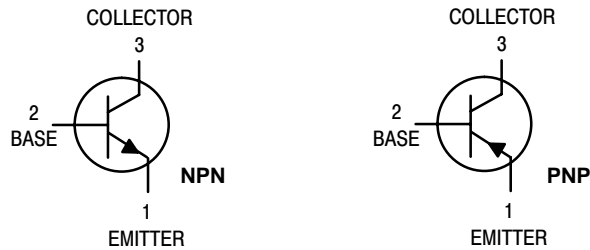


# Amplifier Transistors



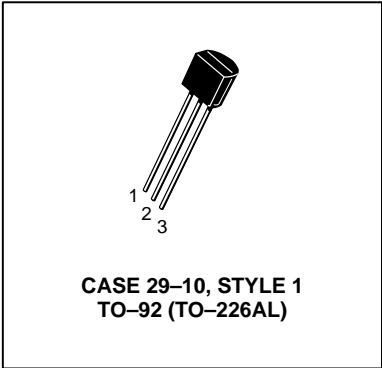
**NPN**  
**MPS650**  
**MPS651 \***  
**PNP**  
**MPS750**  
**MPS751 \***

Voltage and current are negative for PNP transistors

\*ON Semiconductor 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/ $^\circ\text{C}$
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.5	12	Watt mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	–55 to +150		$^\circ\text{C}$



**THERMAL CHARACTERISTICS**

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

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

Characteristic	Symbol	Min	Max	Unit
----------------	--------	-----	-----	------

**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%.

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

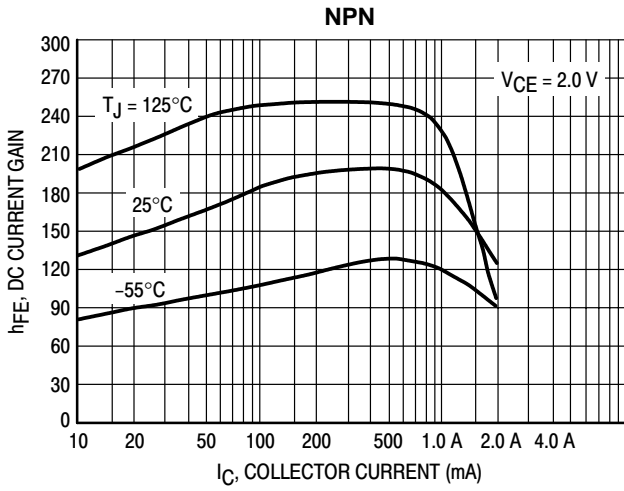
# NPN MPS650 MPS651 PNP MPS750 MPS751

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

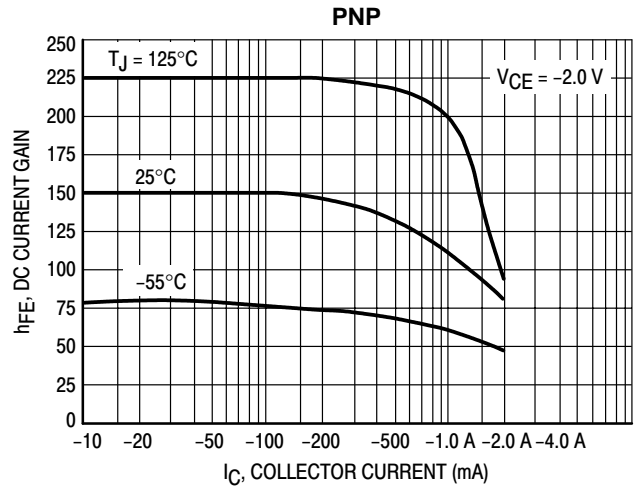
Characteristic	Symbol	Min	Max	Unit
<b>ON CHARACTERISTICS(1)</b>				
DC Current Gain (I <sub>C</sub> = 50 mA, V <sub>CE</sub> = 2.0 V) (I <sub>C</sub> = 500 mA, V <sub>CE</sub> = 2.0 V) (I <sub>C</sub> = 1.0 A, V <sub>CE</sub> = 2.0 V) (I <sub>C</sub> = 2.0 A, V <sub>CE</sub> = 2.0 V)	h <sub>FE</sub>	75 75 75 40	— — — —	—
Collector–Emitter Saturation Voltage (I <sub>C</sub> = 2.0 A, I <sub>B</sub> = 200 mA) (I <sub>C</sub> = 1.0 A, I <sub>B</sub> = 100 mA)	V <sub>CE(sat)</sub>	— —	0.5 0.3	Vdc
Base–Emitter On Voltage (I <sub>C</sub> = 1.0 A, V <sub>CE</sub> = 2.0 V)	V <sub>BE(on)</sub>	—	1.0	Vdc
Base–Emitter Saturation Voltage (I <sub>C</sub> = 1.0 A, I <sub>B</sub> = 100 mA)	V <sub>BE(sat)</sub>	—	1.2	Vdc
<b>SMALL–SIGNAL CHARACTERISTICS</b>				
Current–Gain — Bandwidth Product <sup>(2)</sup> (I <sub>C</sub> = 50 mA, V <sub>CE</sub> = 5.0 Vdc, f = 100 MHz)	f <sub>T</sub>	75	—	MHz

