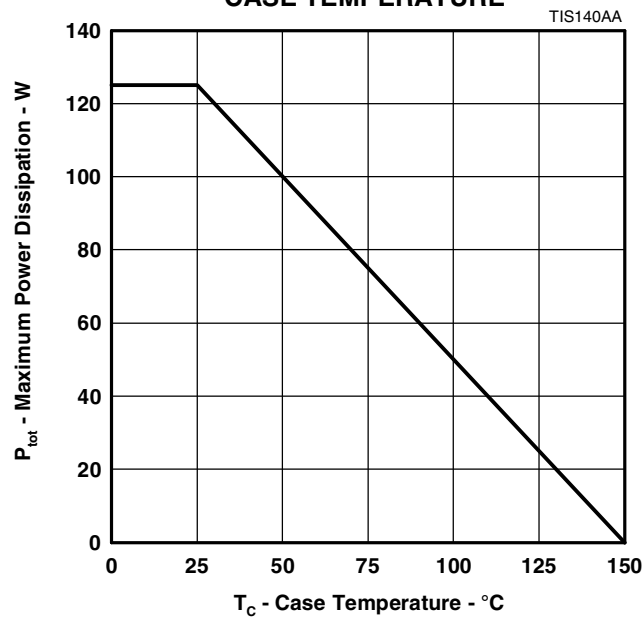


Figure 5.

**PRODUCT INFORMATION**

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