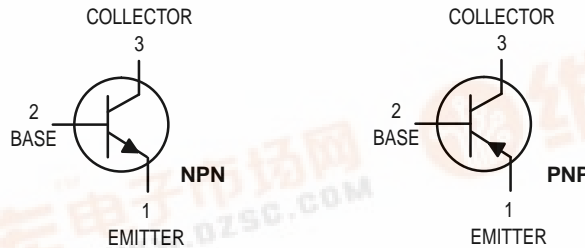


## Amplifier Transistors



**NPN**  
**MPS650**  
**MPS651 \***  
**PNP**  
**MPS750**  
**MPS751 \***

Voltage and current are  
negative for PNP transistors

\*Motorola Preferred Devices

### MAXIMUM RATINGS

Rating	Symbol	MPS650 MPS750	MPS651 MPS751	Unit
Collector–Emitter Voltage	$V_{CE}$	40	60	Vdc
Collector–Base Voltage	$V_{CB}$	60	80	Vdc
Emitter–Base Voltage	$V_{EB}$	5.0		Vdc
Collector Current — Continuous	$I_C$	2.0		Adc
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	625 5.0		mW mW/°C
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.5 12		Watt mW/°C
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	–55 to +150		°C



CASE 29–04, STYLE 1  
TO–92 (TO–226AA)

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	°C/W

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

Characteristic	Symbol	Min	Max	Unit
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### OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage <sup>(1)</sup> ( $I_C = 10 \text{ mAdc}$ , $I_E = 0$ )	MPS650, MPS750 MPS651, MPS751	$V_{(BR)CEO}$	40 60	— —	Vdc
Collector–Base Breakdown Voltage ( $I_C = 100 \mu\text{Adc}$ , $I_E = 0$ )	MPS650, MPS750 MPS651, MPS751	$V_{(BR)CBO}$	60 80	— —	Vdc
Emitter–Base Breakdown Voltage ( $I_C = 0$ , $I_E = 10 \mu\text{Adc}$ )		$V_{(BR)EBO}$	5.0	—	Vdc
Collector Cutoff Current ( $V_{CB} = 60 \text{ Vdc}$ , $I_E = 0$ ) ( $V_{CB} = 80 \text{ Vdc}$ , $I_E = 0$ )	MPS650, MPS750 MPS651, MPS751	$I_{CBO}$	— —	0.1 0.1	$\mu\text{Adc}$
Emitter Cutoff Current ( $V_{EB} = 4.0 \text{ V}$ , $I_C = 0$ )		$I_{EBO}$	—	0.1	$\mu\text{Adc}$

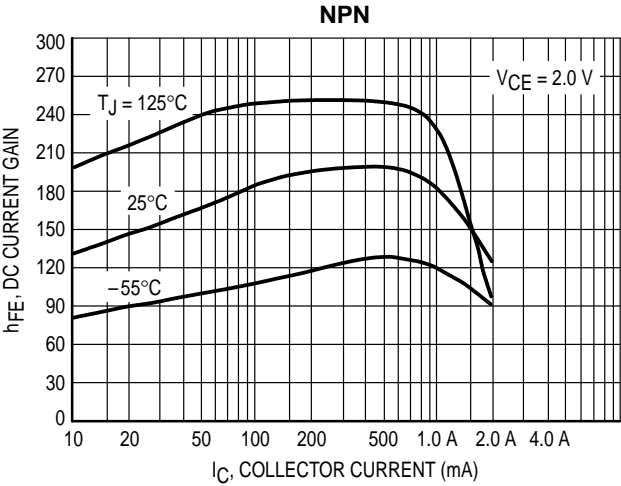
1. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle = 2.0%.