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle = 2.0%.
2. f<sub>T</sub> is defined as the frequency at which |h<sub>fe</sub>| extrapolates to unity.

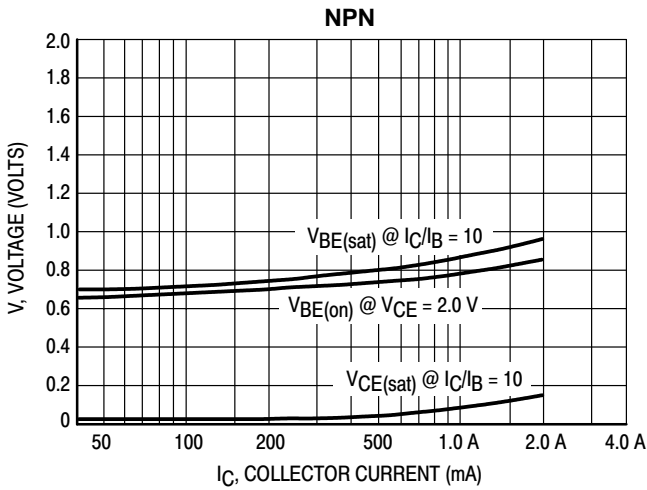
# NPN MPS650 MPS651 PNP MPS750 MPS751



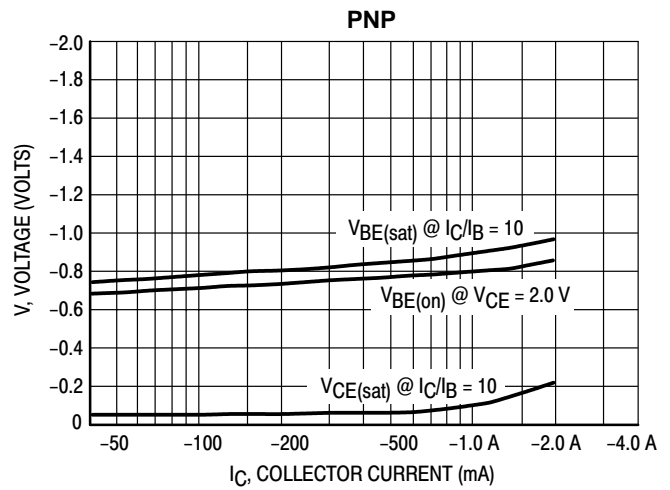
**Figure 1. MPS650, MPS651  
Typical DC Current Gain**



