

Amplifier Transistors

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage MPS6601/6651 MPS6602/6652	V_{CE0}	25 40	Vdc
Collector–Base Voltage MPS6601/6651 MPS6602/6652	V_{CBO}	25 30	Vdc
Emitter–Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous	I_C	1000	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	625 5.0	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	1.5 12	Watts mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

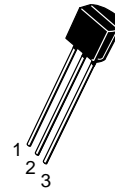
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}^{(1)}$	200	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	$^\circ\text{C}/\text{W}$

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

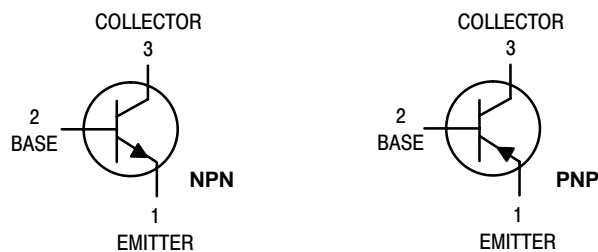
NPN
MPS6601
MPS6602*
PNP
MPS6651
MPS6652*

Voltage and current are negative for PNP transistors

*ON Semiconductor Preferred Device



CASE 29-11, STYLE 1
TO-92 (TO-226AA)



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

NPN MPS6601 MPS6602 PNP MPS6651 MPS6652

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

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage (I _C = 1.0 mAdc, I _B = 0)	MPS6601/6651 MPS6602/6652	V _{(BR)CEO}	25 40	— —	Vdc
Collector–Base Breakdown Voltage (I _C = 100 μAdc, I _E = 0)	MPS6601/6651 MPS6602/6652	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 MPS6602/6652	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 MPS6602/6652	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 ≥ 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

NPN MPS6601 MPS6602 PNP MPS6651 MPS6652

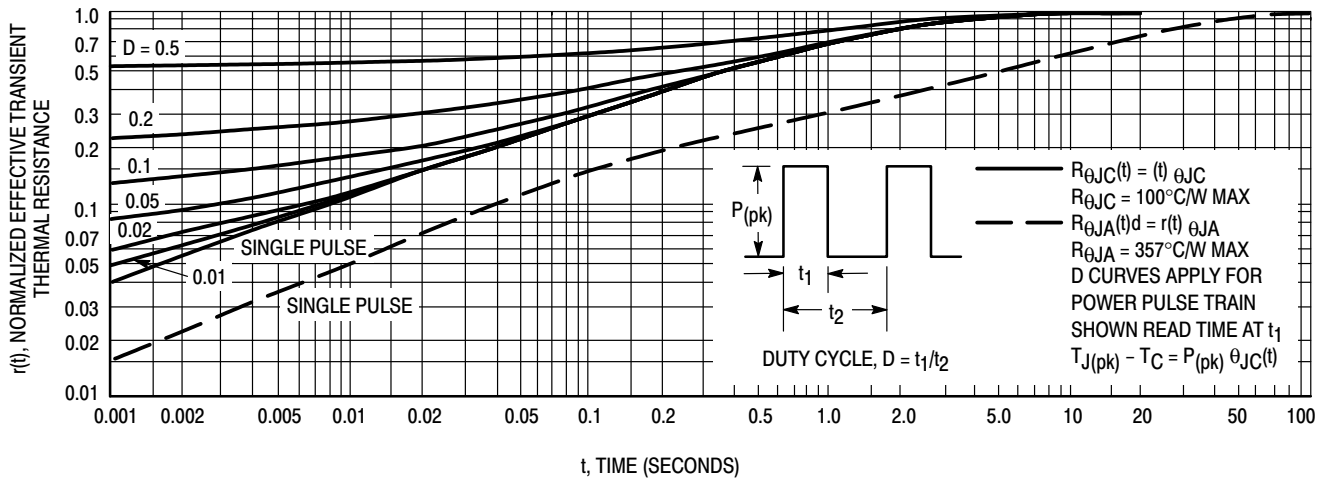
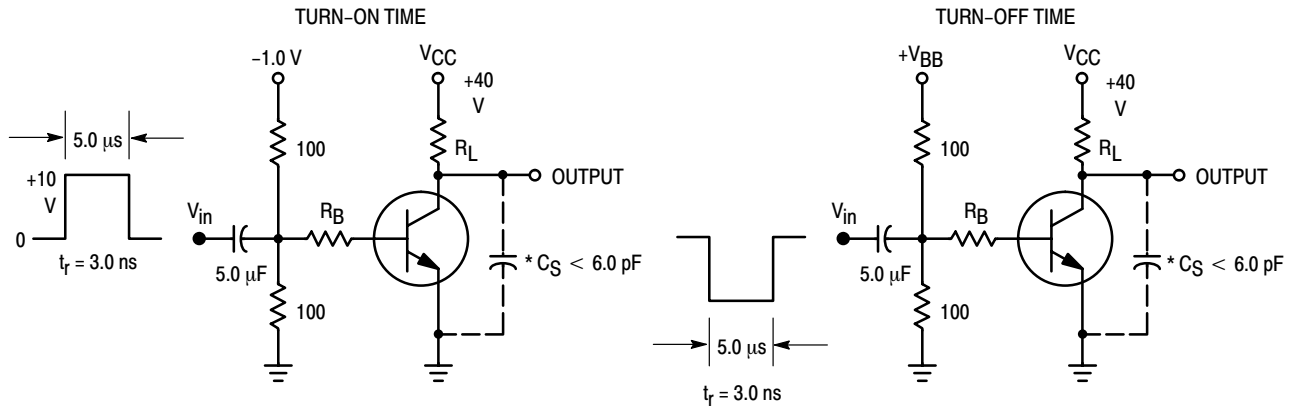


