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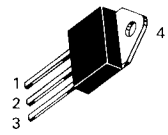
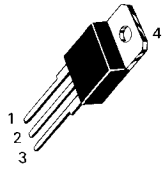
*Consult Motorola if a direct replacement is necessary.

TABLE 4 — PLASTIC TO-218



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



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

CASE 340-02 (TO-218AC)

I_CCont Amps Max	$V_{CEO(sus)}$ Volts Min	Device Type NPN	Device Type PNP	h_{FE} Min/Max	@ I_C Amp	Resistive Switching t_s μs Max	Resistive Switching t_f μs Max	Resistive Switching @ I_C Amp	f_T MHz Min	P_D (Case) Watts @ 25°C
3	750	MJH16032		4 min	3	2	1.5	2		125
	850	MJH16034		4 min	3	2	1.5	2		125
5	400	BUW11		6 min	3	4	0.8	3		125
	450	BUW11A MJH16002 MJH16004		6 min 5 min 7 min	2.5 5 5	4 3 2.7	0.8 0.3 0.35	2.5 3 3		125 100 100
	500	MJH16002A		5 min	5	3	0.3	3		100
	1500*	MJH12004		2.5 min	4.5	—	1	4.5	4	100
6	375	BU426†		30 typ	0.6	2 typ	0.5 typ	2.5	6 typ	113
	400	BU426A†		30 typ	0.6	2 typ	0.5 typ	2.5	6 typ	113
8	400	BUW12 MJH16106		6 min 6/25	6 8	4 2 typ	0.8 0.1 typ	5 5		125 125
	450	BUW12A MJH16006 MJH16008		6 min 5 min 7 min	5 8 8	4 2.5 2.2	0.8 0.25 0.25	5 5 5		125 125 125
	500	BUT50P##† MJH16006A		30 min 5 min	2 8	0.75 typ 2.5	0.1 typ 0.25	5 5		100 125
	700	BU508,A BU508D,AD		2.25 min 2.25 min	4.5 4.5	8 typ 8 typ	0.5 typ 0.5 typ	4.5 4.5	7 7	125 125
	750	MJH12005					0.4 typ	5	4	100
9	400	BUV47†		7 min	5	2	0.4	6		128
	450	BUV47A†		7 min	6	2	0.4	6		128
10	40	TIP33	TIP34	20 min	3				3	80
	60	BDV65##† TIP33A TIP140##	BDV64##† TIP34A TIP145##	1k min 20 min 500 min	5 3 10	 2.5 typ	 2.5 typ	 5	 3 4#	125 80 125
	80	BDV65A##† TIP33B TIP141##	BDV64A##† TIP34B TIP146##	1k min 20 min 500 min	5 3 10	 2.5 typ	 2.5 typ	 5	 3 4#	125 80 125
	100	BDV65B##† TIP33C TIP142##	BDV64B##† TIP34C TIP147##	1k min 20 min 500 min	5 3 10	 2.5 typ	 2.5 typ	 5	 3 4#	125 80 125
	120	BDV65C##†	BDV64C##†	1k min	5					125
	200	BU323P##†		150 min	6	15	15	6		125
	250	BU323AP##†		150 min	6	15	15	6		125
	400	MJH10012##		100/2k	6	15	15	6		118
	800	MJH16018		4 min	5	4.5 typ	0.2 typ	5		150
15	60	TIP3055	TIP2955	5 min	10				2.5	80
	150	MJH11018##	MJH11017##	400/15k	10				3#	150
	200	MJH11020##	MJH11019##	400/15k	10				3#	150
	250	MJH11022##	MJH11021##	400/15k	10				3#	150

$|h_{fe}|$ @ 1 MHz, ## Darlington
* $V_{(BR)CEX}$ or $V_{(BR)CES}$
† These devices supplied in Case 340D-01. Consult Motorola for details.

