

NPN - MPS650, MPS651; PNP - MPS750, MPS751



Amplifier Transistors

Features

- These are Pb-Free Devices*

ON Semiconductor®

<http://onsemi.com>

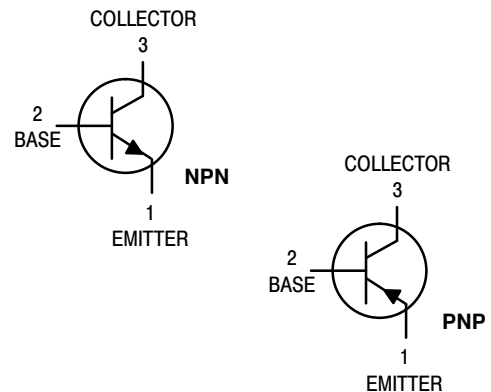
MAXIMUM RATINGS

| 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°C | P_D | 625 5.0 | mW mW/ $^\circ\text{C}$ |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 1.5 12 | W mW/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

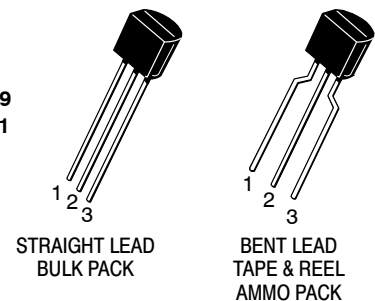
THERMAL CHARACTERISTICS

| 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 | $^\circ\text{C}/\text{W}$ |

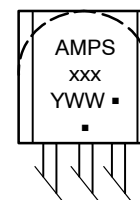
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.



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.

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

| Characteristic | | Symbol | Min | Max | Unit |
|--|----------------------------------|----------------------|----------|------------|------|
| OFF CHARACTERISTICS | | | | | |
| Collector – Emitter Breakdown Voltage (Note 1) (I _C = 10 mA, I _B = 0) | MPS650, MPS750 MPS651, MPS751 | V _{(BR)CEO} | 40 60 | – – | Vdc |
| Collector – Base Breakdown Voltage (I _C = 100 μA, I _E = 0) | MPS650, MPS750 MPS651, MPS751 | V _{(BR)CBO} | 60 80 | – – | Vdc |
| Emitter – Base Breakdown Voltage (I _C = 0, I _E = 10 μA) | | V _{(BR)EBO} | 5.0 | – | Vdc |
| Collector Cutoff Current (V _{CB} = 60 Vdc, I _E = 0) (V _{CB} = 80 Vdc, I _E = 0) | MPS650, MPS750 MPS651, MPS751 | I _{CBO} | – – | 0.1 0.1 | μA |
| Emitter Cutoff Current (V _{EB} = 4.0 V, I _C = 0) | | I _{EBO} | – | 0.1 | μA |

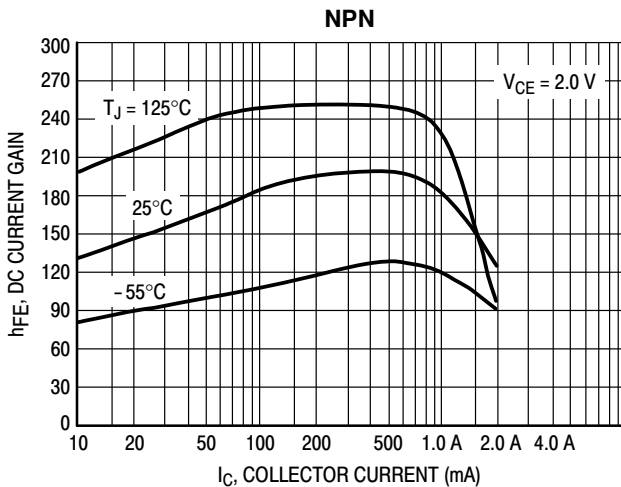
ON CHARACTERISTICS (Note 1)

| | | | | | |
|--|--|----------------------|----------------------|------------------|-----|
| DC Current Gain (I _C = 50 mA, V _{CE} = 2.0 V) (I _C = 500 mA, V _{CE} = 2.0 V) (I _C = 1.0 A, V _{CE} = 2.0 V) (I _C = 2.0 A, V _{CE} = 2.0 V) | | h _{FE} | 75 75 75 40 | – – – – | – |
| Collector – Emitter Saturation Voltage (I _C = 2.0 A, I _B = 200 mA) (I _C = 1.0 A, I _B = 100 mA) | | V _{CE(sat)} | – – | 0.5 0.3 | Vdc |
| Base – Emitter On Voltage (I _C = 1.0 A, V _{CE} = 2.0 V) | | V _{BE(on)} | – | 1.0 | Vdc |
| Base – Emitter Saturation Voltage (I _C = 1.0 A, I _B = 100 mA) | | V _{BE(sat)} | – | 1.2 | Vdc |

