

MPS650G Datasheet

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DiGi Electronics Part Number	MPS650G-DG
Manufacturer	onsemi
Manufacturer Product Number	MPS650G
Description	TRANS NPN 40V 2A TO92
Detailed Description	Bipolar (BJT) Transistor NPN 40 V 2 A 75MHz 625 mW Through Hole TO-92 (TO-226)



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Purchase and inquiry

Manufacturer Product Number:

MPS650G

Series:

-

Transistor Type:

NPN

Voltage - Collector Emitter Breakdown (Max):

40 V

Current - Collector Cutoff (Max):

100nA (ICBO)

Power - Max:

625 mW

Operating Temperature:

-55°C ~ 150°C (TJ)

Package / Case:

TO-226-3, TO-92-3 Long Body

Base Product Number:

MPS650

Manufacturer:

onsemi

Product Status:

Obsolete

Current - Collector (Ic) (Max):

2 A

Vce Saturation (Max) @ Ib, Ic:

500mV @ 200mA, 2A

DC Current Gain (hFE) (Min) @ Ic, Vce:

75 @ 1A, 2V

Frequency - Transition:

75MHz

Mounting Type:

Through Hole

Supplier Device Package:

TO-92 (TO-226)

Environmental & Export classification

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

REACH Status:

REACH Unaffected

HTSUS:

8541.21.0095

ON Semiconductor

Is Now

The logo for onsemi, featuring the word "onsemi" in a dark teal, lowercase, sans-serif font. The letter "i" is stylized with a white dot and a teal vertical bar. A small orange triangle is positioned above the top right of the "i". A trademark symbol (TM) is located to the right of the logo.

To learn more about onsemi™, please visit our website at
www.onsemi.com

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NPN - MPS650, MPS651; PNP - MPS750, MPS751

Amplifier Transistors

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 @ $T_A = 25^\circ\text{C}$ 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

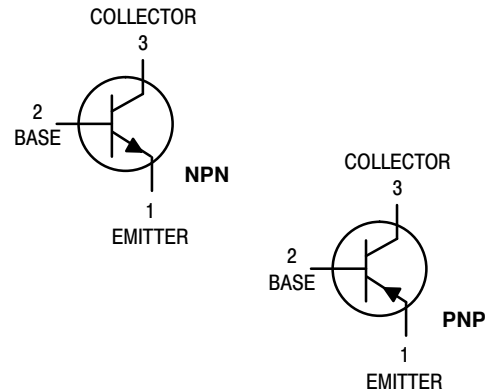
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Ambient	V_{CE}	200	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	V_{CB}	83.3	$^\circ\text{C}/\text{W}$

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.

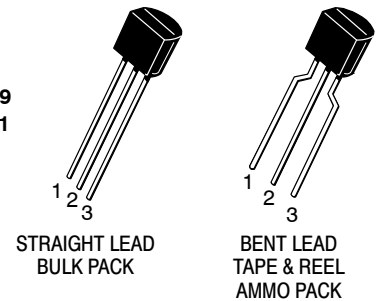


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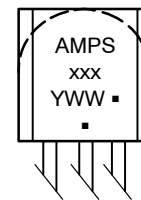
<http://onsemi.com>



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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector – Emitter Breakdown Voltage (Note 1) ($I_C = 10\text{ mAdc}$, $I_B = 0$)	MPS650, MPS750 MPS651, MPS751	$V_{(BR)CEO}$	40 60	– –	Vdc
Collector – Base Breakdown Voltage ($I_C = 100\text{ }\mu\text{Adc}$, $I_E = 0$)	MPS650, MPS750 MPS651, MPS751	$V_{(BR)CBO}$	60 80	– –	Vdc
Emitter – Base Breakdown Voltage ($I_C = 0$, $I_E = 10\text{ }\mu\text{Adc}$)		$V_{(BR)EBO}$	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	μAdc
Emitter Cutoff Current ($V_{EB} = 4.0\text{ V}$, $I_C = 0$)		I_{EBO}	–	0.1	μAdc

