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NPN - MPS6601; PNP - MPS6651, MPS6652

MPS6652 is a Preferred Device

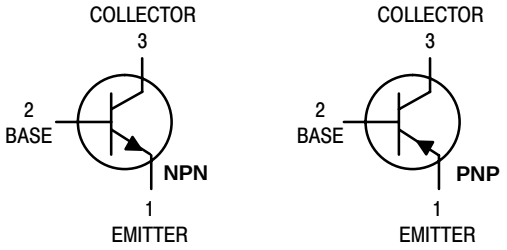
Amplifier Transistors

ON Semiconductor®

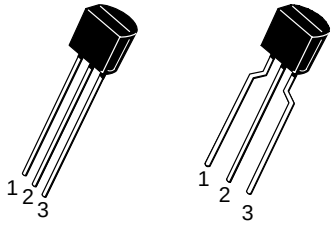
http://onsemi.com

Features

- Voltage and Current are Negative for PNP Transistors
- Pb−Free Packages are Available*



TO−92
CASE 29
STYLE 1



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector−Emitter Voltage MPS6601/6651 MPS6652	V_{CEO}	 25 40	Vdc
Collector−Base Voltage MPS6601/6651 MPS6652	V_{CBO}	 25 30	Vdc
Emitter−Base Voltage	V_{EBO}	4.0	Vdc
Collector Current − Continuous	I_C	1000	mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	625 5.0	W mW/°C
Total Device 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

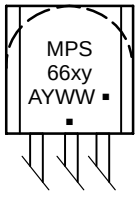
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction−to−Ambient (Note 1)	$R_{\theta JA}$	200	°C/W
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	83.3	°C/W

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.

1. $R_{\theta JA}$ is measured with the device soldered into a typical printed circuit board.

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

MARKING DIAGRAM



MPS66xy = Device Code
x = 0 or 5
y = 1 or 2
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 2 of this data sheet.

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

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector−Emitter Breakdown Voltage (I_C = 1.0 mAdc, I_B = 0)	MPS6601/6651 MPS6652	$V_{(BR)CEO}$	 25 40	 − −	Vdc
Collector−Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0)	MPS6601/6651 MPS6652	$V_{(BR)CBO}$	 25 40	 − −	Vdc
Emitter−Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)		$V_{(BR)EBO}$	4.0	−	Vdc
Collector Cutoff Current (V_{CE} = 25 Vdc, I_B = 0) (V_{CE} = 30 Vdc, I_B = 0)	MPS6601/6651 MPS6652	I_{CES}	 − −	 0.1 0.1	μAdc
Collector Cutoff Current (V_{CB} = 25 Vdc, I_E = 0) (V_{CB} = 30 Vdc, I_E = 0)	MPS6601/6651 MPS6652	I_{CBO}	 − −	 0.1 0.1	μAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 100 mAdc, V_{CE} = 1.0 Vdc) (I_C = 500 mAdc, V_{CE} = 1.0 Vdc) (I_C = 1000 mAdc, V_{CE} = 1.0 Vdc)		h_{FE}	 50 50 30	 − − −	−
Collector−Emitter Saturation Voltage (I_C = 1000 mAdc, I_B = 100 mAdc)		$V_{CE(sat)}$	−	0.6	Vdc
Base−Emitter On Voltage (I_C = 500 mAdc, V_{CE} = 1.0 Vdc)		$V_{BE(on)}$	−	1.2	Vdc
SMALL−SIGNAL CHARACTERISTICS					
Current−Gain — Bandwidth Product (I_C = 50 mAdc, V_{CE} = 10 Vdc, f = 100 MHz)		f_T	100	−	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 1.0 MHz)		C_{obo}	−	30	pF
SWITCHING CHARACTERISTICS					
Delay Time	(V_{CC} = 40 Vdc, I_C = 500 mAdc, I_{B1} = 50 mAdc, $t_p \geq$ 300 ns Duty Cycle)	t_d	−	25	ns
Rise Time		t_r	−	30	ns
Storage Time		t_s	−	250	ns
Fall Time		t_f	−	50	ns

ORDERING INFORMATION

Device	Package	Shipping†
MPS6601RLRAG	TO−92 (TO−226) (Pb−Free)	2000 Units / Tape & Reel
MPS6651G	TO−92 (TO−226) (Pb−Free)	5000 Units / Bulk
MPS6652	TO−92 (TO−226)	
MPS6652G	TO−92 (TO−226) (Pb−Free)	
MPS6652RLRAG	TO−92 (TO−226) (Pb−Free)	2000 Units / Tape & Reel

†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.