(continued)

MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

NPN	PNP
TIP33	**TIP34**
TIP33A	**TIP34A**
TIP33B	**TIP34B**
TIP33C	**TIP34C**

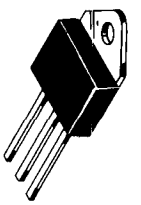
COMPLEMENTARY SILICON HIGH-POWER TRANSISTORS

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

- 10 A Collector Current
- Low Leakage Current — I_{CEO} = 0.7 mA @ 30 and 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

10 AMPERE COMPLEMENTARY SILICON POWER TRANSISTORS

40-100 VOLTS
80 WATTS



MAXIMUM RATINGS

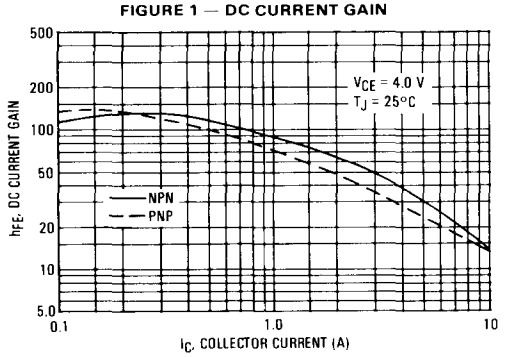
Rating	Symbol	TIP33 TIP34	TIP33A TIP34A	TIP33B TIP34B	TIP33C TIP34C	Unit
Collector-Emitter Voltage	V_{CEO}	40 V	60 V	80 V	100 V	Vdc
Collector-Base Voltage	V_{CB}	40 V	60 V	80 V	100 V	Vdc
Emitter-Base Voltage	V_{EB}	5.0				Vdc
Collector Current — Continuous	I_C	10				Adc
Peak (1)		15				
Base Current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

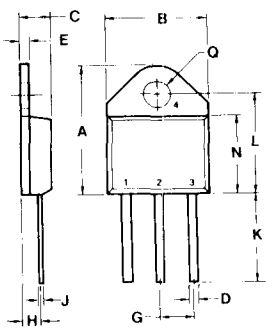
THERMAL CHARACTERISTICS

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





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

DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	20.32	21.08	0.800	0.830
B	15.49	15.90	0.610	0.626
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	15.49	0.500	0.610
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	0.166

CASE 340-02
TO-218AC

3

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)	TIP33, TIP34	$V_{CEO(sus)}$	40	—	Vdc
	TIP33A, TIP34A		60	—	
	TIP33B, TIP34B		80	—	
	TIP33C, TIP34C		100	—	
Collector-Emitter Cutoff Current		I_{CEO}			mA
(V_{CE} = 30 V, I_B = 0)	TIP33, TIP33A, TIP34, TIP34A		—	0.7	
(V_{CE} = 60 V, I_B = 0)	TIP33B, TIP33C, TIP34B, TIP34C		—	0.7	
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		h_{FE}			—
(I_C = 1.0 A, V_{CE} = 4.0 V)			40	—	
(I_C = 3.0 A, V_{CE} = 4.0 V)			20	100	
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$			Vdc
(I_C = 3.0 A, I_B = 0.3 A)			—	1.0	
(I_C = 10 A, I_B = 2.5 A)			—	4.0	
Base-Emitter On Voltage		$V_{BE(on)}$			Vdc
(I_C = 3.0 A, V_{CE} = 4.0 V)			—	1.6	
(I_C = 10 A, V_{CE} = 4.0 V)			—	3.0	
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 (2) (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%.
(2) $f_T = |h_{fe}| \cdot f_{test}$

FIGURE 2 — MAXIMUM RATED FORWARD BIAS SAFE OPERATING AREA

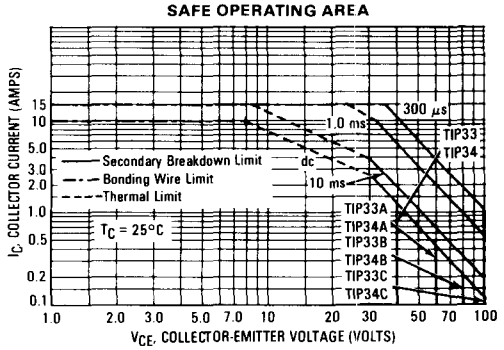
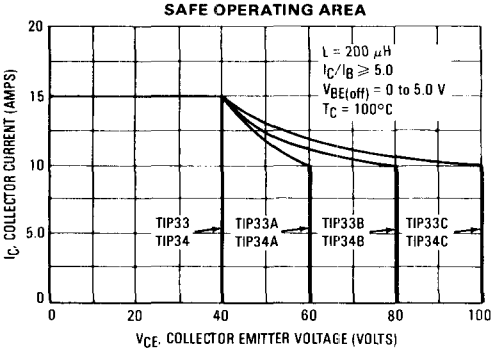


FIGURE 3 — MAXIMUM RATED REVERSE BIAS SAFE OPERATING AREA



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.