Figure 1. Thermal Response



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

Figure 2. Switching Time Test Circuits

NPN MPS6601 MPS6602 PNP MPS6651 MPS6652

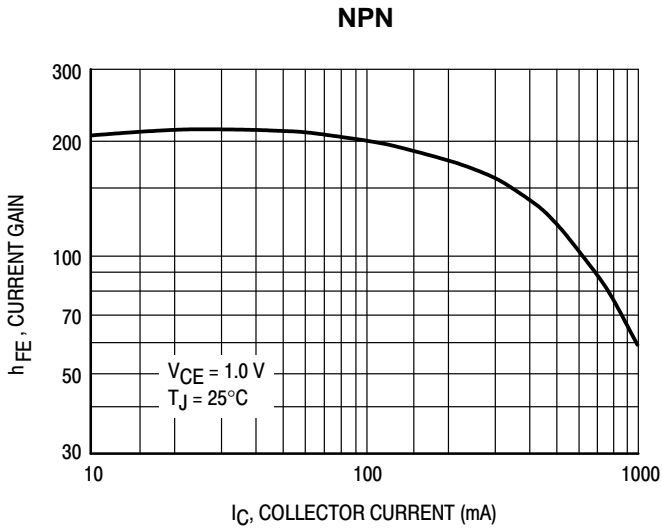


