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# NPN - MPS650, MPS651; PNP - MPS750, MPS751



## Amplifier Transistors

### Features

- These are Pb-Free Devices\*

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<http://onsemi.com>

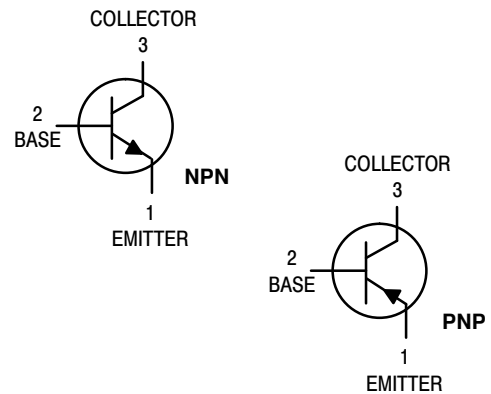
### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector - Emitter Voltage MPS650; MPS750 MPS651; MPS751	$V_{CE}$	40 60	Vdc
Collector - Base Voltage MPS650; MPS750 MPS651; MPS751	$V_{CB}$	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	W mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

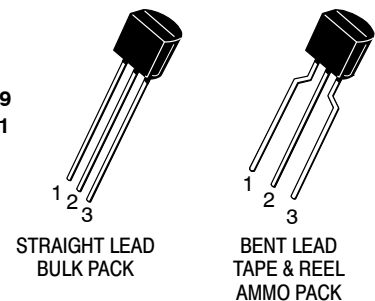
### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Ambient	$V_{CE}$	200	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$V_{CB}$	83.3	$^\circ\text{C}/\text{W}$

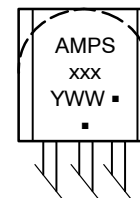
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.



TO-92  
CASE 29  
STYLE 1



### MARKING DIAGRAM



- xxx = 650, 750, 651, or 751
- A = Assembly Location
- Y = Year
- WW = Work Week
- = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

# NPN – MPS650, MPS651; PNP – MPS750, MPS751

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

Characteristic		Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector – Emitter Breakdown Voltage (Note 1) (I <sub>C</sub> = 10 mA <sub>dc</sub> , I <sub>B</sub> = 0)	MPS650, MPS750 MPS651, MPS751	V <sub>(BR)CEO</sub>	40 60	– –	V <sub>dc</sub>
Collector – Base Breakdown Voltage (I <sub>C</sub> = 100 μA <sub>dc</sub> , I <sub>E</sub> = 0)	MPS650, MPS750 MPS651, MPS751	V <sub>(BR)CBO</sub>	60 80	– –	V <sub>dc</sub>
Emitter – Base Breakdown Voltage (I <sub>C</sub> = 0, I <sub>E</sub> = 10 μA <sub>dc</sub> )		V <sub>(BR)EBO</sub>	5.0	–	V <sub>dc</sub>
Collector Cutoff Current (V <sub>CB</sub> = 60 V <sub>dc</sub> , I <sub>E</sub> = 0) (V <sub>CB</sub> = 80 V <sub>dc</sub> , I <sub>E</sub> = 0)	MPS650, MPS750 MPS651, MPS751	I <sub>CBO</sub>	– –	0.1 0.1	μA <sub>dc</sub>
Emitter Cutoff Current (V <sub>EB</sub> = 4.0 V, I <sub>C</sub> = 0)		I <sub>EBO</sub>	–	0.1	μA <sub>dc</sub>

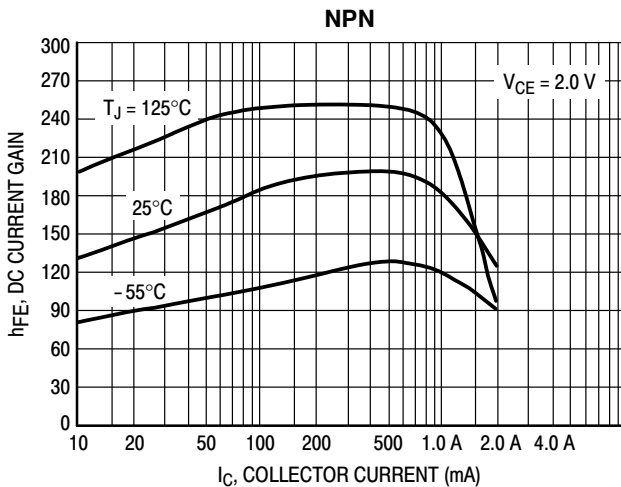
## ON CHARACTERISTICS (Note 1)

