

## Complementary Silicon High-Power Transistors

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

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

### MAXIMUM RATINGS

Rating	Symbol	TIP33B TIP34B	TIP33C TIP34C	Unit
Collector-Emitter Voltage	$V_{CEO}$	80 V	100 V	Vdc
Collector-Base Voltage	$V_{CB}$	80 V	100 V	Vdc
Emitter-Base Voltage	$V_{EB}$	5.0		Vdc
Collector Current — Continuous Peak (1)	$I_C$	10 15		Adc
Base Current — Continuous	$I_B$	3.0		Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	80 0.64		Watts 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  $\leq 10\%$ .

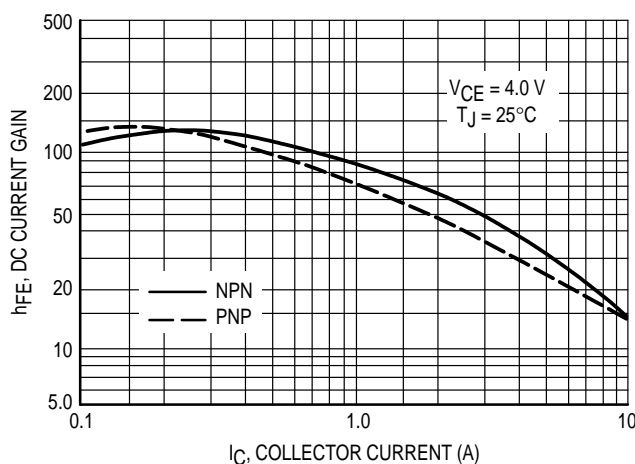
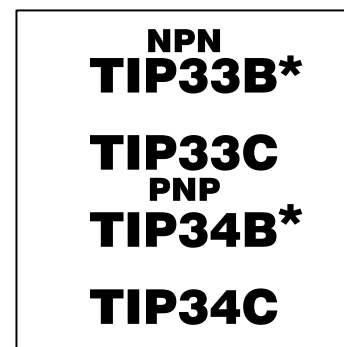


Figure 1. DC Current Gain

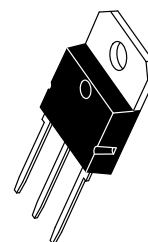
Preferred devices are Motorola recommended choices for future use and best overall value.

REV 1



\*Motorola Preferred Device

**10 AMPERE  
COMPLEMENTARY  
SILICON  
POWER TRANSISTORS  
100 VOLTS  
80 WATTS**



**CASE 340D-02  
TO-218AC**



# TIP33B TIP33C TIP34B TIP34C

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector–Emitter Sustaining Voltage (1) (I <sub>C</sub> = 30 mA, I <sub>B</sub> = 0)	V <sub>CEO(sus)</sub>	80 100	— —	Vdc
Collector–Emitter Cutoff Current (V <sub>CE</sub> = 60 V, I <sub>B</sub> = 0)	I <sub>CEO</sub>	—	0.7	mA
Collector–Emitter Cutoff Current (V <sub>CE</sub> = Rated V <sub>CEO</sub> , V <sub>EB</sub> = 0)	I <sub>CES</sub>	—	0.4	mA
Emitter–Base Cutoff Current (V <sub>EB</sub> = 5.0 V, I <sub>C</sub> = 0)	I <sub>EBO</sub>	—	1.0	mA

## ON CHARACTERISTICS (1)

DC Current Gain (I <sub>C</sub> = 1.0 A, V <sub>CE</sub> = 4.0 V) (I <sub>C</sub> = 3.0 A, V <sub>CE</sub> = 4.0 V)	h <sub>FE</sub>	40 20	— 100	—
Collector–Emitter Saturation Voltage (I <sub>C</sub> = 3.0 A, I <sub>B</sub> = 0.3 A) (I <sub>C</sub> = 10 A, I <sub>B</sub> = 2.5 A)	V <sub>CE(sat)</sub>	— —	1.0 4.0	Vdc
Base–Emitter On Voltage (I <sub>C</sub> = 3.0 A, V <sub>CE</sub> = 4.0 V) (I <sub>C</sub> = 10 A, V <sub>CE</sub> = 4.0 V)	V <sub>BE(on)</sub>	— —	1.6 3.0	Vdc

## DYNAMIC CHARACTERISTICS

Small–Signal Current Gain (I <sub>C</sub> = 0.5 A, V <sub>CE</sub> = 10 V, f = 1.0 kHz)	h <sub>fe</sub>	20	—	—
Current–Gain — Bandwidth Product (I <sub>C</sub> = 0.5 A, V <sub>CE</sub> = 10 V, f = 1.0 MHz)	f <sub>T</sub>	3.0	—	MHz

(1) Pulse Test: Pulse Width = 300 μs, Duty Cycle ≤ 2.0%.