Figure 3. MPS6601/6602 DC Current Gain

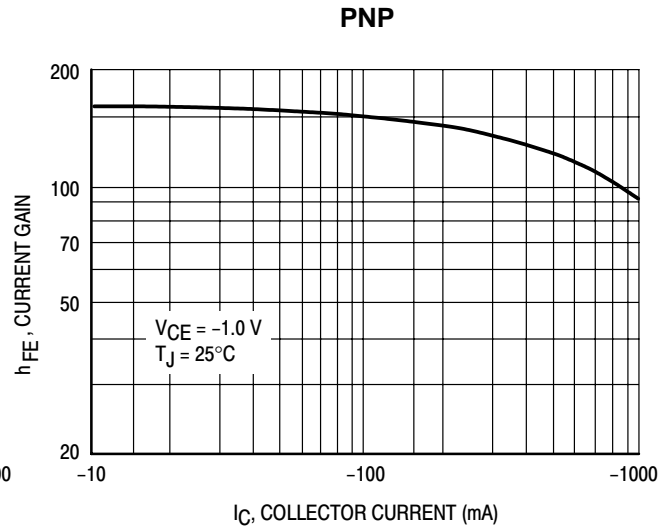


Figure 4. MPS6651/6652 DC Current Gain

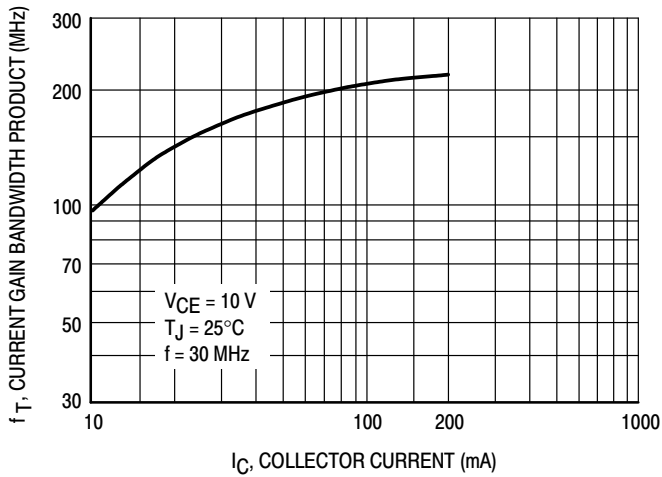


Figure 5. Current Gain Bandwidth Product

