NPN - MPS650, MPS651;
PNP - MPS750, MPS751

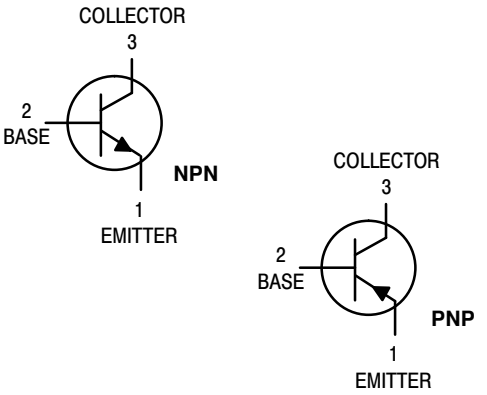
Amplifier Transistors

ON Semiconductor®

http://onsemi.com

Features

- These are Pb−Free Devices*



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

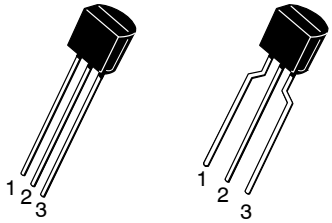
THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction−to−Ambient	V_{CE}	200	°C/W
Thermal Resistance, Junction−to−Case	V_{CB}	83.3	°C/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.

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

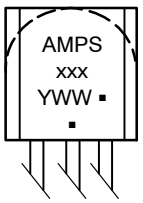
TO−92
CASE 29
STYLE 1



STRAIGHT LEAD
BULK PACK

BENT LEAD
TAPE & REEL
AMMO PACK

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.

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector – Emitter Breakdown Voltage (Note 1)		$V_{(BR)CEO}$			Vdc
(I_C = 10 mAdc, I_B = 0)	MPS650, MPS750		40	–	
	MPS651, MPS751		60	–	
Collector – Base Breakdown Voltage		$V_{(BR)CBO}$			Vdc
(I_C = 100 μAdc, I_E = 0)	MPS650, MPS750		60	–	
	MPS651, MPS751		80	–	
Emitter – Base Breakdown Voltage (I_C = 0, I_E = 10 μAdc)		$V_{(BR)EBO}$	5.0	–	Vdc
Collector Cutoff Current		I_{CBO}			μAdc
(V_{CB} = 60 Vdc, I_E = 0)	MPS650, MPS750		–	0.1	
(V_{CB} = 80 Vdc, I_E = 0)	MPS651, MPS751		–	0.1	
Emitter Cutoff Current (V_{EB} = 4.0 V, I_C = 0)		I_{EBO}	–	0.1	μAdc
ON CHARACTERISTICS (Note 1)					
DC Current Gain		h_{FE}			–
(I_C = 50 mA, V_{CE} = 2.0 V)			75	–	
(I_C = 500 mA, V_{CE} = 2.0 V)			75	–	
(I_C = 1.0 A, V_{CE} = 2.0 V)			75	–	
(I_C = 2.0 A, V_{CE} = 2.0 V)			40	–	
Collector – Emitter Saturation Voltage		$V_{CE(sat)}$			Vdc
(I_C = 2.0 A, I_B = 200 mA)			–	0.5	
(I_C = 1.0 A, I_B = 100 mA)			–	0.3	
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 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.