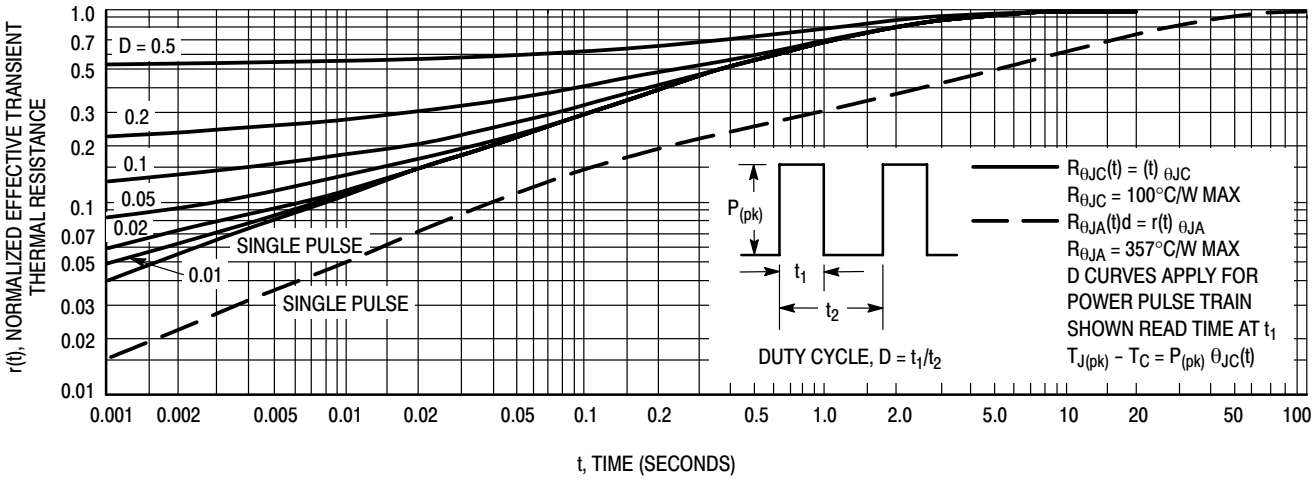
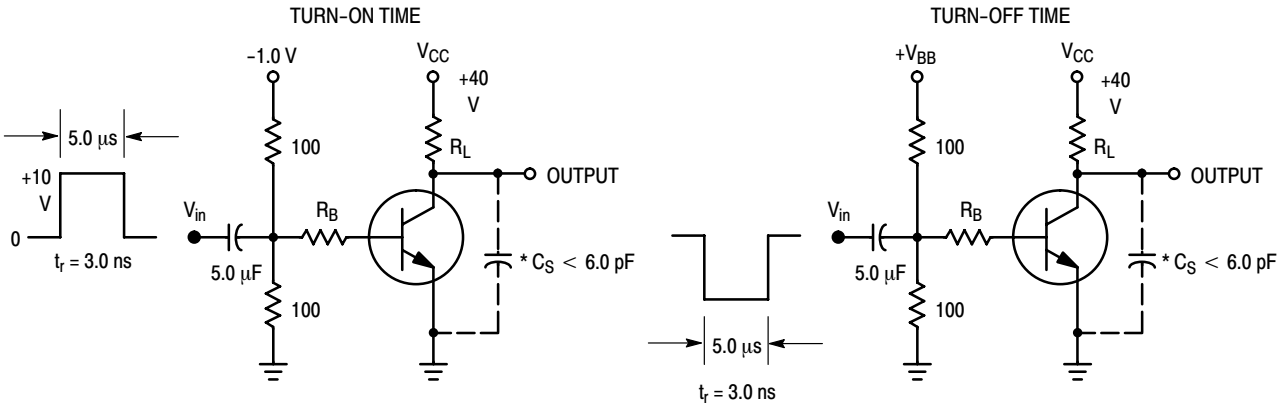


