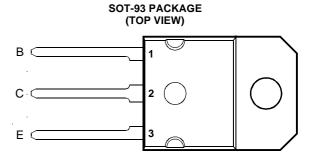
- Designed for Complementary Use with TIP145, TIP146 and TIP147
- 125 W at 25°C Case Temperature
- 10 A Continuous Collector Current
- Minimum h<sub>FE</sub> of 1000 at 4 V, 5 A



Pin 2 is in electrical contact with the mounting base.

MDTRAA

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

RATING			VALUE	UNIT
	TIP140		60	
Collector-base voltage (I <sub>E</sub> = 0)	TIP141	$V_{CBO}$	80	V
	TIP142		100	
	TIP140		60	
Collector-emitter voltage (I <sub>B</sub> = 0)	TIP141	$V_{CEO}$	80	V
	TIP142		100	
Emitter-base voltage			5	V
Continuous collector current			10	Α
Peak collector current (see Note 1)			15	Α
Continuous base current			0.5	Α
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)			125	W
Continuous device dissipation at (or below) 25°C free air temperature (see Note 3)			3.5	W
Unclamped inductive load energy (see Note 4)			100	mJ
Operating junction temperature range			-65 to +150	°C
Storage temperature range			-65 to +150	°C
Lead temperature 3.2 mm from case for 10 seconds			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.

# TIP140, TIP141, TIP142 NPN SILICON POWER DARLINGTONS

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# electrical characteristics at 25°C case temperature

PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT
V <sub>(BR)CEO</sub>	Collector-emitter	I <sub>C</sub> = 30 mA	I <sub>B</sub> = 0	TIP140 TIP141	60 80			V
(BIV)OLO	breakdown voltage	(see Note 5)	b	TIP142	100			
	Collector-emitter	V <sub>CE</sub> = 30 V	I <sub>B</sub> = 0	TIP140			2	
I <sub>CEO</sub>	cut-off current	V <sub>CE</sub> = 40 V	$I_B = 0$	TIP141			2	mA
	cut-on current	V <sub>CE</sub> = 50 V	$I_B = 0$	TIP142			2	
	Collector cut-off current	V <sub>CB</sub> = 60 V	I <sub>E</sub> = 0	TIP140			1	
I <sub>CBO</sub>		$V_{CB} = 80 \text{ V}$	$I_E = 0$	TIP141			1	mA
		V <sub>CB</sub> = 100 V	$I_E = 0$	TIP142			1	
I <sub>EBO</sub>	Emitter cut-off current	V <sub>EB</sub> = 5 V	I <sub>C</sub> = 0				2	mA
h	Forward current	V <sub>CE</sub> = 4 V	I <sub>C</sub> = 5 A	(see Notes 5 and 6)	1000			
h <sub>FE</sub>	transfer ratio	V <sub>CE</sub> = 4 V	$I_{C} = 10 \text{ A}$	(see Notes 5 and 6)	500			
V	Collector-emitter	I <sub>B</sub> = 10 mA	I <sub>C</sub> = 5 A	(see Notes 5 and 6)			2	V
V <sub>CE(sat)</sub>	saturation voltage	$I_B = 40 \text{ mA}$	$I_{C} = 10 \text{ A}$				3	٧
Vas	Base-emitter	V <sub>CE</sub> = 4 V	I <sub>C</sub> = 10 A	(see Notes 5 and 6)			3	V
$V_{BE}$	voltage	ACE - 4 A	IC - 10 V	(500 115105 5 and 6)			3	٧
V <sub>EC</sub>	Parallel diode forward voltage	I <sub>E</sub> = 10 A	I <sub>B</sub> = 0	(see Notes 5 and 6)			3.5	V

NOTES: 5. These parameters must be measured using pulse techniques,  $t_p$  = 300  $\mu$ s, duty cycle  $\leq$  2%.