ON CHARACTERISTICS (Note 1)

DC Current Gain ($I_C = 50\text{ mA}$, $V_{CE} = 2.0\text{ V}$) ($I_C = 500\text{ mA}$, $V_{CE} = 2.0\text{ V}$) ($I_C = 1.0\text{ A}$, $V_{CE} = 2.0\text{ V}$) ($I_C = 2.0\text{ A}$, $V_{CE} = 2.0\text{ V}$)		h_{FE}	75 75 75 40	– – – –	–
Collector – Emitter Saturation Voltage ($I_C = 2.0\text{ A}$, $I_B = 200\text{ mA}$) ($I_C = 1.0\text{ A}$, $I_B = 100\text{ mA}$)		$V_{CE(sat)}$	– –	0.5 0.3	Vdc
Base – Emitter On Voltage ($I_C = 1.0\text{ A}$, $V_{CE} = 2.0\text{ V}$)		$V_{BE(on)}$	–	1.0	Vdc
Base – Emitter Saturation Voltage ($I_C = 1.0\text{ A}$, $I_B = 100\text{ mA}$)		$V_{BE(sat)}$	–	1.2	Vdc

SMALL – SIGNAL CHARACTERISTICS

Current – Gain – Bandwidth Product (Note 2) ($I_C = 50\text{ mAdc}$, $V_{CE} = 5.0\text{ Vdc}$, $f = 100\text{ MHz}$)		f_T	75	–	MHz
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1. Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle = 2.0%.
2. f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

