

Amplifier Transistors

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage MPS6601/6651 MPS6602/6652	V_{CEO}	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	mA _{dc}
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

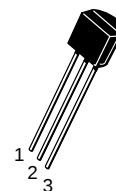
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}^{(1)}$	200	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	$^\circ\text{C/W}$

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

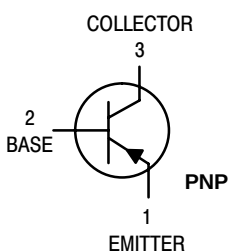
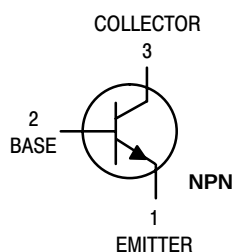
NPN MPS6601 MPS6602* PNP MPS6651 MPS6652*

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 mA _{dc} , I _B = 0)	MPS6601/6651 MPS6602/6652	V _{(BR)CEO}	25 40	— —	V _{dc}
Collector–Base Breakdown Voltage (I _C = 100 μA _{dc} , I _E = 0)	MPS6601/6651 MPS6602/6652	V _{(BR)CBO}	25 40	— —	V _{dc}
Emitter–Base Breakdown Voltage (I _E = 10 μA _{dc} , I _C = 0)		V _{(BR)EBO}	4.0	—	V _{dc}
Collector Cutoff Current (V _{CE} = 25 V _{dc} , I _B = 0) (V _{CE} = 30 V _{dc} , I _B = 0)	MPS6601/6651 MPS6602/6652	I _{CES}	— —	0.1 0.1	μA _{dc}
Collector Cutoff Current (V _{CB} = 25 V _{dc} , I _E = 0) (V _{CB} = 30 V _{dc} , I _E = 0)	MPS6601/6651 MPS6602/6652	I _{CBO}	— —	0.1 0.1	μA _{dc}

ON CHARACTERISTICS

DC Current Gain (I _C = 100 mA _{dc} , V _{CE} = 1.0 V _{dc}) (I _C = 500 mA _{dc} , V _{CE} = 1.0 V _{dc}) (I _C = 1000 mA _{dc} , V _{CE} = 1.0 V _{dc})	h _{FE}	50 50 30	— — —	—
Collector–Emitter Saturation Voltage (I _C = 1000 mA _{dc} , I _B = 100 mA _{dc})	V _{CE(sat)}	—	0.6	V _{dc}
Base–Emitter On Voltage (I _C = 500 mA _{dc} , V _{CE} = 1.0 V _{dc})	V _{BE(on)}	—	1.2	V _{dc}

SMALL–SIGNAL CHARACTERISTICS

Current–Gain — Bandwidth Product (I _C = 50 mA _{dc} , V _{CE} = 10 V _{dc} , f = 100 MHz)	f _T	100	—	MHz
Output Capacitance (V _{CB} = 10 V _{dc} , I _E = 0, f = 1.0 MHz)	C _{obo}	—	30	pF

SWITCHING CHARACTERISTICS

Delay Time	(V _{CC} = 40 V _{dc} , I _C = 500 mA _{dc} , I _{B1} = 50 mA _{dc} , 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