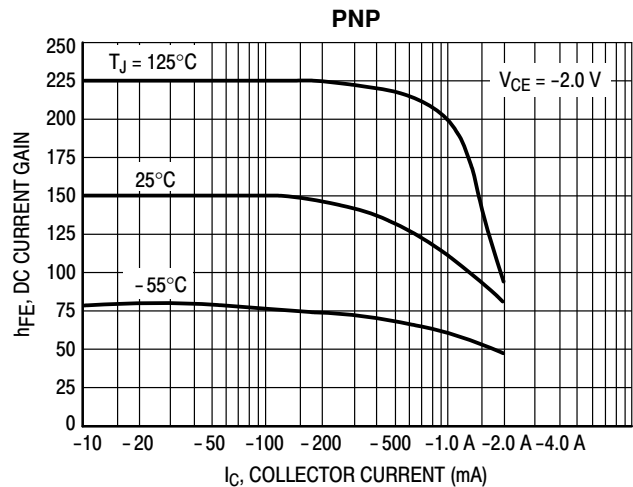
SMALL – SIGNAL CHARACTERISTICS

| | | | | | |
|---|--|----------------|----|---|-----|
| Current – Gain – Bandwidth Product (Note 2) (I _C = 50 mA, V _{CE} = 5.0 Vdc, f = 100 MHz) | | f _T | 75 | – | MHz |
|---|--|----------------|----|---|-----|