Figure 1. Thermal Response



*Total Shunt Capacitance of Test Jig and Connectors
For PNP Test Circuits, Reverse All Voltage Polarities

Figure 2. Switching Time Test Circuits

NPN

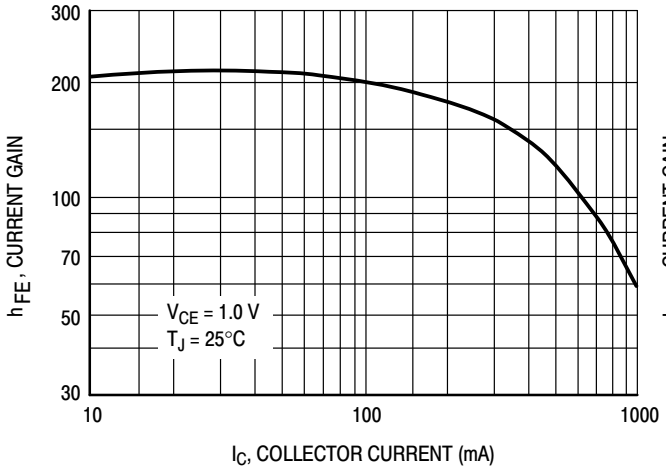


Figure 3. MPS6601/6602 DC Current Gain

PNP

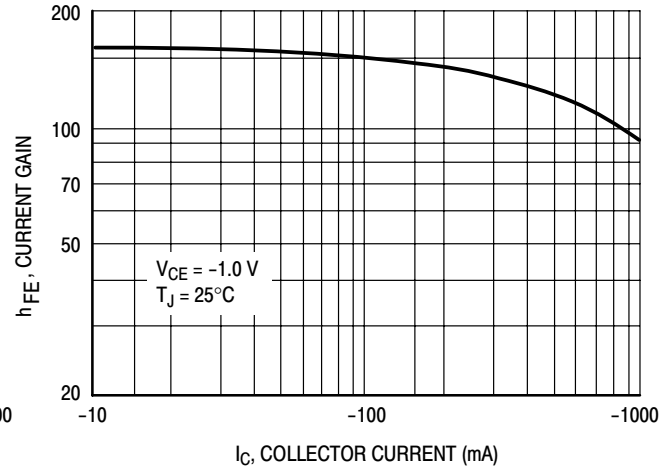


Figure 4. MPS6651/6652 DC Current Gain

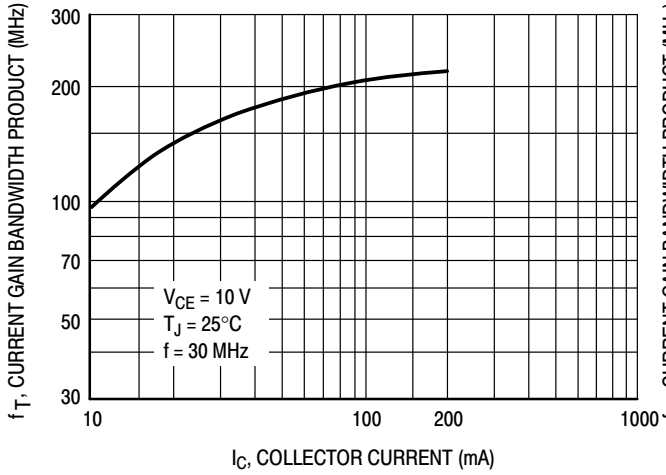


