Complementary Silicon High-Power Transistors

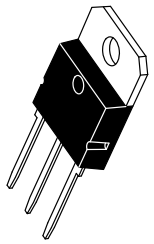
. . . for general–purpose power amplifier and switching applications.

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

NPN
TIP33B*
TIP33C
PNP
TIP34B*
TIP34C

***Motorola Preferred Device**

10 AMPERE COMPLEMENTARY SILICON POWER TRANSISTORS 100 VOLTS 80 WATTS



CASE 340D–02
TO–218AC

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°C Derate above 25°C	P_D	 80 0.64		 Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–65 to +150		°C

THERMAL CHARACTERISTICS

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

(1) Pulse Test: Pulse Width = 10 ms, Duty Cycle ≤ 10%.

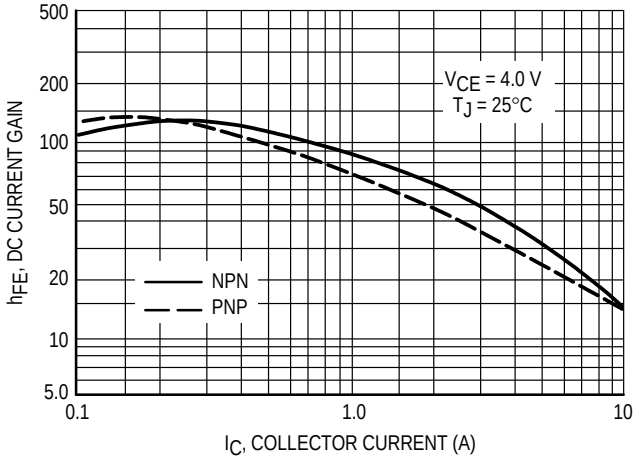


Figure 1. DC Current Gain

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

REV 1

© Motorola, Inc. 1996

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Sustaining Voltage (1) (I_C = 30 mA, I_B = 0)	TIP33B, TIP34B TIP33C, TIP34C	$V_{CEO(sus)}$	 80 100	 — —	Vdc
Collector–Emitter Cutoff Current (V_{CE} = 60 V, I_B = 0)	TIP33B, TIP33C, TIP34B, TIP34C	I_{CEO}	—	0.7	mA
Collector–Emitter Cutoff Current (V_{CE} = Rated V_{CEO}, V_{EB} = 0)		I_{CES}	—	0.4	mA
Emitter–Base Cutoff Current (V_{EB} = 5.0 V, I_C = 0)		I_{EBO}	—	1.0	mA
ON CHARACTERISTICS (1)					
DC Current Gain (I_C = 1.0 A, V_{CE} = 4.0 V) (I_C = 3.0 A, V_{CE} = 4.0 V)		h_{FE}	 40 20	 — 100	—
Collector–Emitter Saturation Voltage (I_C = 3.0 A, I_B = 0.3 A) (I_C = 10 A, I_B = 2.5 A)		$V_{CE(sat)}$	 — —	 1.0 4.0	Vdc
Base–Emitter On Voltage (I_C = 3.0 A, V_{CE} = 4.0 V) (I_C = 10 A, V_{CE} = 4.0 V)		$V_{BE(on)}$	 — —	 1.6 3.0	Vdc
DYNAMIC CHARACTERISTICS					
Small–Signal Current Gain (I_C = 0.5 A, V_{CE} = 10 V, f = 1.0 kHz)		h_{fe}	20	—	—
Current–Gain — Bandwidth Product (I_C = 0.5 A, V_{CE} = 10 V, f = 1.0 MHz)		f_T	3.0	—	MHz

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

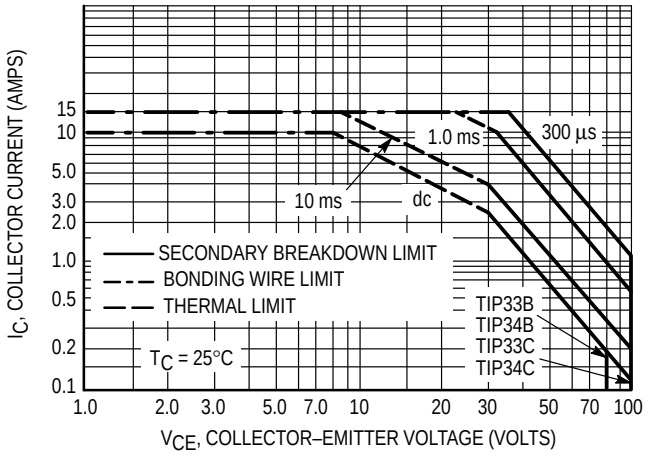


Figure 2. Maximum Rated Forward Bias Safe Operating Area

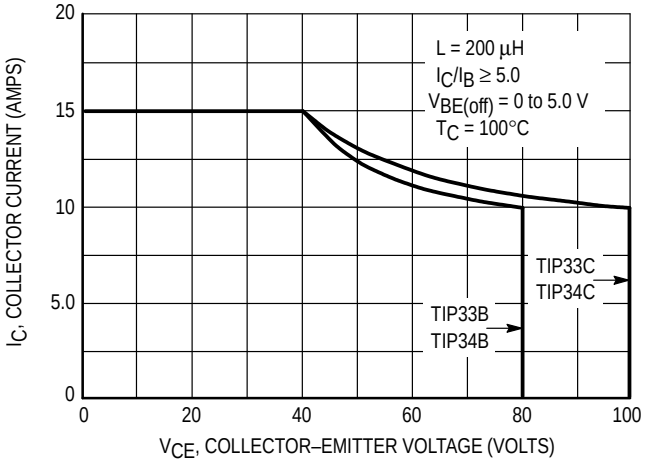


Figure 3. Maximum Rated Forward Bias Safe Operating Area

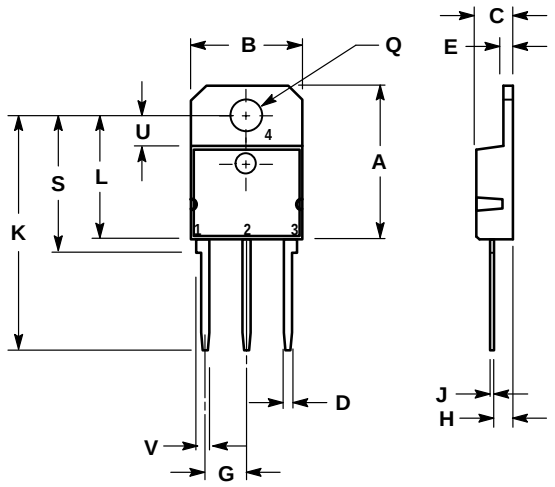
FORWARD BIAS

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_C = 25°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°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.

PACKAGE DIMENSIONS



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

	MILLIMETERS		INCHES	
DIM	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

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. “Typical” parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including “Typicals” must be validated for each customer application by customer’s technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and Ⓜ are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

How to reach us:

USA / EUROPE / Locations Not Listed: Motorola Literature Distribution; P.O. Box 20912; Phoenix, Arizona 85036. 1–800–441–2447 or 602–303–5454

MFAX: RMFAX0@email.sps.mot.com – TOUCHTONE 602–244–6609

INTERNET: http://Design–NET.com

JAPAN: Nippon Motorola Ltd.; Tatsumi–SPD–JLDC, 6F Seibu–Butsuryu–Center, 3–14–2 Tatsumi Koto–Ku, Tokyo 135, Japan. 03–81–3521–8315

ASIA / PACIFIC: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park, 51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852–26629298