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	V <sub>dc</sub>
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	V <sub>dc</sub>
Base – Emitter Saturation Voltage (I <sub>C</sub> = 1.0 A, I <sub>B</sub> = 100 mA)		V <sub>BE(sat)</sub>	–	1.2	V <sub>dc</sub>

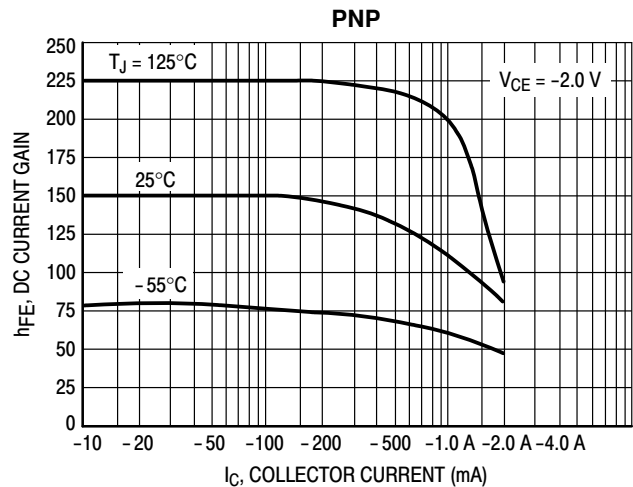
## SMALL – SIGNAL CHARACTERISTICS

Current – Gain – Bandwidth Product (Note 2) (I <sub>C</sub> = 50 mA <sub>dc</sub> , V <sub>CE</sub> = 5.0 V <sub>dc</sub> , f = 100 MHz)		f <sub>T</sub>	75	–	MHz
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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.