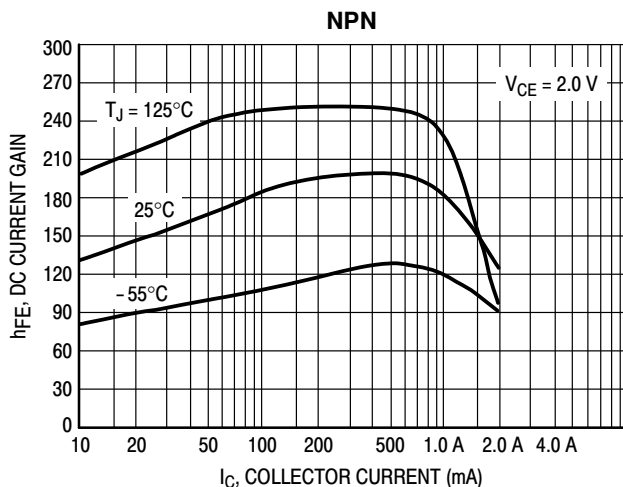


Figure 1. MPS650, MPS651
Typical DC Current Gain

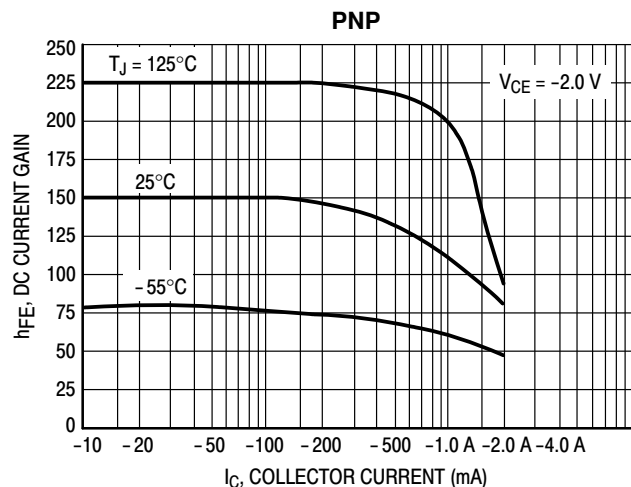
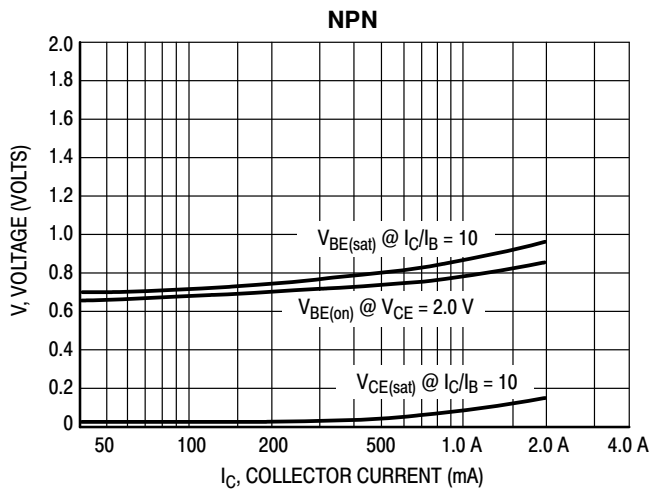
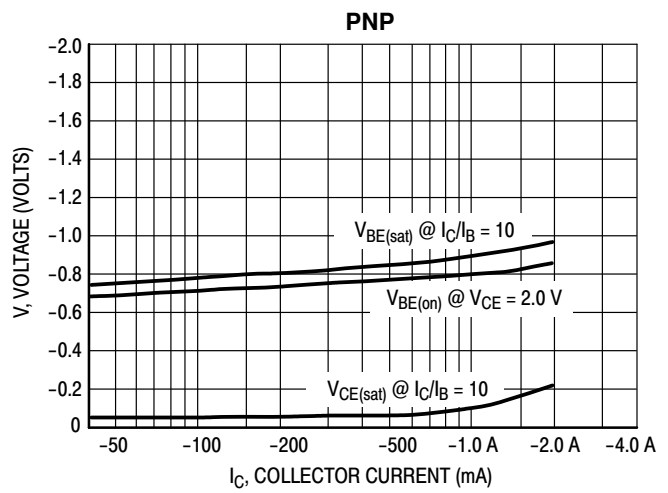


Figure 2. MPS750, MPS751
Typical DC Current Gain

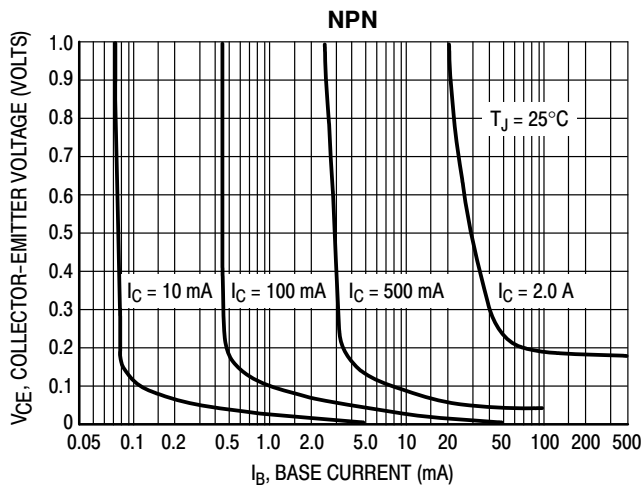
NPN – MPS650, MPS651; PNP – MPS750, MPS751



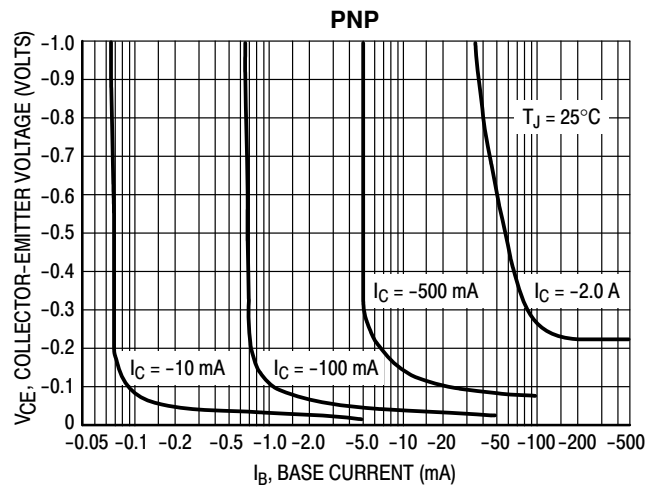
**Figure 3. MPS650, MPS651
On Voltages**