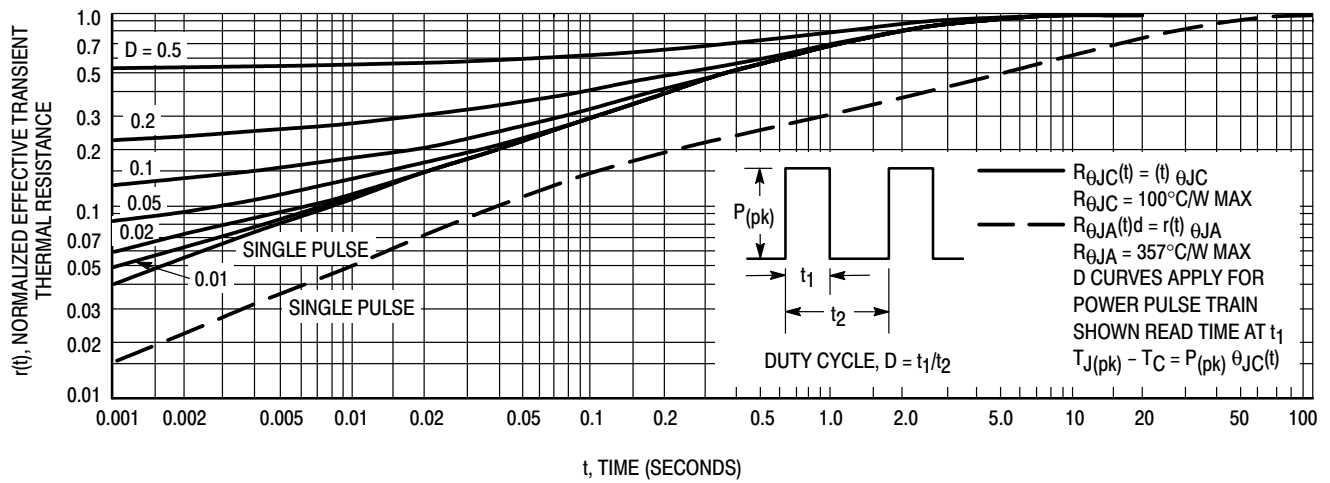
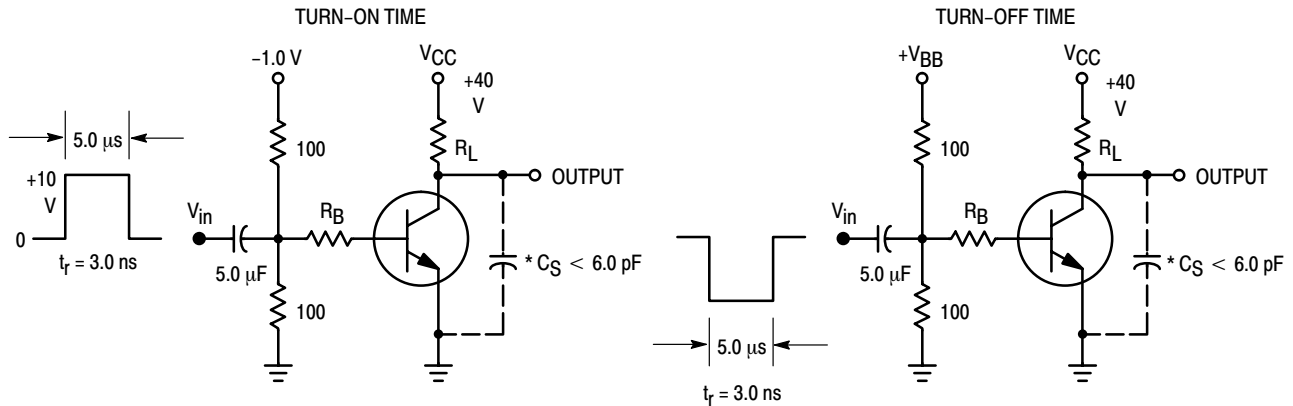