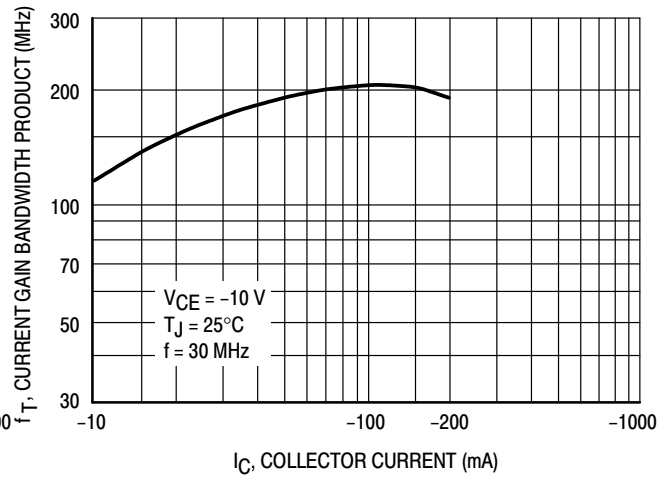


Figure 6. Current Gain Bandwidth Product

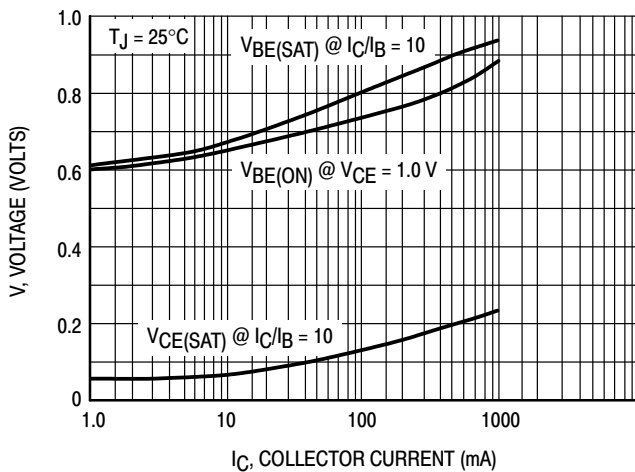


Figure 7. On Voltages

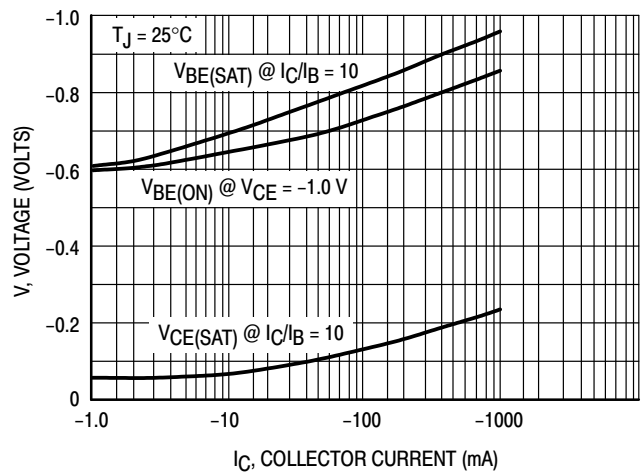
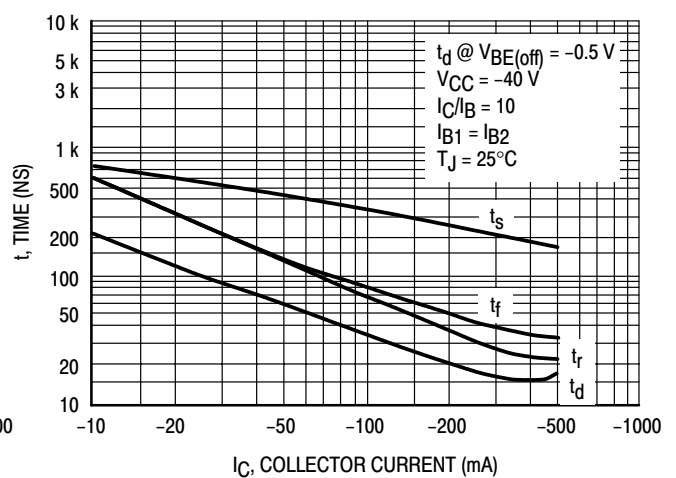