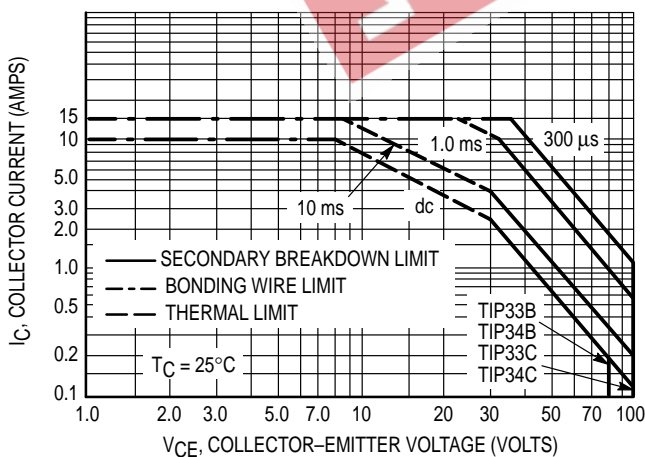


Figure 2. Maximum Rated Forward Bias Safe Operating Area

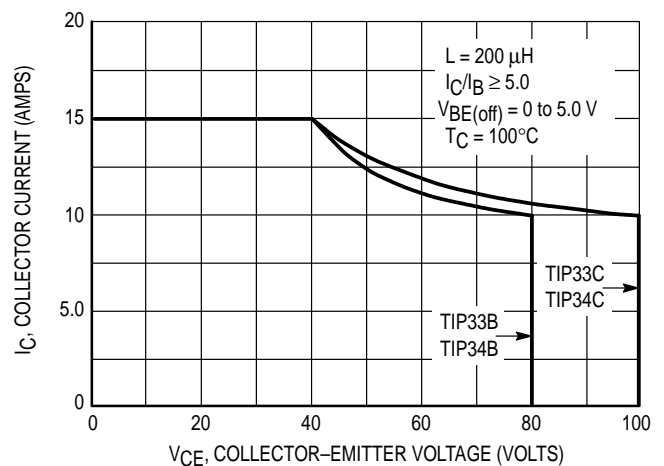


Figure 3. Maximum Rated Forward Bias Safe Operating Area

## FORWARD BIAS

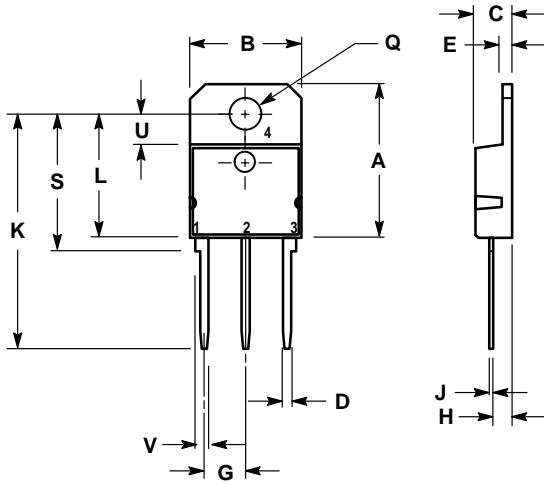
The Forward Bias Safe Operating Area represents the voltage and current conditions these devices can withstand during forward bias. The data is based on T<sub>C</sub> = 25°C; T<sub>J(pk)</sub> is variable depending on power level. Second breakdown pulse limits are valid for duty cycles to 10%, and must be derated thermally for T<sub>C</sub> > 25°C.

## 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.

**TIP33B TIP33C TIP34B TIP34C**

**PACKAGE DIMENSIONS**

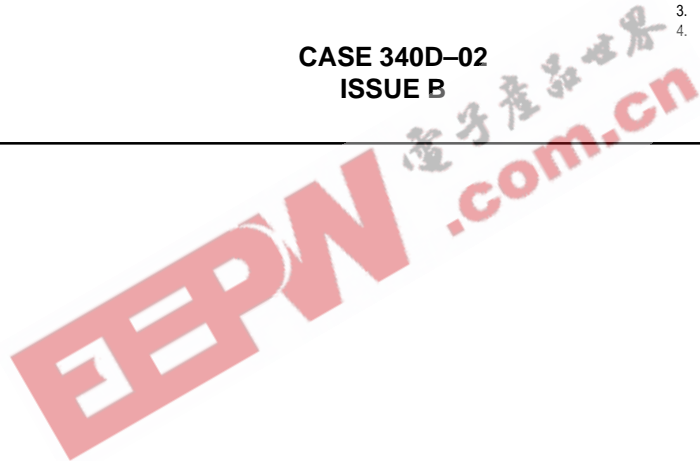


NOTES:  
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
 2. CONTROLLING DIMENSION: MILLIMETER.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	—	20.35	—	0.801
B	14.70	15.20	0.579	0.598
C	4.70	4.90	0.185	0.193
D	1.10	1.30	0.043	0.051
E	1.17	1.37	0.046	0.054
G	5.40	5.55	0.213	0.219
H	2.00	3.00	0.079	0.118
J	0.50	0.78	0.020	0.031
K	31.00 REF	—	1.220 REF	—
L	—	16.20	—	0.638
Q	4.00	4.10	0.158	0.161
S	17.80	18.20	0.701	0.717
U	4.00 REF	—	0.157 REF	—
V	1.75 REF	—	0.069	—


STYLE 1:  
 PIN 1. BASE  
 2. COLLECTOR  
 3. EMITTER  
 4. COLLECTOR

**CASE 340D-02  
 ISSUE B**



# TIP33B TIP33C TIP34B TIP34C

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TIP33B/D