Figure 1. Thermal Response



*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

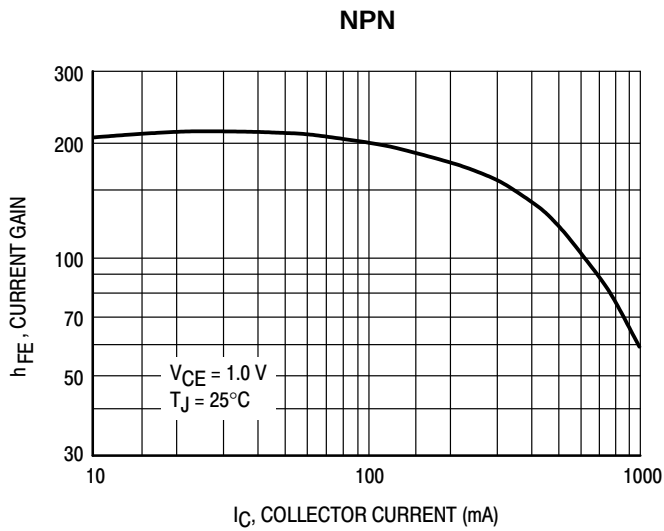


Figure 3. MPS6601/6602 DC Current Gain

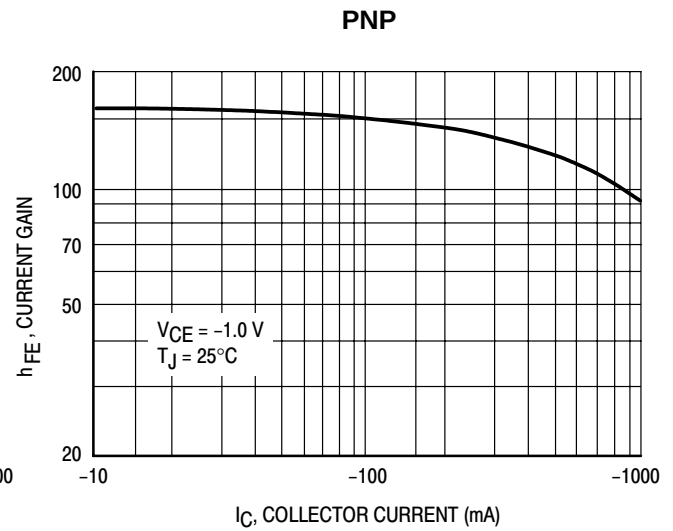


Figure 4. MPS6651/6652 DC Current Gain

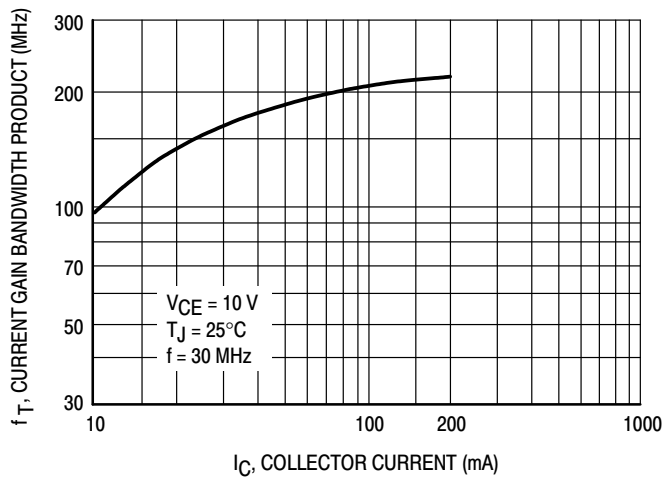


Figure 5. Current Gain Bandwidth Product

