Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

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

**MPS651 and MPS751 are Preferred Devices**

# Amplifier Transistors

**ON Semiconductor®**

**http://onsemi.com**

### Features

- Pb−Free Packages are Available*

### MAXIMUM RATINGS

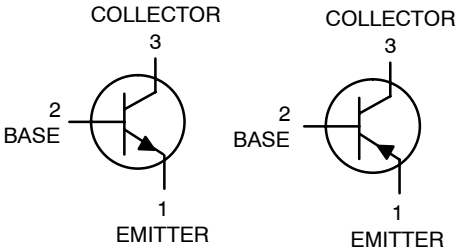
| Rating | Symbol | MPS650 MPS750 | MPS651 MPS751 | Unit |
|---|---|---|---|---|
| Collector − Emitter Voltage | $V_{CE}$ | 40 | 60 | Vdc |
| Collector − Base Voltage | $V_{CB}$ | 60 | 80 | Vdc |
| Emitter − Base Voltage | $V_{EB}$ | 5.0 | | Vdc |
| Collector Current − Continuous | $I_C$ | 2.0 | | Adc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

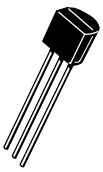
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

### 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 |

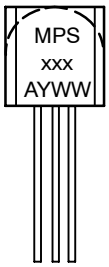
*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



**TO−92**
**CASE 29−11**

**MARKING DIAGRAM**




xxx = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

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

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

| Characteristic | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Collector – Emitter Breakdown Voltage (Note 1)<br>($I_C$ = 10 mAdc, $I_B$ = 0) | <br>MPS650, MPS750<br>MPS651, MPS751 | $V_{(BR)CEO}$ | <br>40<br>60 | <br>–<br>– | Vdc |
| Collector – Base Breakdown Voltage<br>($I_C$ = 100 μAdc, $I_E$ = 0 ) | <br>MPS650, MPS750<br>MPS651, MPS751 | $V_{(BR)CBO}$ | <br>60<br>80 | <br>–<br>– | Vdc |
| Emitter – Base Breakdown Voltage<br>($I_C$ = 0, $I_E$ = 10 μAdc) | | $V_{(BR)EBO}$ | 5.0 | – | Vdc |
| Collector Cutoff Current<br>($V_{CB}$ = 60 Vdc, $I_E$ = 0)<br>($V_{CB}$ = 80 Vdc, $I_E$ = 0) | <br>MPS650, MPS750<br>MPS651, MPS751 | $I_{CBO}$ | <br>–<br>– | <br>0.1<br>0.1 | μAdc |
| Emitter Cutoff Current<br>($V_{EB}$ = 4.0 V, $I_C$ = 0) | | $I_{EBO}$ | – | 0.1 | μAdc |
| **ON CHARACTERISTICS** (Note 1) | | | | | |
| DC Current Gain<br>($I_C$ = 50 mA, $V_{CE}$ = 2.0 V)<br>($I_C$ = 500 mA, $V_{CE}$ = 2.0 V)<br>($I_C$ = 1.0 A, $V_{CE}$ = 2.0 V)<br>($I_C$ = 2.0 A, $V_{CE}$ = 2.0 V) | | $h_{FE}$ | <br>75<br>75<br>75<br>40 | <br>–<br>–<br>–<br>– | – |
| Collector – Emitter Saturation Voltage<br>($I_C$ = 2.0 A, $I_B$ = 200 mA)<br>($I_C$ = 1.0 A, $I_B$ = 100 mA) | | $V_{CE(sat)}$ | <br>–<br>– | <br>0.5<br>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)<br>($I_C$ = 50 mAdc, $V_{CE}$ = 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.