**NPN MPS650 MPS651 PNP MPS750 MPS751**

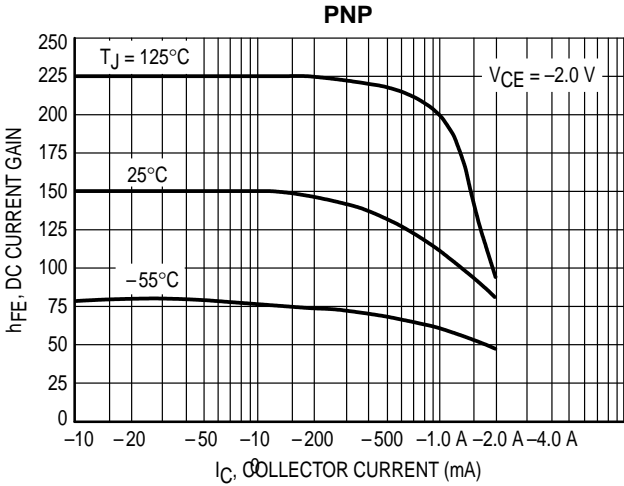
**ELECTRICAL CHARACTERISTICS** ( $T_C = 25^\circ\text{C}$  unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Max	Unit
<b>ON CHARACTERISTICS(1)</b>				
DC Current Gain ( $I_C = 50\text{ mA}$ , $V_{CE} = 2.0\text{ V}$ ) ( $I_C = 500\text{ mA}$ , $V_{CE} = 2.0\text{ V}$ ) ( $I_C = 1.0\text{ A}$ , $V_{CE} = 2.0\text{ V}$ ) ( $I_C = 2.0\text{ A}$ , $V_{CE} = 2.0\text{ V}$ )	$h_{FE}$	75 75 75 40	— — — —	—
Collector–Emitter Saturation Voltage ( $I_C = 2.0\text{ A}$ , $I_B = 200\text{ mA}$ ) ( $I_C = 1.0\text{ A}$ , $I_B = 100\text{ mA}$ )	$V_{CE(sat)}$	— —	0.5 0.3	Vdc
Base–Emitter On Voltage ( $I_C = 1.0\text{ A}$ , $V_{CE} = 2.0\text{ V}$ )	$V_{BE(on)}$	—	1.0	Vdc
Base–Emitter Saturation Voltage ( $I_C = 1.0\text{ A}$ , $I_B = 100\text{ mA}$ )	$V_{BE(sat)}$	—	1.2	Vdc
<b>SMALL–SIGNAL CHARACTERISTICS</b>				
Current–Gain — Bandwidth Product(2) ( $I_C = 50\text{ mAdc}$ , $V_{CE} = 5.0\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$f_T$	75	—	MHz

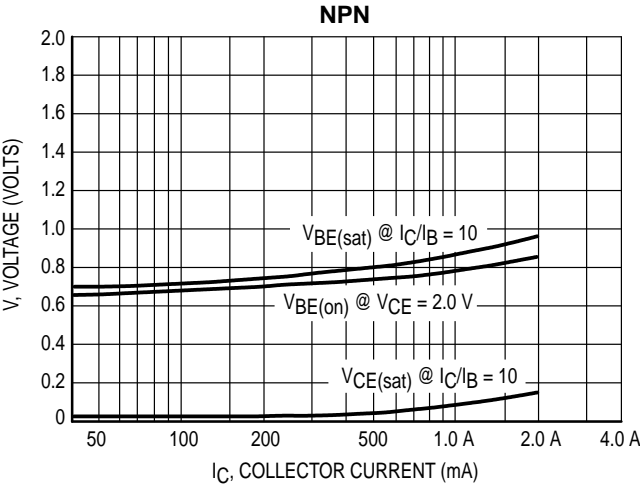
1. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle = 2.0%.  
2.  $f_T$  is defined as the frequency at which  $|h_{fe}|$  extrapolates to unity.



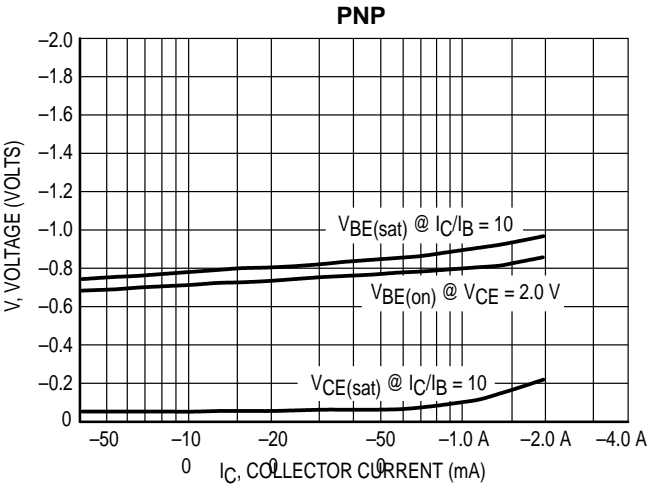
**Figure 1. MPS650, MPS651**  
**Typical DC Current Gain**