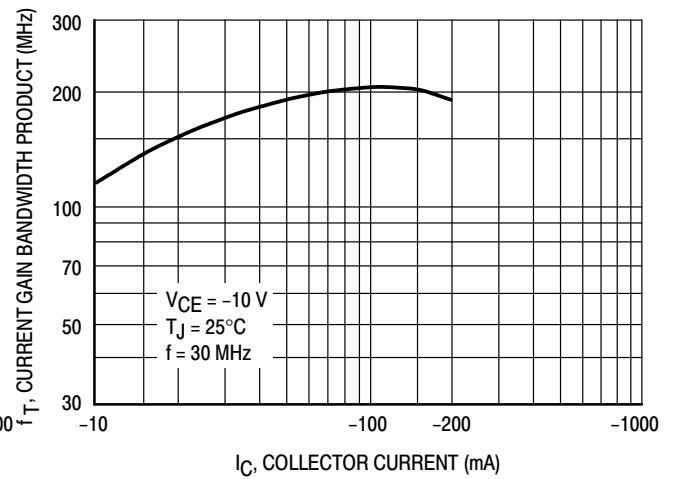


Figure 6. Current Gain Bandwidth Product

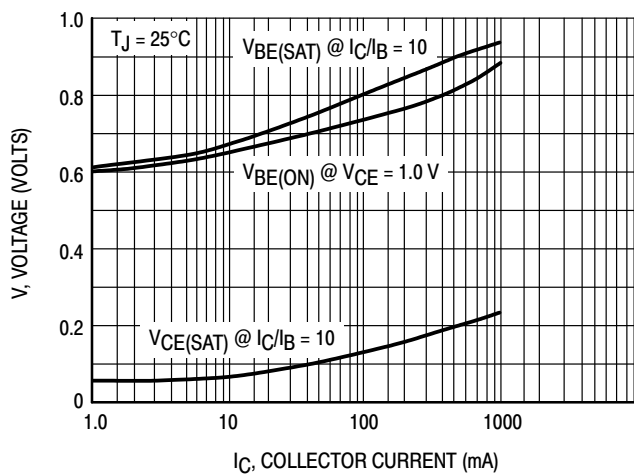


Figure 7. On Voltages

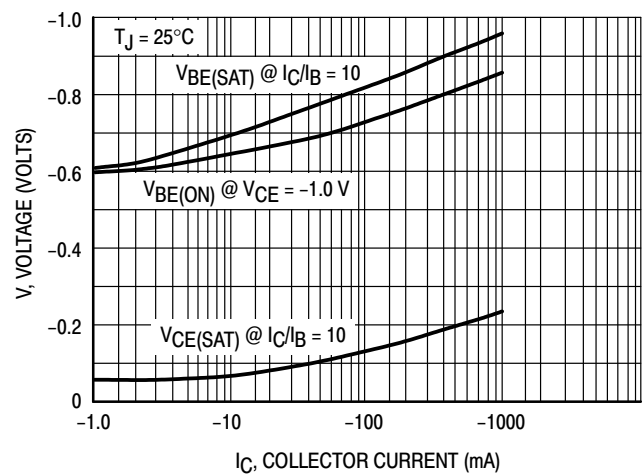


Figure 8. On Voltages

NPN MPS6601 MPS6602 PNP MPS6651 MPS6652

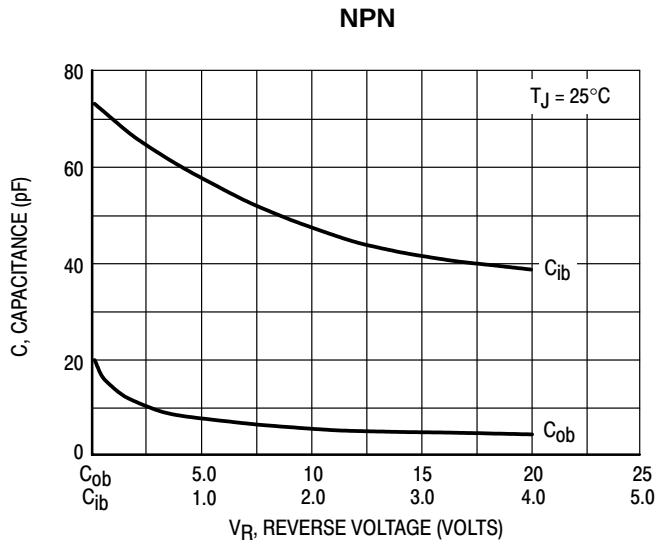


Figure 9. Capacitance

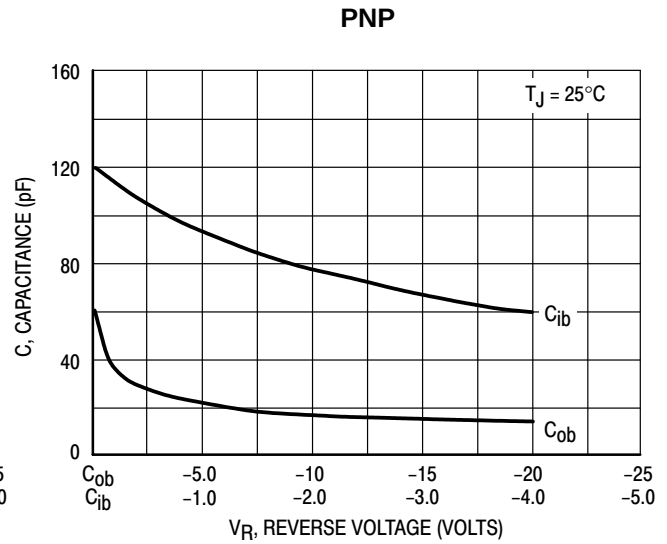