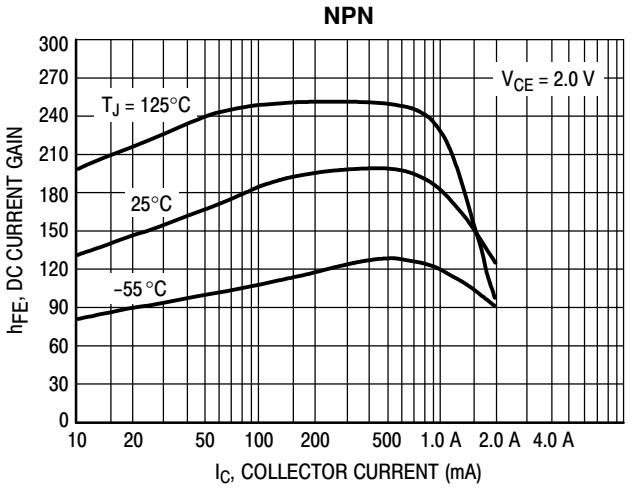



**Figure 1. MPS650, MPS651 Typical DC Current Gain**

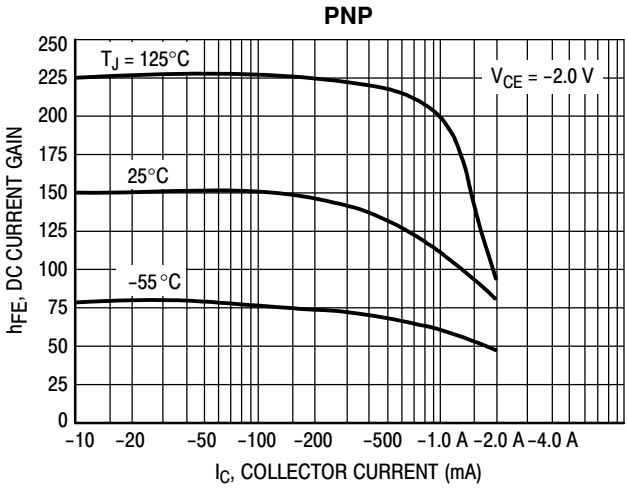



**Figure 2. MPS750, MPS751 Typical DC Current Gain**

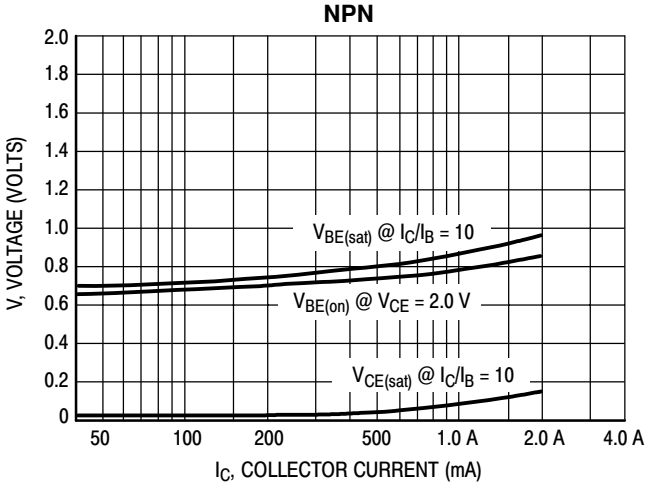



**Figure 3. MPS650, MPS651 On Voltages**

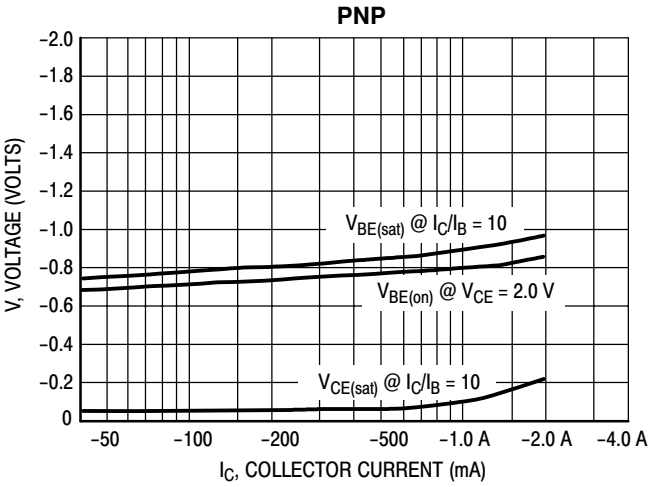



**Figure 4. MPS750, MPS751 On Voltages**

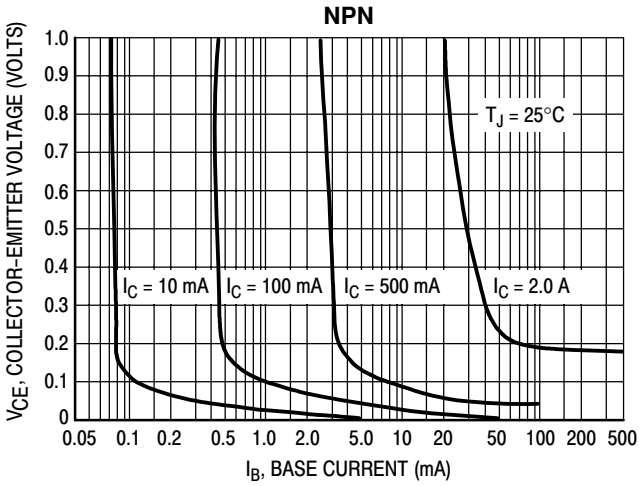



**Figure 5. MPS650, MPS651 Collector Saturation Region**

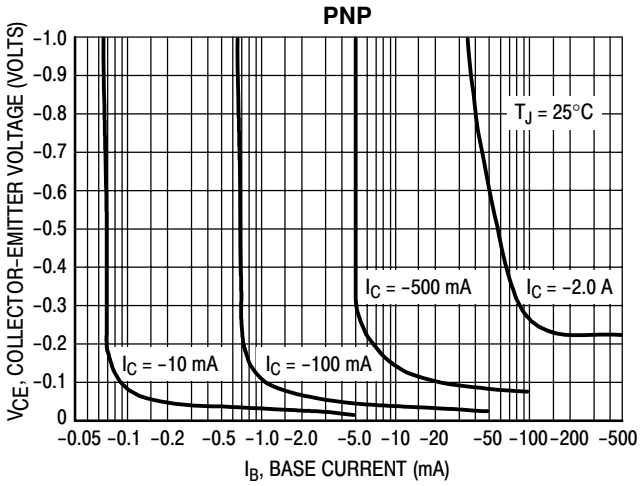



**Figure 6. MPS750, MPS751 Collector Saturation Region**

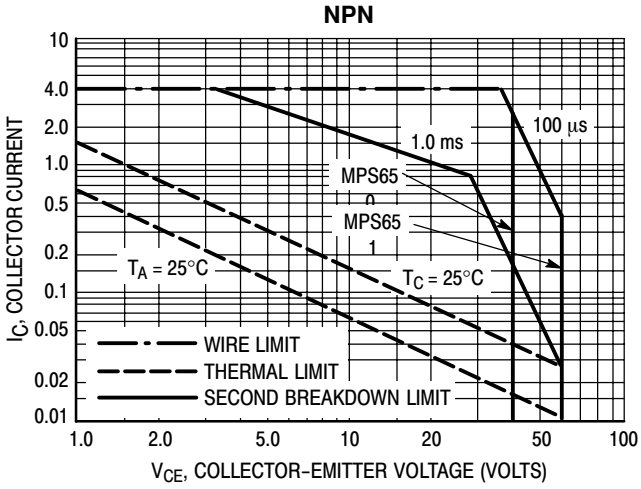



**Figure 7. MPS650, MPS651 SOA, Safe Operating Area**

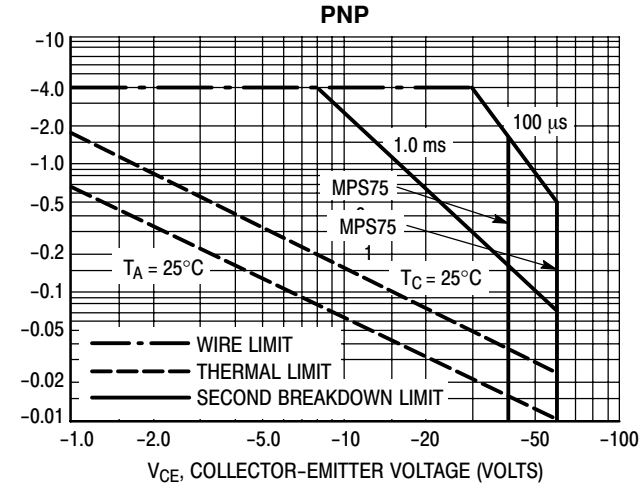



**Figure 8. MPS750, MPS751 SOA, Safe Operating Area**

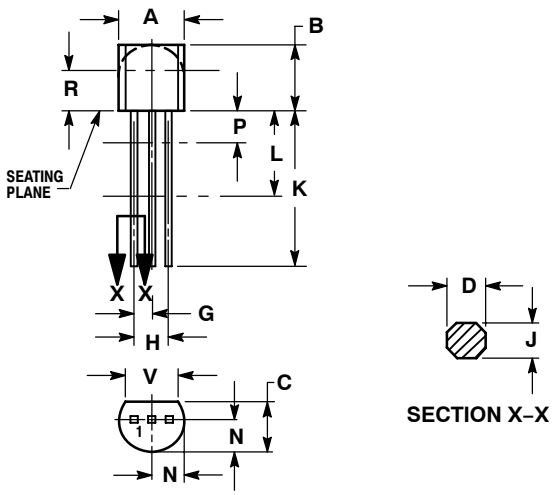
**ORDERING INFORMATION**

| Device | Package | Shipping† |