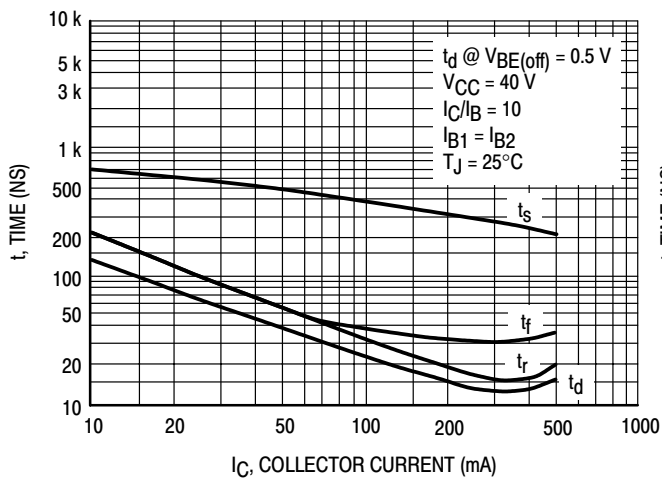
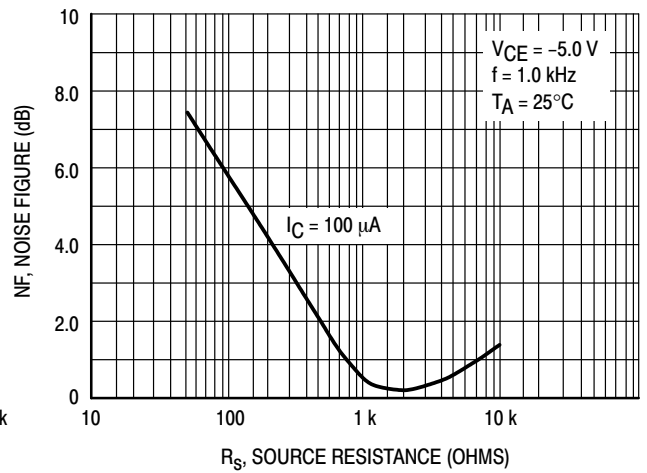
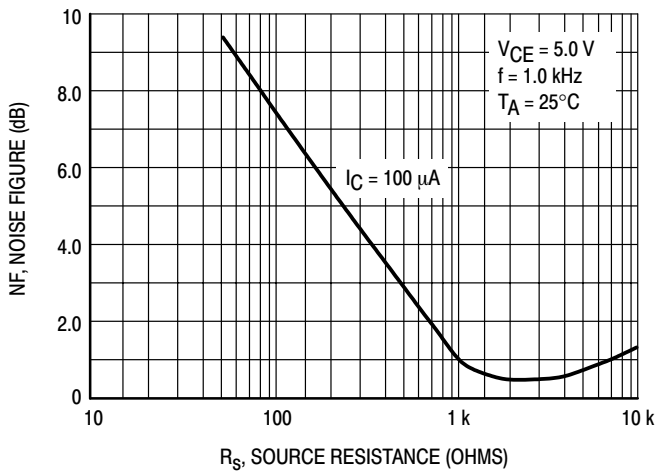
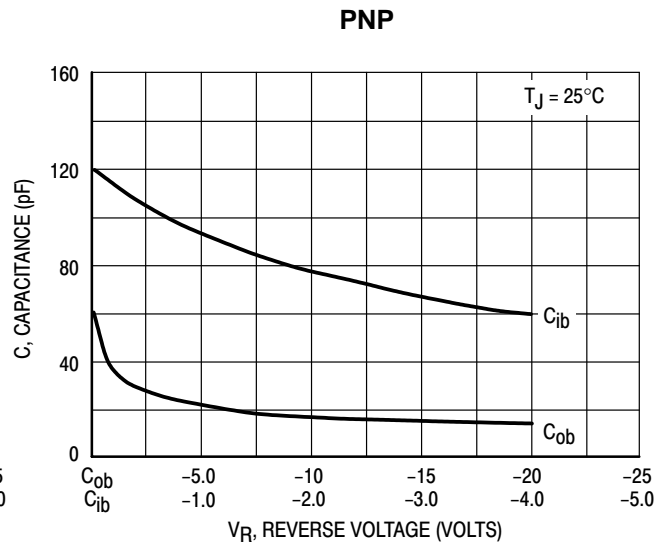
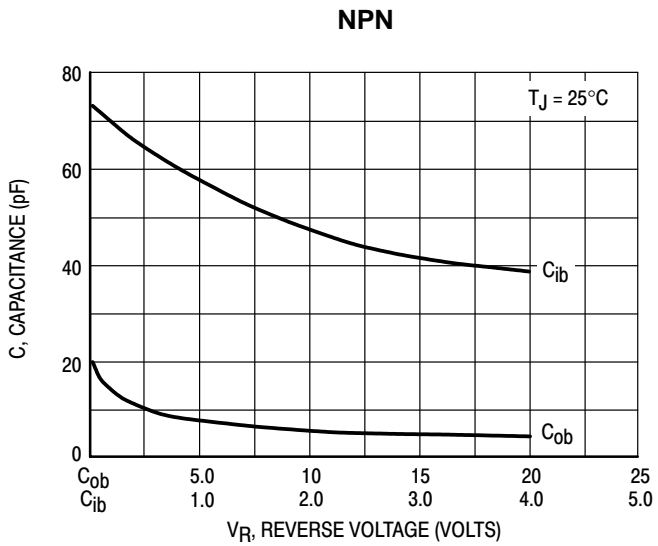