Figure 10. Capacitance

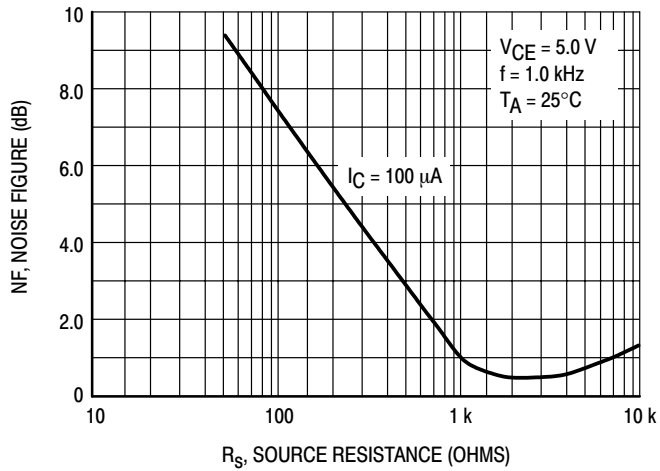


Figure 11. MPS6601/6602 Noise Figure

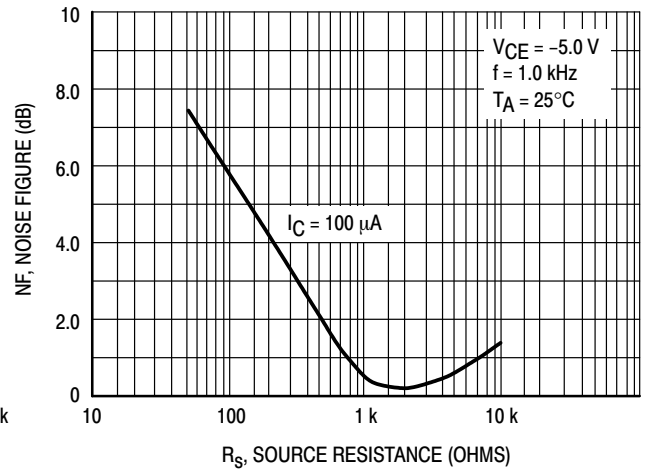


Figure 12. MPS6651/6652 Noise Figure

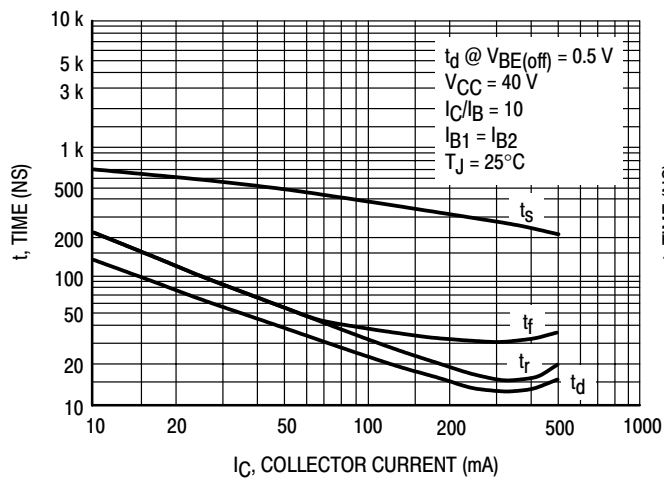


Figure 13. MPS6601/6602 Switching Times

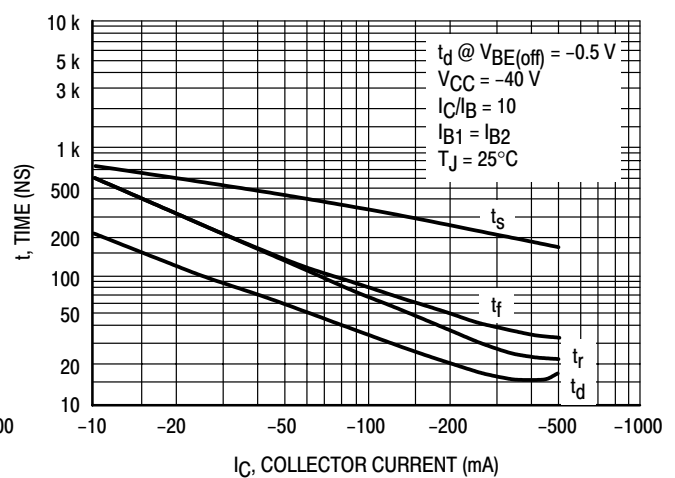


Figure 14. MPS6651/6652 Switching Times