Figure 5. Current Gain Bandwidth Product

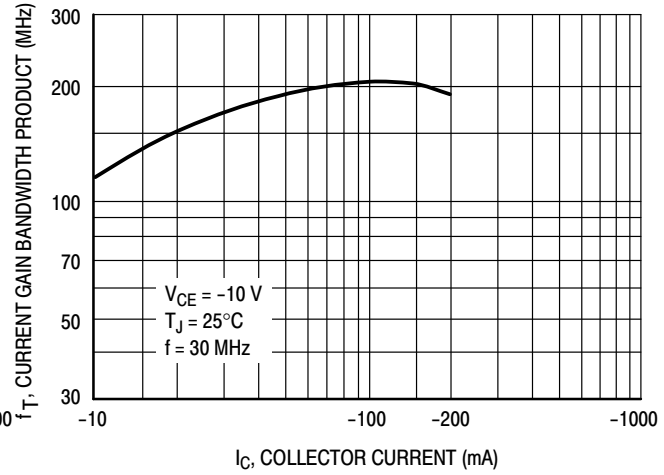


Figure 6. Current Gain Bandwidth Product

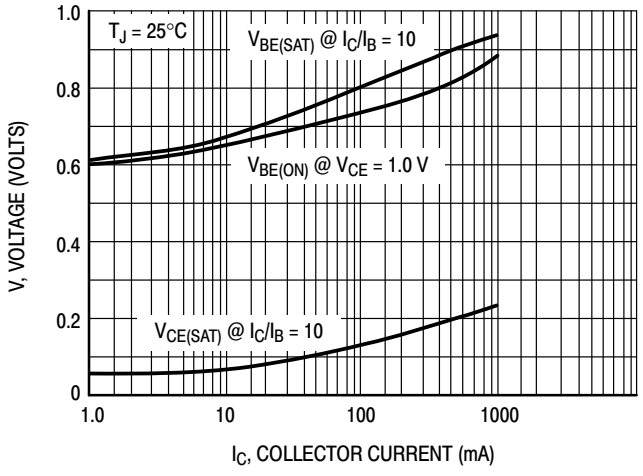


Figure 7. On Voltages

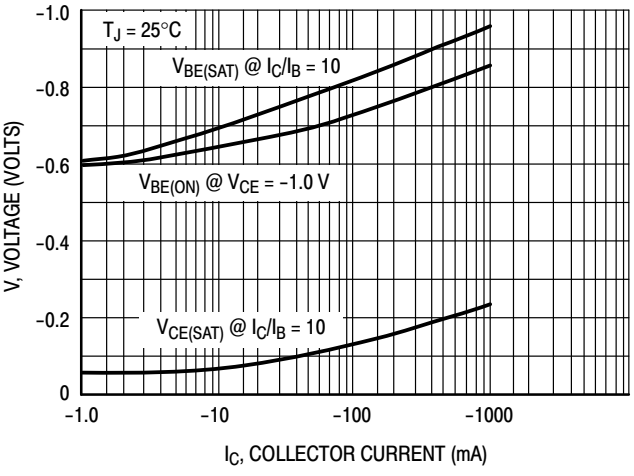


Figure 8. On Voltages

NPN

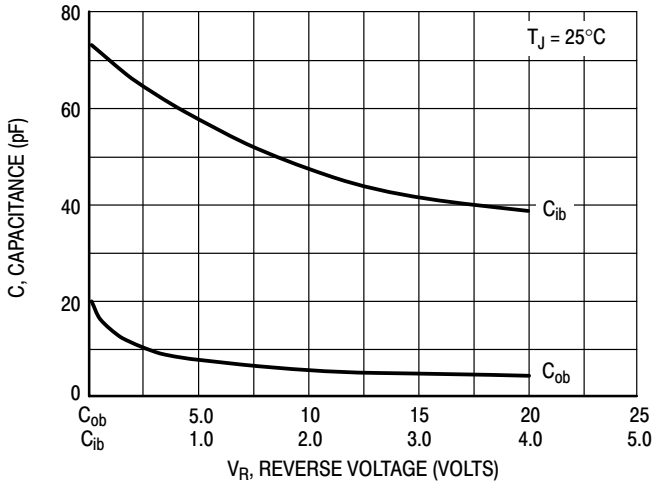


Figure 9. Capacitance

PNP

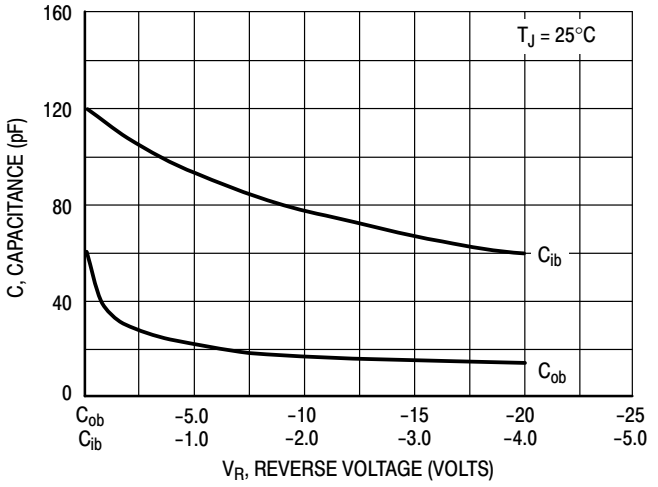


Figure 10. Capacitance

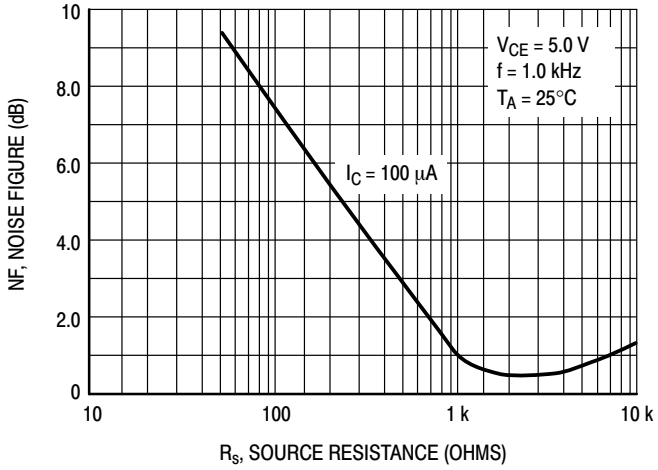