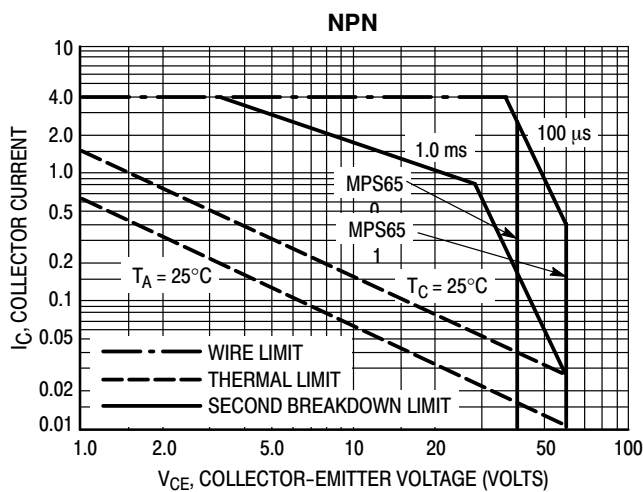
**Figure 4. MPS750, MPS751
On Voltages**



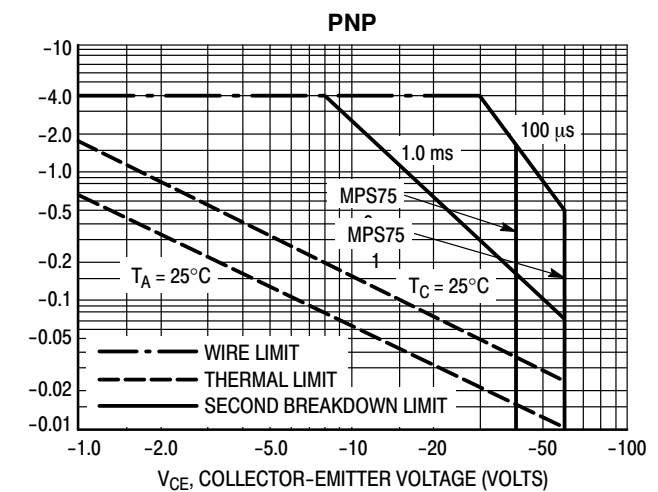
**Figure 5. MPS650, MPS651
Collector Saturation Region**



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



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



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

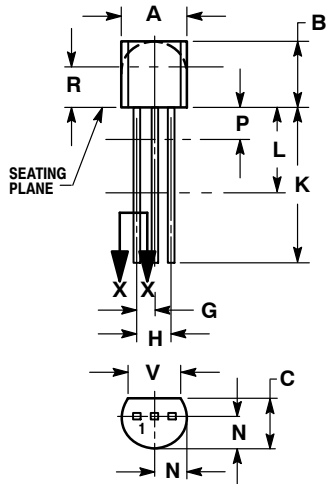
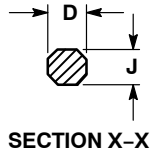
NPN – MPS650, MPS651; PNP – MPS750, MPS751**ORDERING INFORMATION**

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

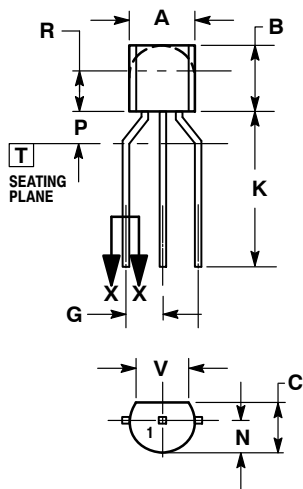
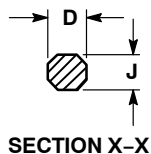
TO-92 (TO-226)
CASE 29-11
ISSUE AMSTRAIGHT LEAD
BULK PACK

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.

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

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.

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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