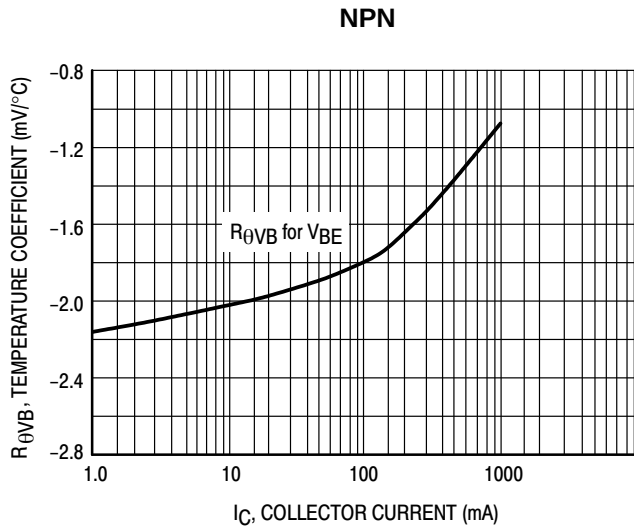


Figure 15. Base-Emitter Temperature Coefficient

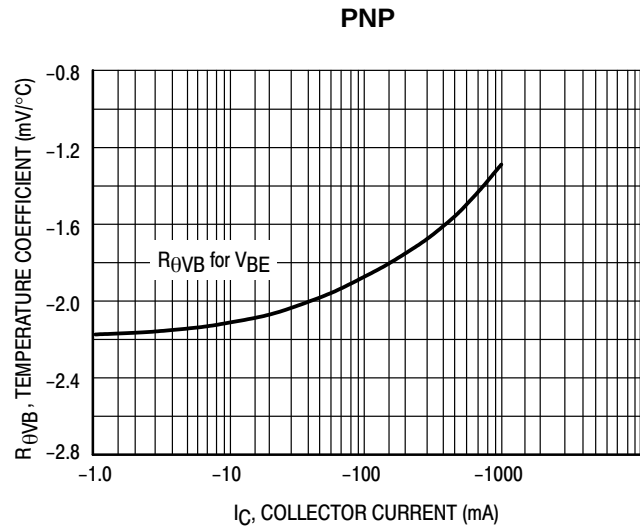


Figure 16. Base-Emitter Temperature Coefficient

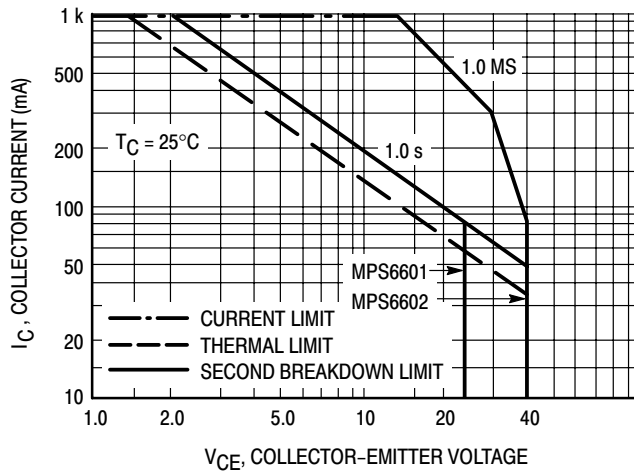


Figure 17. Safe Operating Area

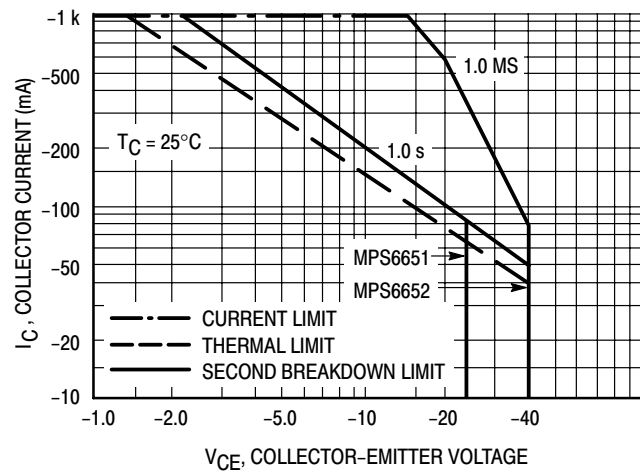


Figure 18. Safe Operating Area