|---|---|---|
| MPS650 | TO−92 | 5000 Units / Bulk |
| MPS650G | TO−92 (Pb−Free) | 5000 Units / Bulk |
| MPS650RLRA | TO−92 | 2000 / Tape & Reel |
| MPS650RLRAG | TO−92 (Pb−Free) | 2000 / Tape & Reel |
| MPS650ZL1 | TO−92 | 2000 / Tape & Ammunition |
| MPS650ZL1G | TO−92 (Pb−Free) | 2000 / Tape & Ammunition |
| MPS651 | TO−92 | 5000 Units / Bulk |
| MPS651G | TO−92 (Pb−Free) | 5000 Units / Bulk |
| MPS651RLRA | TO−92 | 2000 / Tape & Reel |
| MPS651RLRAG | TO−92 (Pb−Free) | 2000 / Tape & Reel |
| MPS651RLRBG | TO−92 (Pb−Free) | 2000 / Tape & Reel |
| MPS651RLRM | TO−92 | 2000 / Tape & Ammunition |
| MPS651RLRMG | TO−92 (Pb−Free) | 2000 / Tape & Ammunition |
| MPS750 | TO−92 | 5000 Units / Bulk |
| MPS750G | TO−92 (Pb−Free) | 5000 Units / Bulk |
| MPS750RLRA | TO−92 | 2000 / Tape & Reel |
| MPS750RLRAG | TO−92 (Pb−Free) | 2000 / Tape & Reel |
| MPS750RLRP | TO−92 | 2000 / Tape & Ammunition |
| MPS750RLRPG | TO−92 (Pb−Free) | 2000 / Tape & Ammunition |
| MPS751 | TO−92 | 5000 Units / Bulk |
| MPS751G | TO−92 (Pb−Free) | 5000 Units / Bulk |
| MPS751RLRA | TO−92 | 2000 / Tape & Reel |
| MPS751RLRAG | TO−92 (Pb−Free) | 2000 / Tape & Reel |
| MPS751RLRP | TO−92 | 2000 / Tape & Ammunition |
| MPS751RLRPG | TO−92 (Pb−Free) | 2000 / Tape & Ammunition |
| MPS751ZL1 | TO−92 | 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.

## PACKAGE DIMENSIONS

**TO−92 (TO−226)**
CASE 29−11
ISSUE AL




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.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | 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 | --- |



**PUBLICATION ORDERING INFORMATION**

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**MPS650/D**