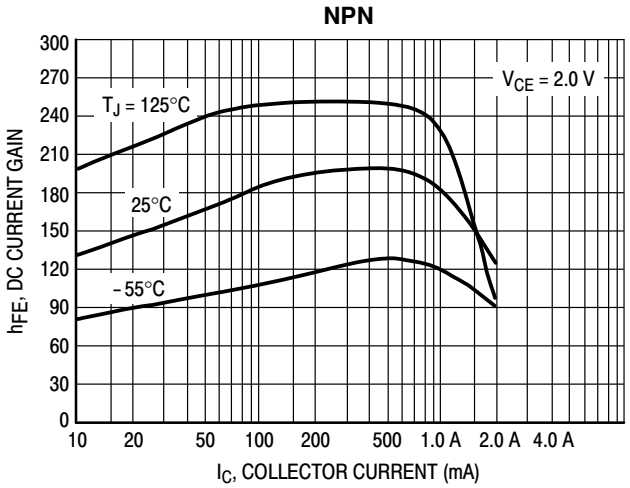


Figure 1. MPS650, MPS651 Typical DC Current Gain

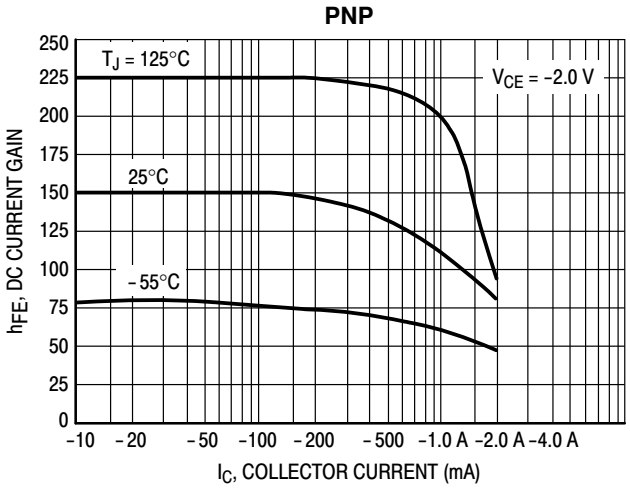


Figure 2. MPS750, MPS751 Typical DC Current Gain

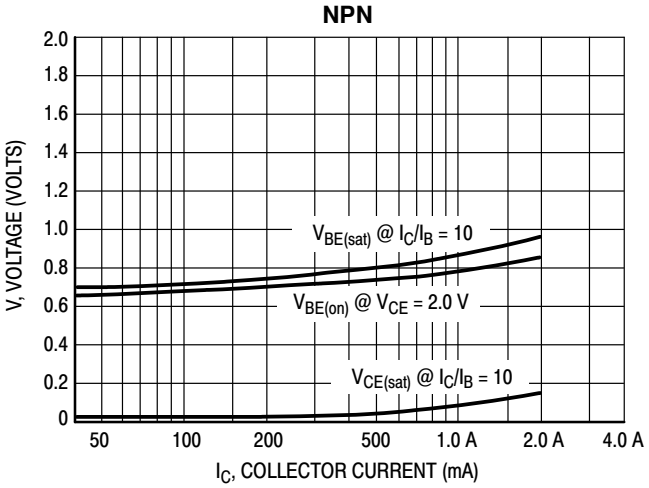


Figure 3. MPS650, MPS651 On Voltages

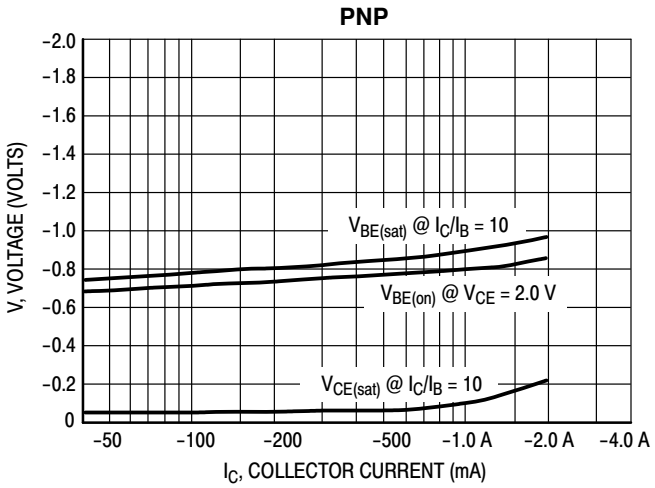


Figure 4. MPS750, MPS751 On Voltages

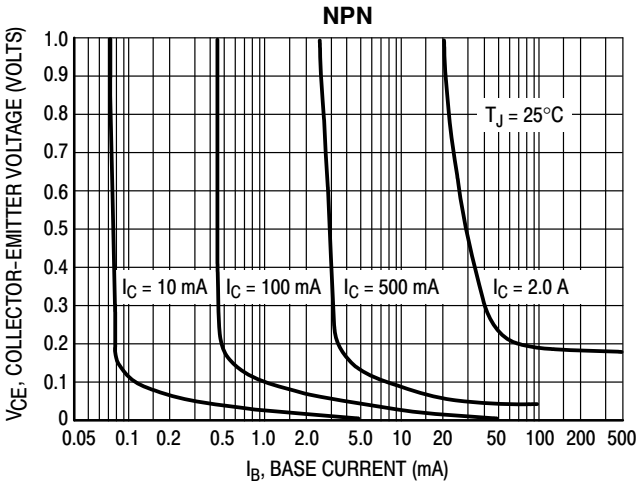


Figure 5. MPS650, MPS651 Collector Saturation Region

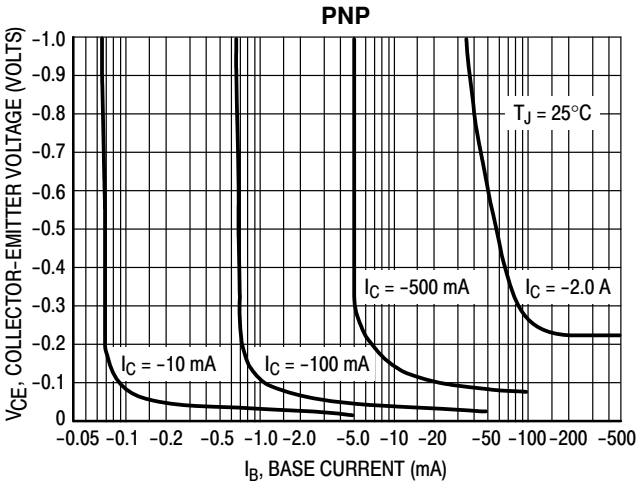


Figure 6. MPS750, MPS751 Collector Saturation Region

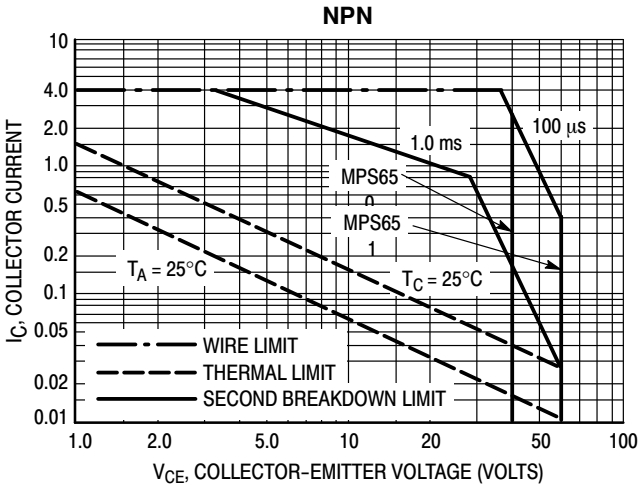


Figure 7. MPS650, MPS651 SOA, Safe Operating Area

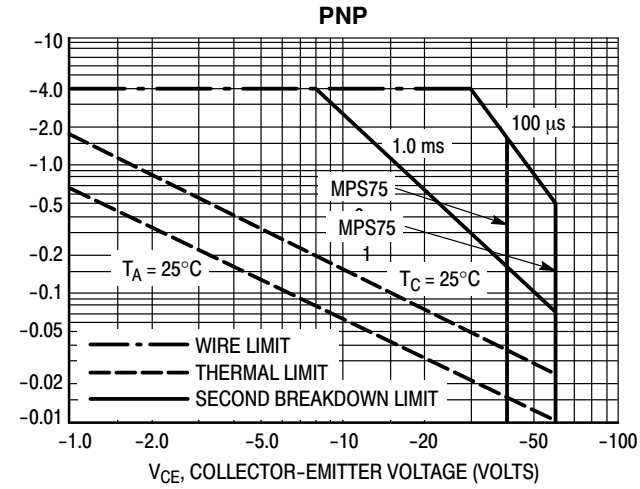


Figure 8. MPS750, MPS751 SOA, Safe Operating Area

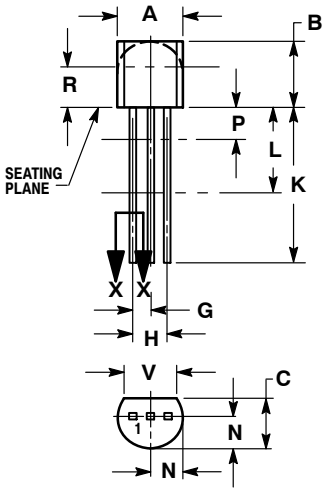
ORDERING INFORMATION

Device	Package	Shipping†
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

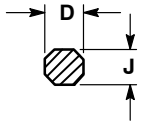
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

PACKAGE DIMENSIONS

TO–92 (TO–226)
CASE 29–11
ISSUE AM



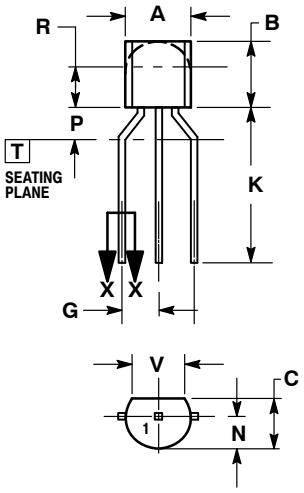
STRAIGHT LEAD
BULK PACK



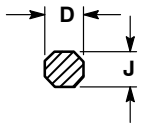
SECTION X–X

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	---



BENT LEAD
TAPE & REEL
AMMO PACK



SECTION X–X

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.

	MILLIMETERS	
DIM	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:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303–675–2175 or 800–344–3860 Toll Free USA/Canada
Fax: 303–675–2176 or 800–344–3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800–282–9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81–3–5817–1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

MPS650/D