Figure 11. MPS6601/6602 Noise Figure

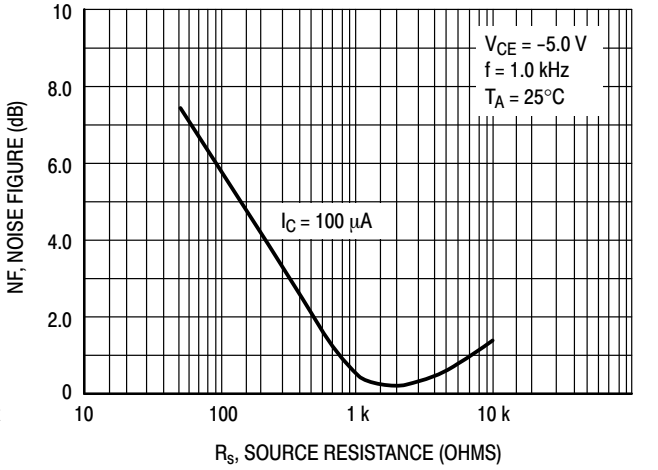


Figure 12. MPS6651/6652 Noise Figure

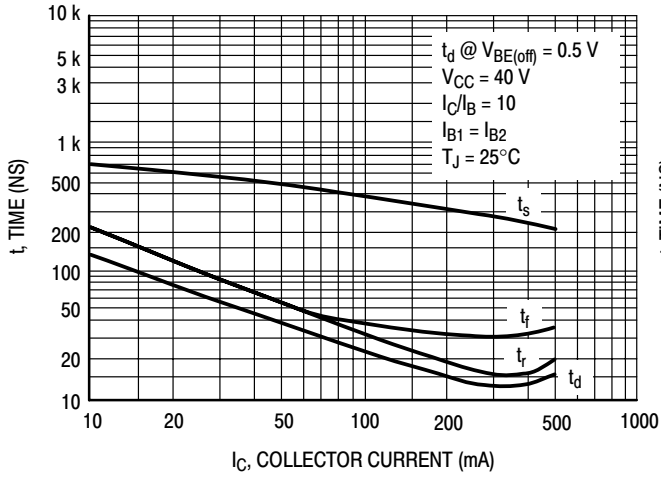


Figure 13. MPS6601/6602 Switching Times

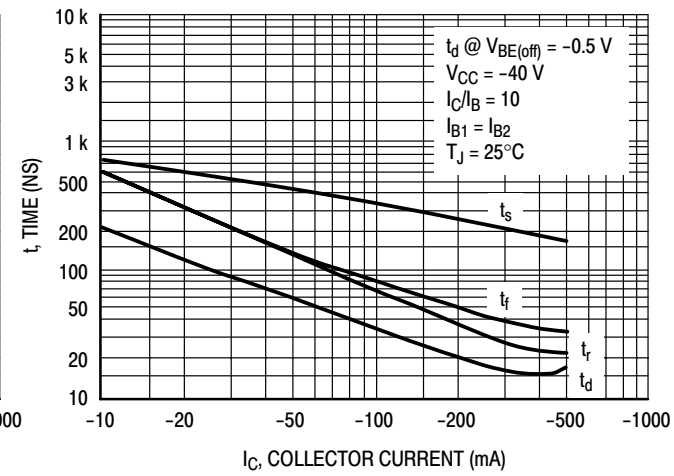


Figure 14. MPS6651/6652 Switching Times

NPN

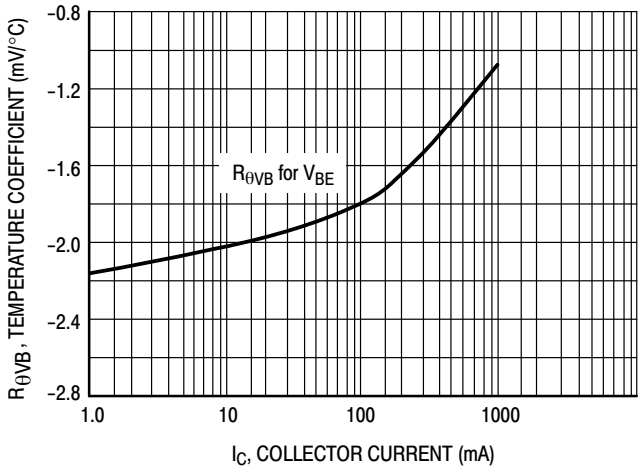


Figure 15. Base−Emitter Temperature Coefficient

PNP