**Figure 2. MPS750, MPS751**  
**Typical DC Current Gain**

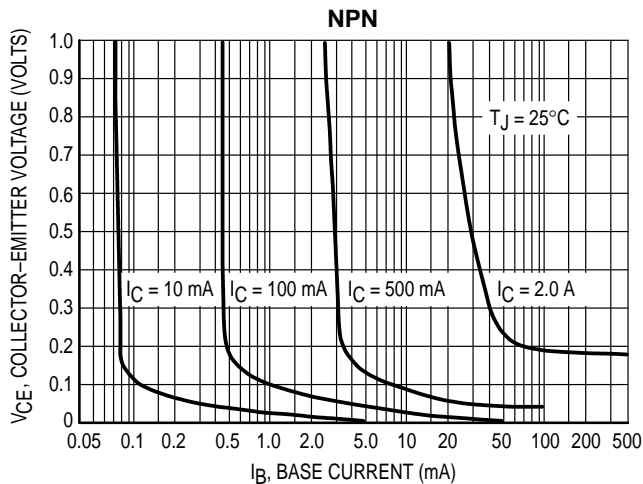


**Figure 3. MPS650, MPS651**  
**On Voltages**

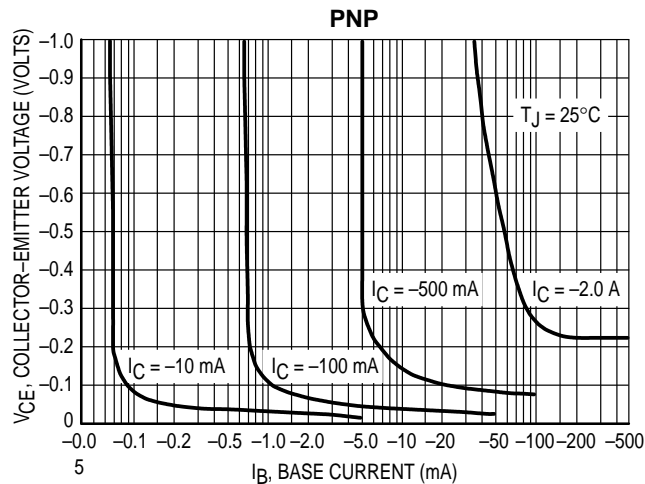


**Figure 4. MPS750, MPS751**  
**On Voltages**

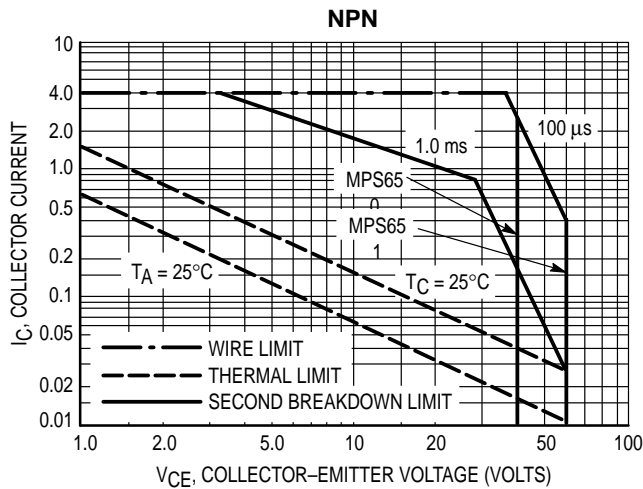
**NPN MPS650 MPS651 PNP MPS750 MPS751**



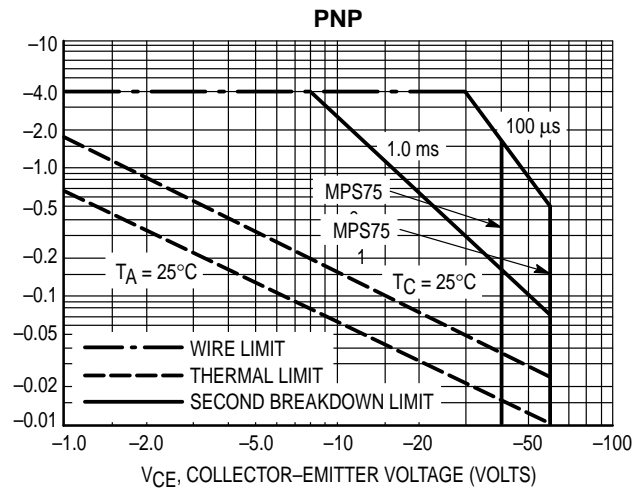
**Figure 5. MPS650, MPS651  
Collector Saturation Region**



**Figure 6. MPS750, MPS751  
Collector Saturation Region**



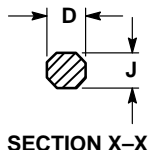
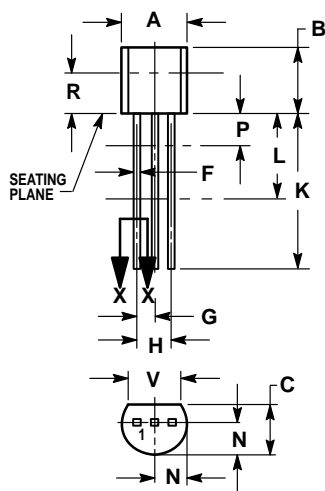
**Figure 7. MPS650, MPS651 SOA,  
Safe Operating Area**



**Figure 8. MPS750, MPS751 SOA,  
Safe Operating Area**

# NPN MPS650 MPS651 PNP MPS750 MPS751

## PACKAGE DIMENSIONS



**CASE 029-04  
(TO-226AA)  
ISSUE AD**


### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K MINIMUM. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.022	0.41	0.55
F	0.016	0.019	0.41	0.48
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	—	12.70	—
L	0.250	—	6.35	—
N	0.080	0.105	2.04	2.66
P	—	0.100	—	2.54
R	0.115	—	2.93	—
V	0.135	—	3.43	—

### STYLE 1:

1. PIN 1. EMITTER
2. BASE
3. COLLECTOR

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