**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

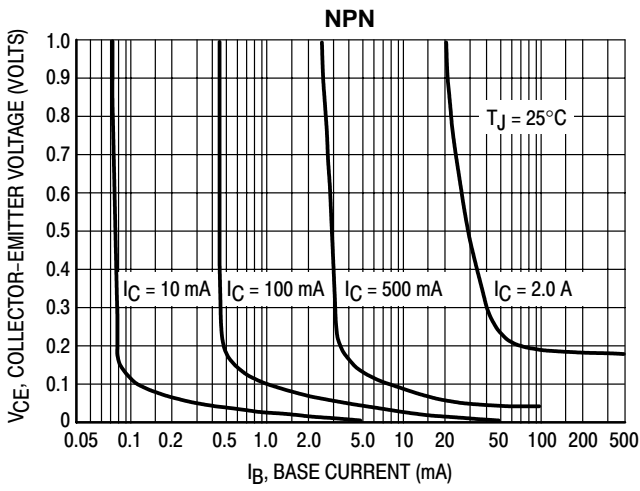


Figure 5. MPS650, MPS651  
Collector Saturation Region

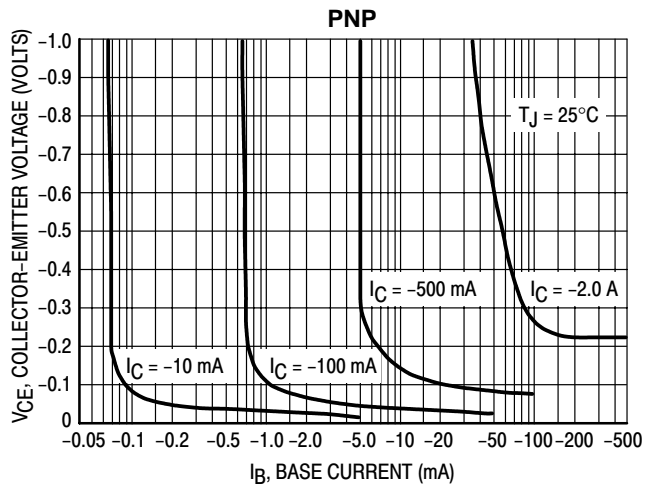


Figure 6. MPS750, MPS751  
Collector Saturation Region

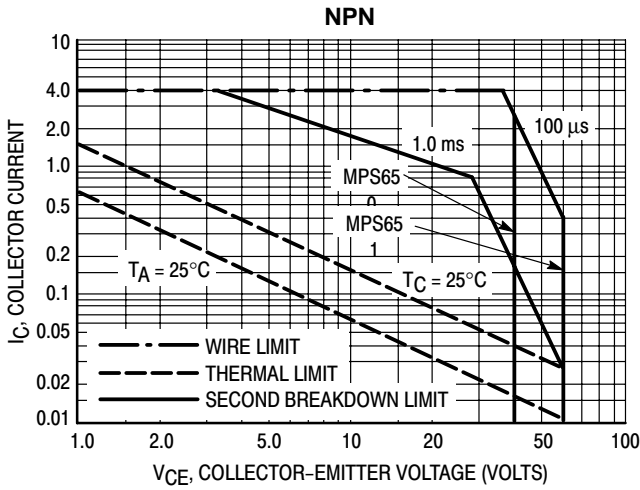


Figure 7. MPS650, MPS651 SOA,  
Safe Operating Area

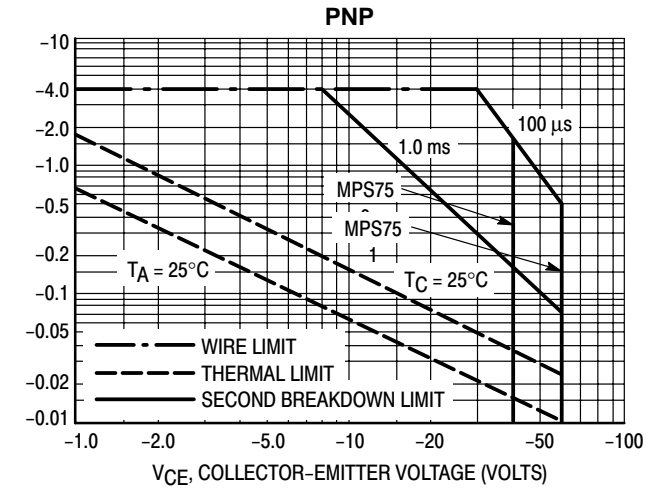
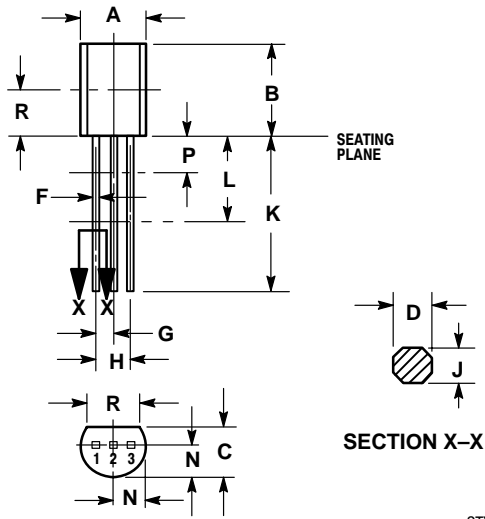


Figure 8. MPS750, MPS751 SOA,  
Safe Operating Area

# NPN MPS650 MPS651 PNP MPS750 MPS751

## PACKAGE DIMENSIONS

TO-92 (TO-226)  
CASE 29-10  
ISSUE AL



SECTION X-X

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


- 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. DIMENSIONS 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	4.44	5.21
B	0.290	0.310	7.37	7.87
C	0.125	0.165	3.18	4.19
D	0.018	0.021	0.457	0.533
F	0.016	0.019	0.407	0.482
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.018	0.024	0.46	0.61
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	0.135	---	3.43	---

## Notes

## Notes

# NPN MPS650 MPS651 PNP MPS750 MPS751

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