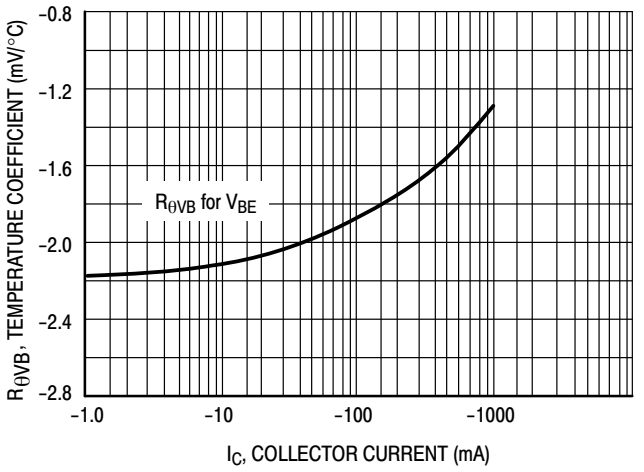


Figure 16. Base−Emitter Temperature Coefficient

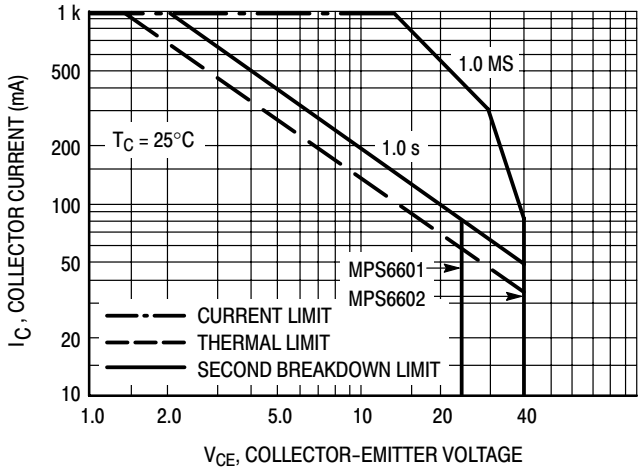


Figure 17. Safe Operating Area

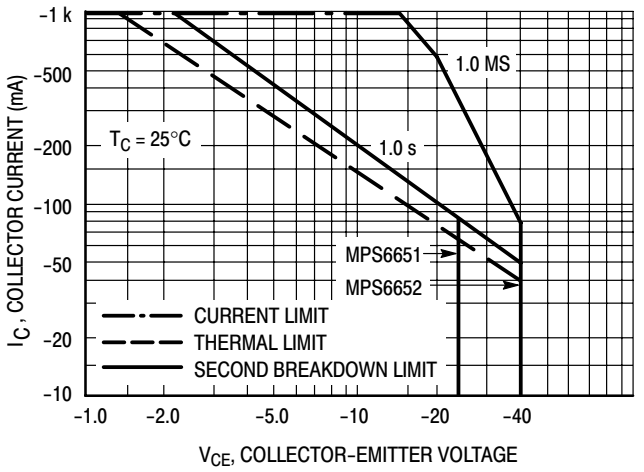


Figure 18. Safe Operating Area

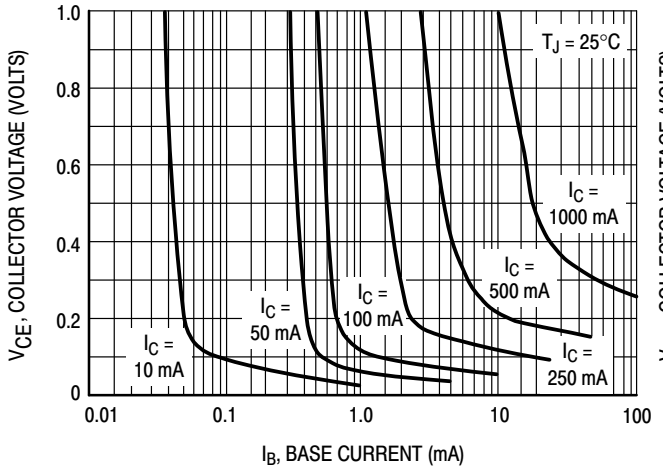


Figure 19. MPS6601/6602 Saturation Region

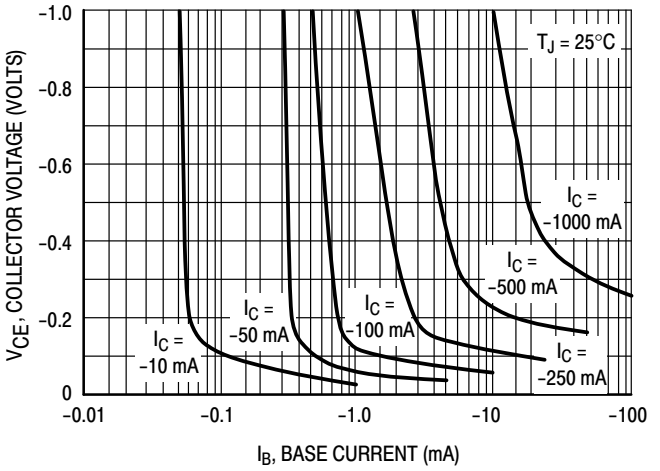
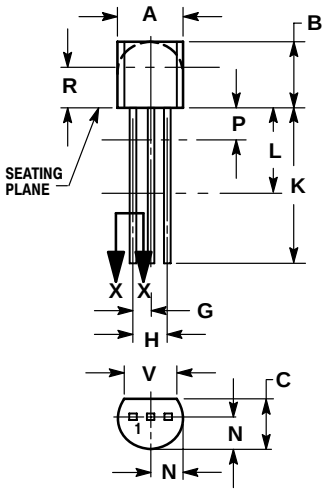


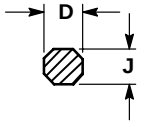
Figure 20. MPS6651/6652 Saturation Region

PACKAGE DIMENSIONS

TO−92 (TO−226)
CASE 29−11
ISSUE AM



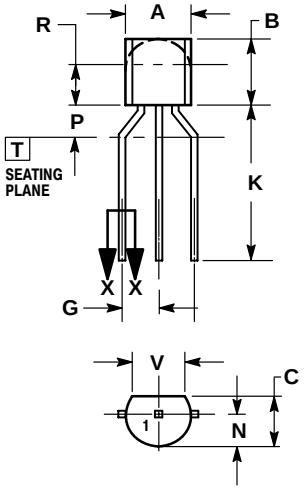
STRAIGHT LEAD
BULK PACK



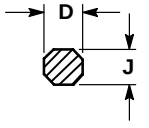
SECTION X−X

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
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MPS6601/D

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