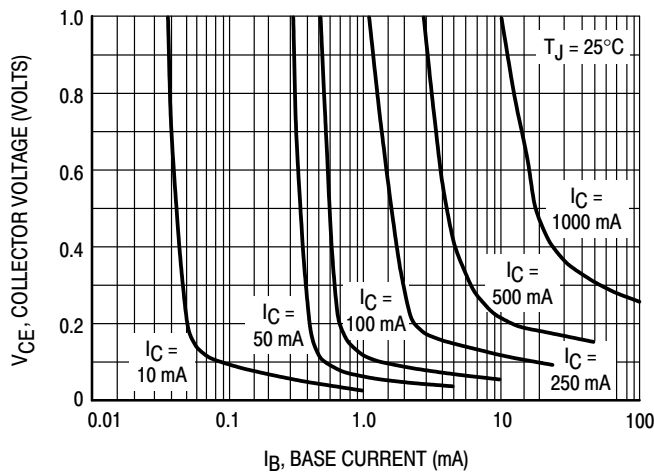


Figure 19. MPS6601/6602 Saturation Region

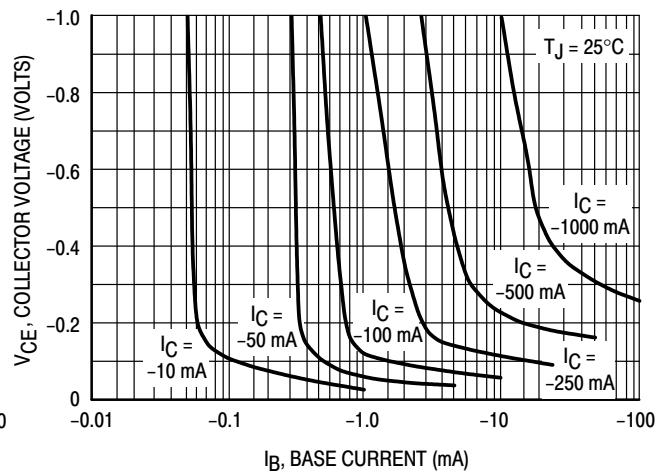
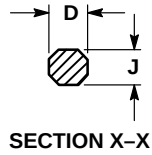
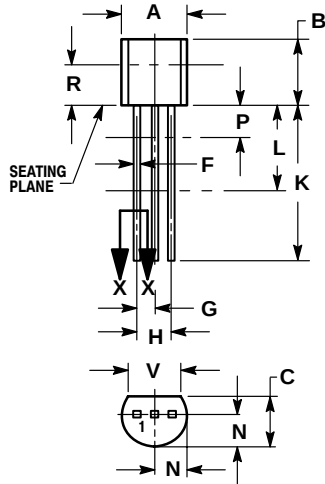


Figure 20. MPS6651/6652 Saturation Region

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

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