Figure 8. On Voltages

NPN MPS6601 MPS6602 PNP MPS6651 MPS6652



NPN MPS6601 MPS6602 PNP MPS6651 MPS6652

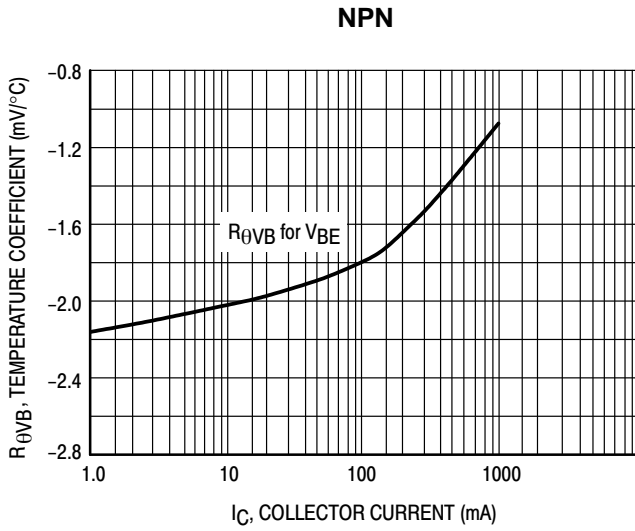


Figure 15. Base-Emitter Temperature Coefficient

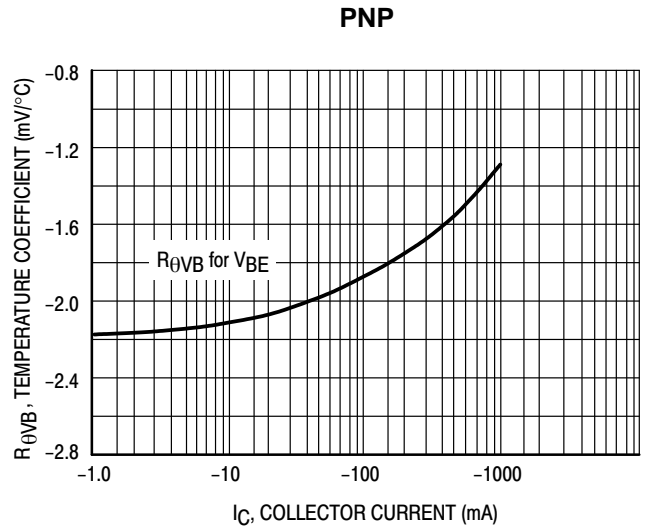


Figure 16. Base-Emitter Temperature Coefficient

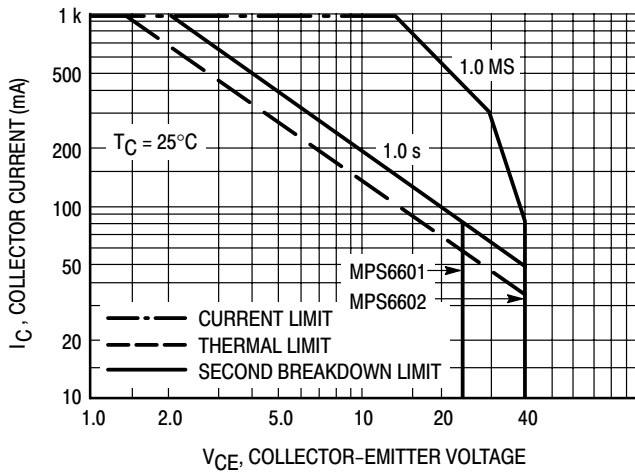


Figure 17. Safe Operating Area

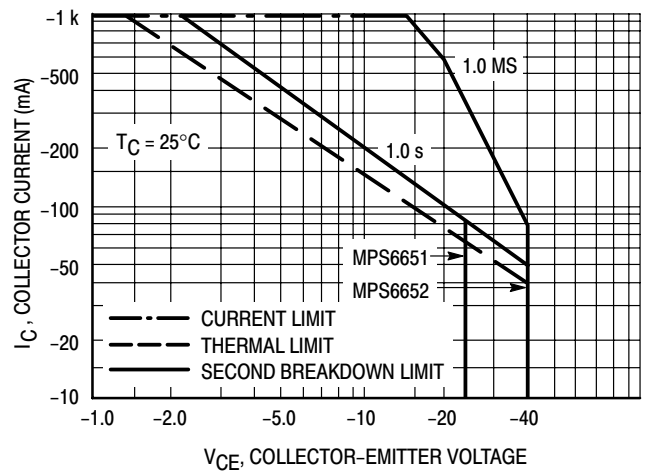


Figure 18. Safe Operating Area

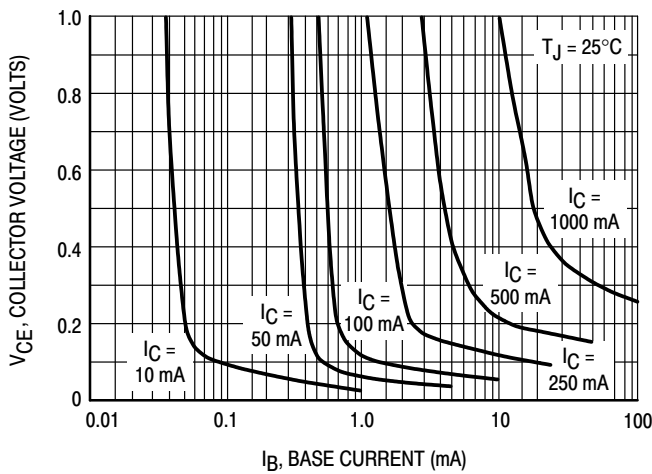


Figure 19. MPS6601/6602 Saturation Region

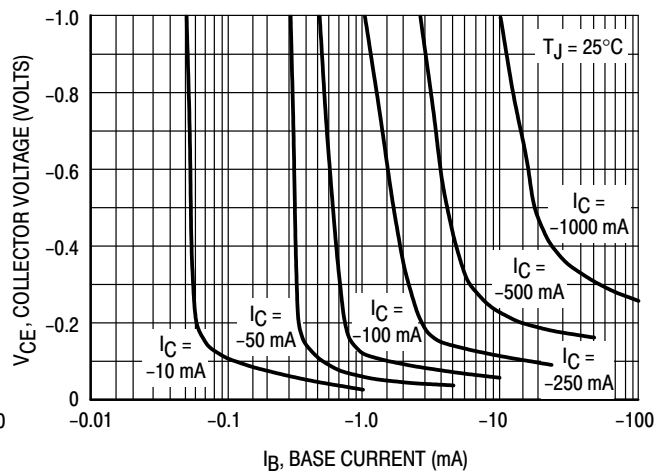
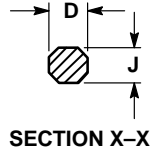
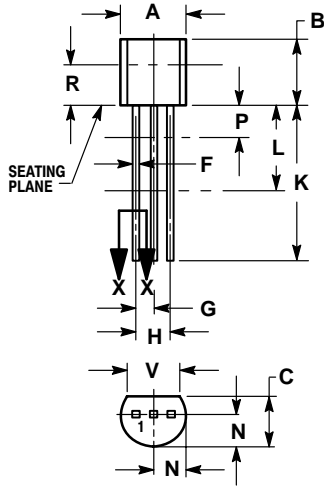


Figure 20. MPS6651/6652 Saturation Region

NPN MPS6601 MPS6602 PNP MPS6651 MPS6652

PACKAGE DIMENSIONS

CASE 029-11
(TO-226AA)
ISSUE AD



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K MINIMUM. 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	0.022	0.41	0.55
F	0.016	0.019	0.41	0.48
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	---

STYLE 1:

1. EMITTER
2. BASE
3. COLLECTOR

NPN MPS6601 MPS6602 PNP MPS6651 MPS6652

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