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

		PARAMETER	TEST CONDITIONS †		MIN	TYP	MAX	UNIT	
Ī	t <sub>on</sub>	Turn-on time	I <sub>C</sub> = 10 A	$I_{B(on)} = 40 \text{ mA}$	$I_{B(off)} = -40 \text{ mA}$		0.9		μs
Ī	t <sub>off</sub>	Turn-off time	$V_{BE(off)} = -4.2 \text{ V}$	$R_L = 3 \Omega$	$t_p = 20 \ \mu s, \ dc \le 2\%$		11		μs

 $<sup>^{\</sup>dagger} \ \ \mbox{Voltage and current values shown are nominal; exact values vary slightly with transistor parameters.}$ 

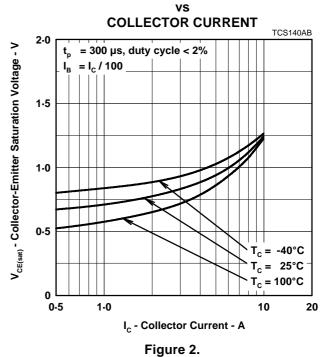
<sup>6.</sup> These parameters must be measured using voltage-sensing contacts, separate from the current carrying contacts.

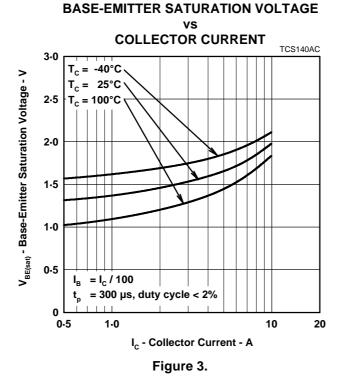
#### TYPICAL CHARACTERISTICS

# **TYPICAL DC CURRENT GAIN COLLECTOR CURRENT** TCS140AA 70000 = -40°C 25°C 100°C h<sub>FE</sub> - Typical DC Current Gain 10000 1000 = 300 μs, duty cycle < 2% 100 0.5 1.0 10 20 I<sub>C</sub> - Collector Current - A

Figure 1.

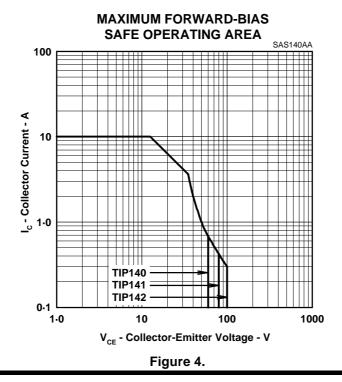
## **COLLECTOR-EMITTER SATURATION VOLTAGE**





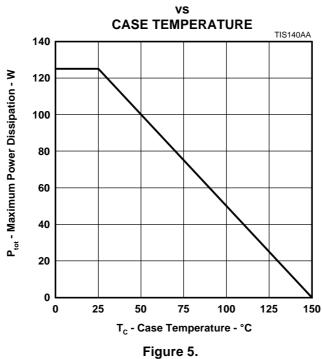


#### **MAXIMUM SAFE OPERATING REGIONS**



#### THERMAL INFORMATION

#### **MAXIMUM POWER DISSIPATION**



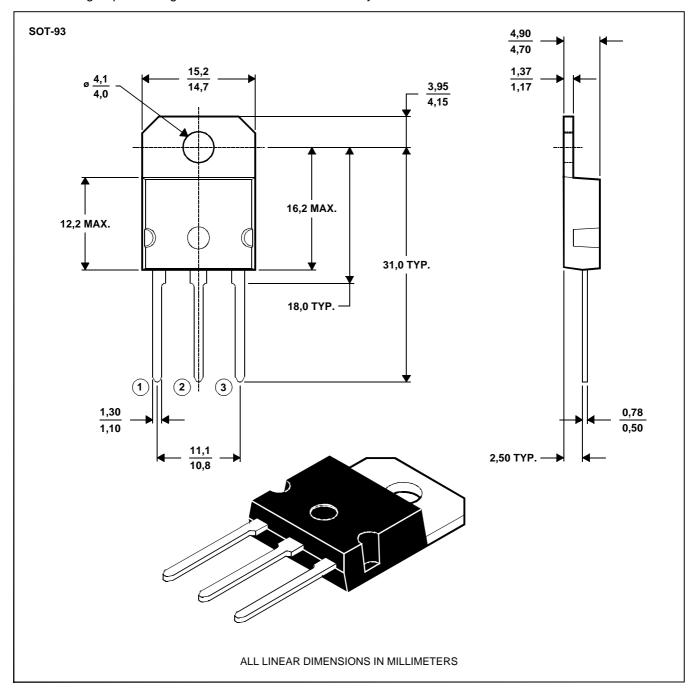
# PRODUCT INFORMATION

#### **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** 

### PRODUCT INFORMATION

# TIP140, TIP141, TIP142 NPN SILICON POWER DARLINGTONS

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