

MOTOROLA SEMICONDUCTOR TECHNICAL DATA

NPN
TIP33
TIP33A
TIP33B
TIP33C

PNP
TIP34
TIP34A
TIP34B
TIP34C

COMPLEMENTARY SILICON HIGH-POWER TRANSISTORS

... for general-purpose power amplifier and switching applications.

- 10 A Collector Current
- Low Leakage Current — $I_{CEO} = 0.7 \text{ mA @ 30 and 60 V}$
- Excellent dc Gain — $h_{FE} = 40 \text{ Typ @ 3.0 A}$
- High Current Gain Bandwidth Product — $h_{f_c} = 3.0 \text{ min @ } I_C = 0.5 \text{ A, } f = 1.0 \text{ MHz}$

10 AMPERE COMPLEMENTARY SILICON POWER TRANSISTORS

40-100 VOLTS
80 WATTS

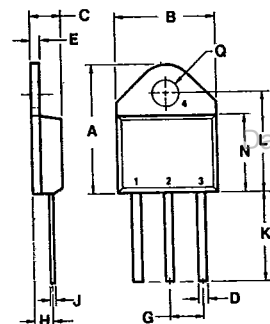
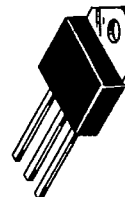
MAXIMUM RATINGS

Rating	Symbol	TIP33 TIP34	TIP33A TIP34A	TIP33B TIP34B	TIP33C TIP34C	Unit
Collector-Emitter Voltage	V_{CEO}	40 V	60 V	80 V	100 V	Vdc
Collector-Base Voltage	V_{CB}	40 V	60 V	80 V	100 V	Vdc
Emitter-Base Voltage	V_{EB}	5.0				Vdc
Collector Current — Continuous Peak (1)	I_C	10				Adc
		15				
Base Current — Continuous	I_B	3.0				Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	80				Watts
		0.64				W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +150				$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.56	$^\circ\text{C/W}$
Junction-To-Free-Air Thermal Resistance	$R_{\theta JA}$	35.7	$^\circ\text{C/W}$

(1) Pulse Test: Pulse Width = 10 ms, Duty Cycle $\leq 10\%$.



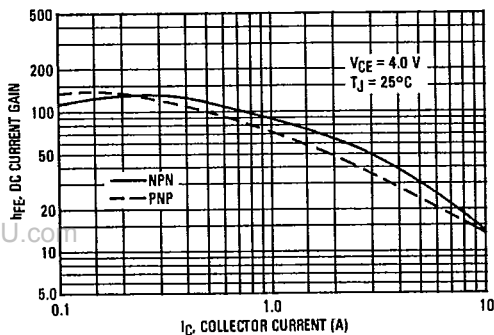
STYLE 1:

1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	20.32	21.08	0.800	0.830
B	15.49	15.90	0.610	0.628
C	4.19	5.08	0.165	0.200
D	1.02	1.65	0.040	0.065
E	1.35	1.65	0.053	0.065
G	5.21	5.72	0.205	0.225
H	2.41	3.20	0.095	0.126
J	0.38	0.64	0.015	0.025
K	12.70	13.49	0.500	0.530
L	15.88	16.51	0.625	0.650
N	12.19	12.70	0.480	0.500
Q	4.04	4.22	0.159	0.165

CASE 340-02
TO-218C

FIGURE 1 — DC CURRENT GAIN

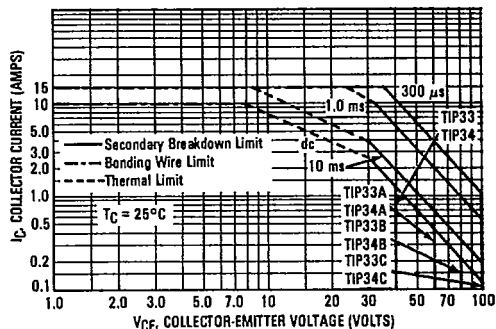


ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

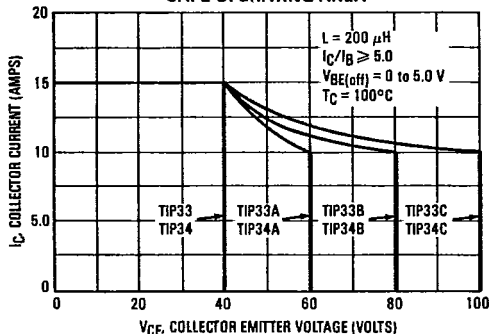
Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (1) ($I_C = 30\text{ mA}$, $I_B = 0$)	TIP33, TIP34 TIP33A, TIP34A TIP33B, TIP34B TIP33C, TIP34C	$V_{CE(sus)}$	40 60 80 100	— — — —
Collector-Emitter Cutoff Current ($V_{CE} = 30\text{ V}$, $I_B = 0$)	TIP33, TIP33A, TIP34, TIP34A	I_{CEO}	—	0.7
($V_{CE} = 60\text{ V}$, $I_B = 0$)	TIP33B, TIP33C, TIP34B, TIP34C		—	0.7
Collector-Emitter Cutoff Current ($V_{CE} = \text{Rated } V_{CE}$, $V_{EB} = 0$)		I_{CES}	—	0.4
Emitter-Base Cutoff Current ($V_{EB} = 5.0\text{ V}$, $I_C = 0$)		I_{EBO}	—	1.0

ON CHARACTERISTICS (1)				
DC Current Gain ($I_C = 1.0\text{ A}$, $V_{CE} = 4.0\text{ V}$) ($I_C = 3.0\text{ A}$, $V_{CE} = 4.0\text{ V}$)		h_{FE}	40 20	— 100
Collector-Emitter Saturation Voltage ($I_C = 3.0\text{ A}$, $I_B = 0.3\text{ A}$) ($I_C = 10\text{ A}$, $I_B = 2.5\text{ A}$)		$V_{CE(sat)}$	—	1.0 4.0
Base-Emitter On Voltage ($I_C = 3.0\text{ A}$, $V_{CE} = 4.0\text{ V}$) ($I_C = 10\text{ A}$, $V_{CE} = 4.0\text{ V}$)		$V_{BE(on)}$	—	1.6 3.0

DYNAMIC CHARACTERISTICS				
Small-Signal Current Gain ($I_C = 0.5\text{ A}$, $V_{CE} = 10\text{ V}$, $f = 1.0\text{ kHz}$)		h_{fe}	20	—
Current-Gain—Bandwidth Product (2) ($I_C = 0.5\text{ A}$, $V_{CE} = 10\text{ V}$, $f = 1.0\text{ MHz}$)		f_T	3.0	—

(1) Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2.0\%$.(2) $f_T = |h_{fe}| \cdot f_{test}$ **FIGURE 2 — MAXIMUM RATED FORWARD BIAS SAFE OPERATING AREA****FORWARD BIAS**

The Forward Bias Safe Operating Area represents the voltage and current conditions these devices can withstand during forward bias. The data is based on $T_C = 25^\circ\text{C}$; $T_J(pk)$ is variable depending on power level. Second breakdown pulse limits are valid for duty cycles to 10%, and must be derated thermally for $T_C > 25^\circ\text{C}$.

FIGURE 3 — MAXIMUM RATED REVERSE BIAS SAFE OPERATING AREA**REVERSE BIAS**

The Reverse Bias Safe Operating Area represents the voltage and current conditions these devices can withstand during reverse biased turn-off. This rating is verified under clamped conditions so the device is never subjected to an avalanche mode.