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



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

NPN – MPS650, MPS651; PNP – MPS750, MPS751

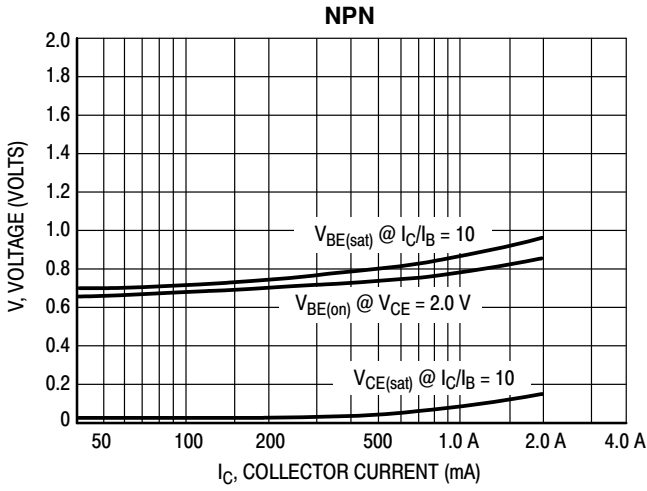


Figure 3. MPS650, MPS651 On Voltages

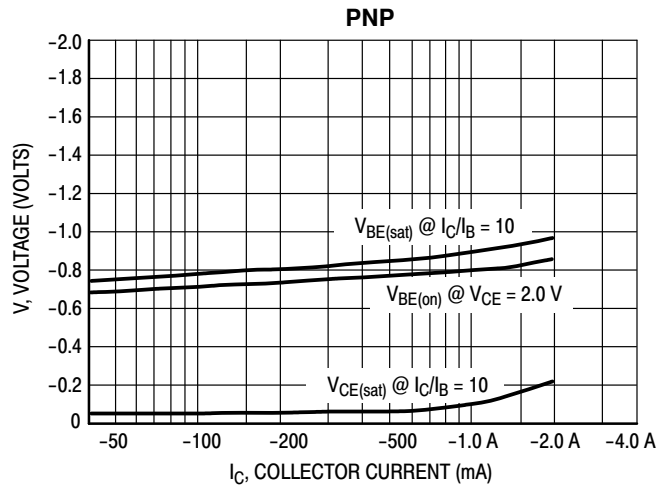


Figure 4. MPS750, MPS751 On Voltages

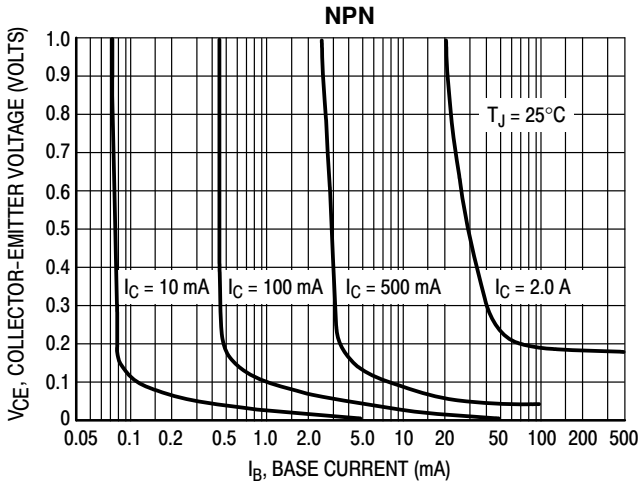


Figure 5. MPS650, MPS651 Collector Saturation Region

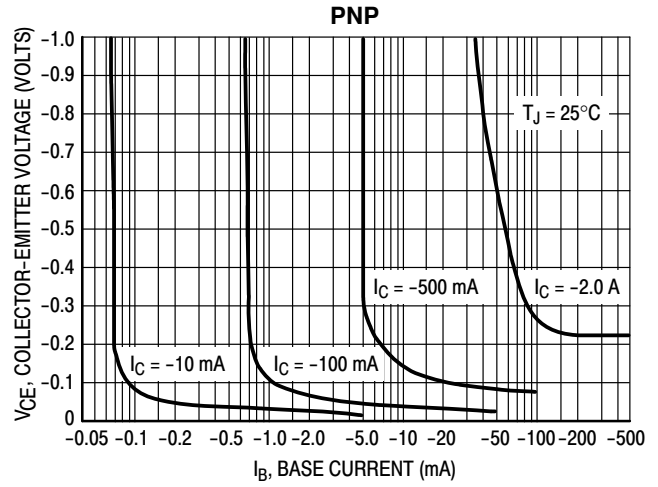


Figure 6. MPS750, MPS751 Collector Saturation Region

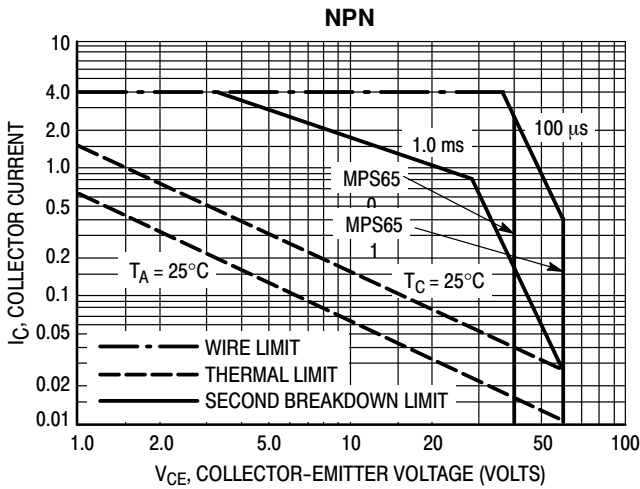


Figure 7. MPS650, MPS651 SOA, Safe Operating Area

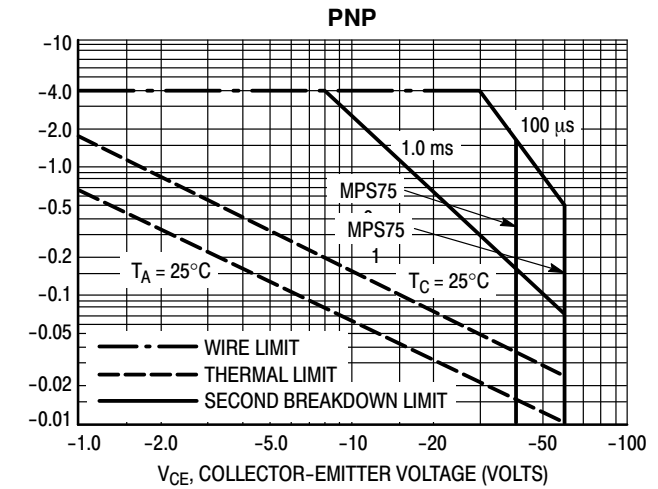


Figure 8. MPS750, MPS751 SOA, Safe Operating Area

## NPN – MPS650, MPS651; PNP – MPS750, MPS751

### ORDERING INFORMATION

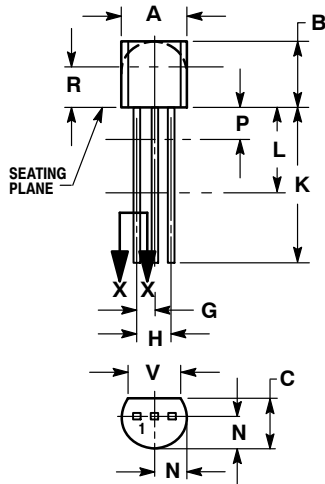
Device	Package	Shipping†
MPS650G	TO-92 (Pb-Free)	5000 Units / Bulk
MPS650RLRAG	TO-92 (Pb-Free)	2000 / Tape & Reel
MPS650ZL1G	TO-92 (Pb-Free)	2000 / Tape & Ammunition
MPS651G	TO-92 (Pb-Free)	5000 Units / Bulk
MPS651RLRAG	TO-92 (Pb-Free)	2000 / Tape & Reel
MPS651RLRMG	TO-92 (Pb-Free)	2000 / Tape & Ammunition
MPS750G	TO-92 (Pb-Free)	5000 Units / Bulk
