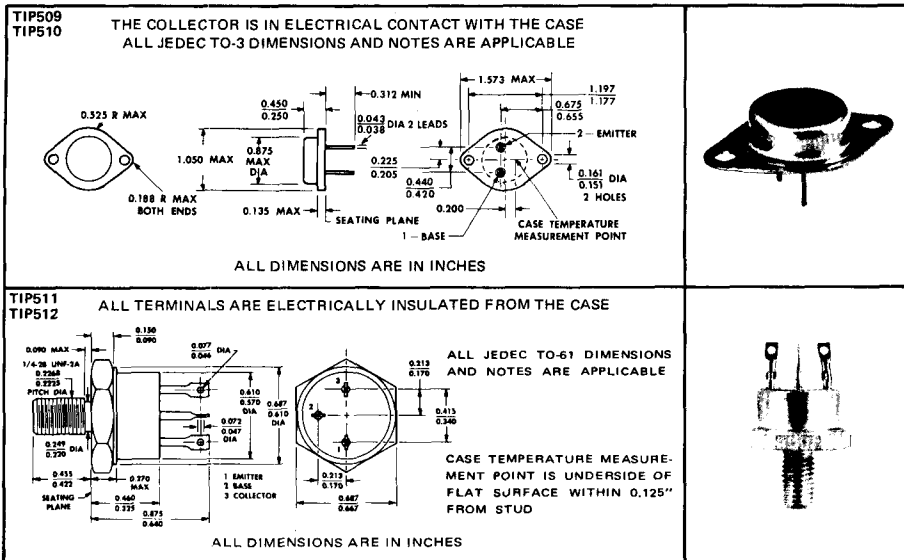


TYPES TIP509 THRU TIP512 N-P-N SILICON POWER TRANSISTORS

FOR POWER-AMPLIFIER AND HIGH-SPEED-SWITCHING APPLICATIONS

- 120 V and 150 V Min $V_{(BR)CEO}$
- 4-A Rated Continuous Collector Current
- 30 Watts at 100°C Case Temperature
- Min f_T of 70 MHz at 5 V, 0.5 A

mechanical data



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

	TIP509	TIP510
Collector-Base Voltage	130 V	160 V
Collector-Emitter Voltage (See Note 1)	120 V	150 V
Emitter-Base Voltage	6 V	6 V
Continuous Collector Current	4 A	4 A
Peak Collector Current (See Note 2)	8 A	8 A
Continuous Base Current	2 A	2 A
Continuous Device Dissipation at (or below) 100°C Case Temperature (See Note 3)	30 W	30 W
Continuous Device Dissipation at (or below) 25°C Free-Air Temperature (See Note 4)	4 W	4 W
Operating Collector Junction Temperature Range	-65°C to 200°C	-65°C to 200°C
Storage Temperature Range	-65°C to 200°C	-65°C to 200°C
Terminal Temperature 1/16 Inch from Case for 10 Seconds	300°C	300°C

- NOTES: 1. These values apply when the base-emitter diode is open-circuited.
 2. This value applies for $t_W \leq 0.3$ ms, duty cycle $\leq 10\%$.
 3. Derate linearly to 200°C case temperature at the rate of 0.3 W/°C.
 4. Derate linearly to 200°C free-air temperature at the rate of 22.8 mW/°C.

TYPES TIP509 THRU TIP512

N-P-N SILICON POWER TRANSISTORS

electrical characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS	TIP509 TIP511	TIP510 TIP512	UNIT
		MIN MAX	MIN MAX	
$V_{(BR)CEO}$ Collector-Emitter Breakdown Voltage	$I_C = 30 \text{ mA}$, $I_B = 0$, See Note 5	120	150	V
I_{CEO} Collector Cutoff Current	$V_{CE} = 60 \text{ V}$, $I_B = 0$	0.5		mA
	$V_{CE} = 75 \text{ V}$, $I_B = 0$		0.5	
I_{CES} Collector Cutoff Current	$V_{CE} = 120 \text{ V}$, $V_{BE} = 0$	1		mA
	$V_{CE} = 150 \text{ V}$, $V_{BE} = 0$		1	
	$V_{CE} = 60 \text{ V}$, $V_{BE} = 0$, $T_C = 150^\circ\text{C}$	1		
	$V_{CE} = 75 \text{ V}$, $V_{BE} = 0$, $T_C = 150^\circ\text{C}$		1	
I_{EBO} Emitter Cutoff Current	$V_{EB} = 3 \text{ V}$, $I_C = 0$	50	50	μA
	$V_{EB} = 6 \text{ V}$, $I_C = 0$	500	500	
h_{FE} Static Forward Current Transfer Ratio	$V_{CE} = 4 \text{ V}$, $I_C = 2 \text{ A}$, See Notes 5 and 6	40 200	40 200	
	$V_{CE} = 4 \text{ V}$, $I_C = 4 \text{ A}$, See Notes 5 and 6	25	25	
V_{BE} Base-Emitter Voltage	$V_{CE} = 4 \text{ V}$, $I_C = 4 \text{ A}$, See Notes 5 and 6	1.4	1.4	V
$V_{CE(sat)}$ Collector-Emitter Saturation Voltage	$I_B = 0.2 \text{ A}$, $I_C = 2 \text{ A}$, See Notes 5 and 6	0.6	0.6	V
	$I_B = 0.4 \text{ A}$, $I_C = 4 \text{ A}$, See Notes 5 and 6	1.5	1.5	
h_{fe} Small-Signal Common-Emitter Forward Current Transfer Ratio	$V_{CE} = 5 \text{ V}$, $I_C = 0.5 \text{ A}$, $f = 1 \text{ kHz}$	40	40	
h_{fe} Small-Signal Common-Emitter Forward Current Transfer Ratio	$V_{CE} = 5 \text{ V}$, $I_C = 0.5 \text{ A}$, $f = 10 \text{ MHz}$	7	7	

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

6. These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts and located within 0.125 inch from the device body.

thermal characteristics

PARAMETER	MAX	UNIT
$R_{\theta JC}$ Junction-to-Case Thermal Resistance	3.33	$^\circ\text{C/W}$
$R_{\theta JA}$ Junction-to-Free-Air Thermal Resistance	43.75	