1. Pulse Test: Pulse Width ≤ 300 μs, 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**

NPN – MPS650, MPS651; PNP – MPS750, MPS751

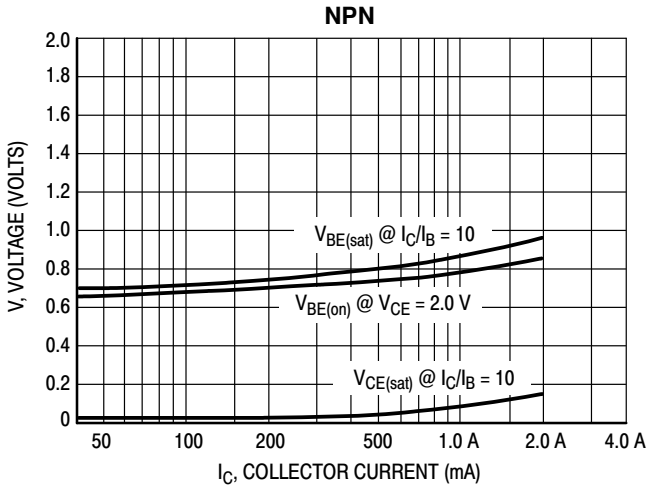


Figure 3. MPS650, MPS651 On Voltages

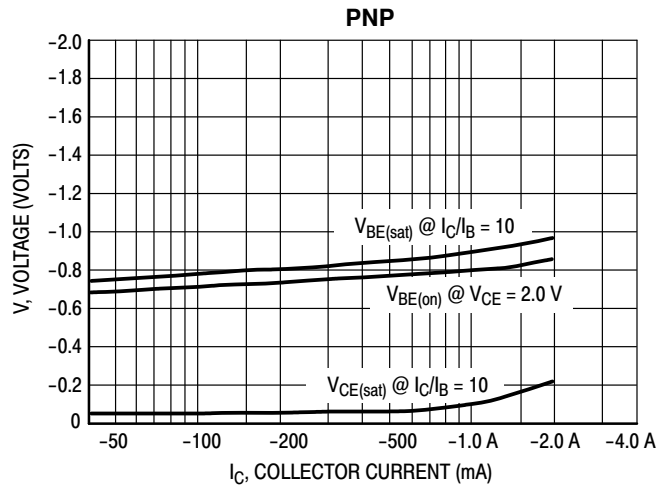


Figure 4. MPS750, MPS751 On Voltages

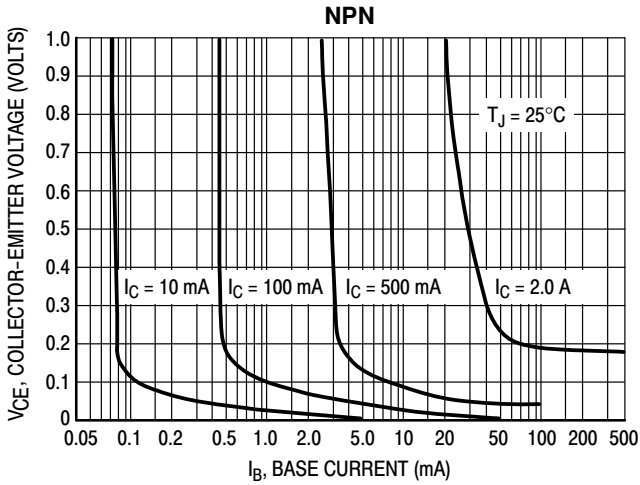


Figure 5. MPS650, MPS651 Collector Saturation Region

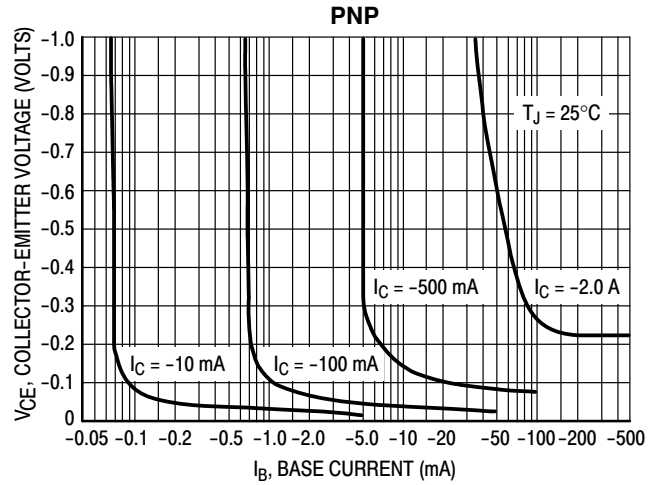


Figure 6. MPS750, MPS751 Collector Saturation Region

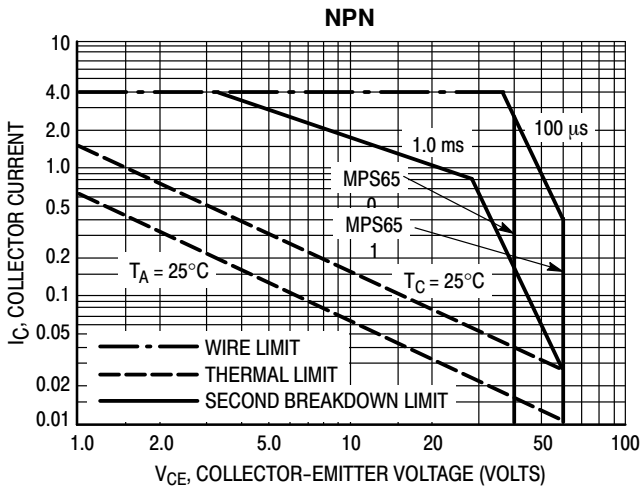


Figure 7. MPS650, MPS651 SOA, Safe Operating Area

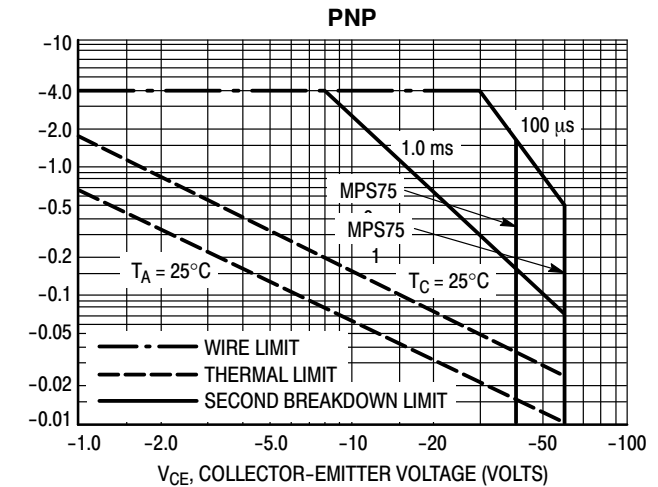


Figure 8. MPS750, MPS751 SOA, Safe Operating Area

NPN – MPS650, MPS651; PNP – MPS750, MPS751

ORDERING INFORMATION

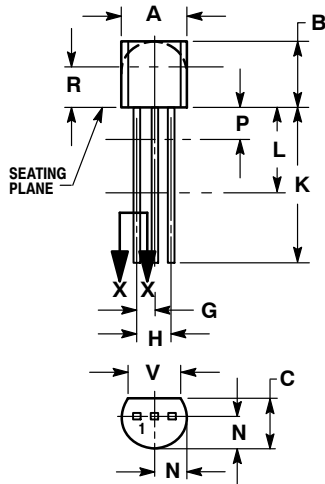
| Device | Package | Shipping† |
|-------------|--------------------|--------------------------|
| MPS650G | TO-92 (Pb-Free) | 5000 Units / Bulk |
| MPS650RLRAG | TO-92 (Pb-Free) | 2000 / Tape & Reel |
| MPS650ZL1G | TO-92 (Pb-Free) | 2000 / Tape & Ammunition |
| MPS651G | TO-92 (Pb-Free) | 5000 Units / 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.

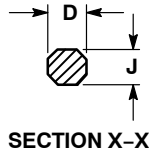
NPN – MPS650, MPS651; PNP – MPS750, MPS751

PACKAGE DIMENSIONS

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



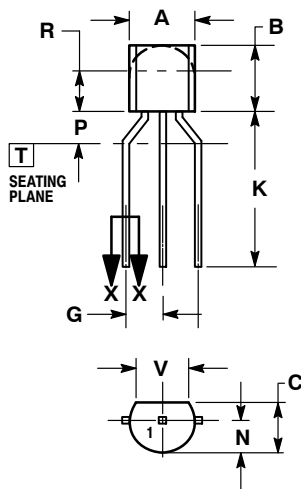
STRAIGHT LEAD
BULK PACK



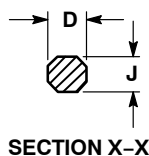
NOTES:

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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