MPS750RLRAG	TO-92 (Pb-Free)	2000 / Tape & Reel
MPS750RLRPG	TO-92 (Pb-Free)	2000 / Tape & Ammunition
MPS751G	TO-92 (Pb-Free)	5000 Units / Bulk
MPS751RLRAG	TO-92 (Pb-Free)	2000 / Tape & Reel
MPS751RLRPG	TO-92 (Pb-Free)	2000 / Tape & Ammunition
MPS751ZL1G	TO-92 (Pb-Free)	2000 / Tape & Ammunition

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

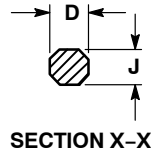
# NPN – MPS650, MPS651; PNP – MPS750, MPS751

## PACKAGE DIMENSIONS

TO-92 (TO-226)  
CASE 29-11  
ISSUE AM



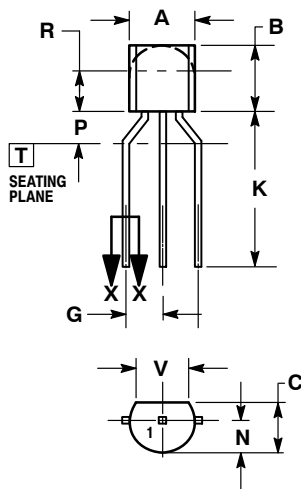
STRAIGHT LEAD  
BULK PACK



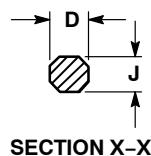
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. 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	0.021	0.407	0.533
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	---



BENT LEAD  
TAPE & REEL  
AMMO PACK



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	MILLIMETERS	
	MIN	MAX
A	4.45	5.20
B	4.32	5.33
C	3.18	4.19
D	0.40	0.54
G	2.40	2.80
J	0.39	0.50
K	12.70	---
N	2.04	2.66
P	1.50	4.00
R	2.93	---
V	3.43	---

STYLE 1:

1. EMITTER
2. BASE
3. COLLECTOR

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