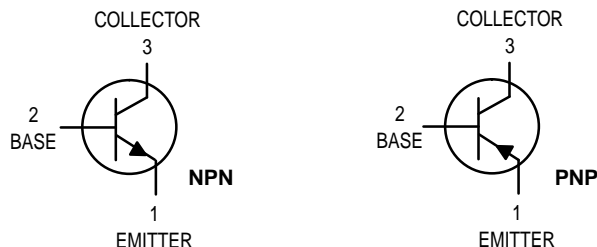


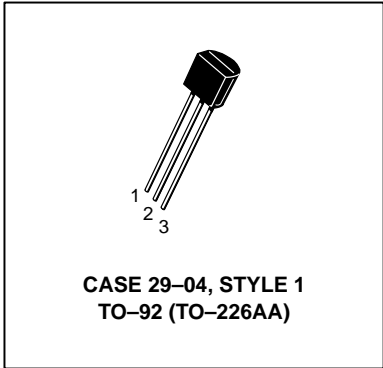
Amplifier Transistors



NPN
MPS6601
MPS6602*
PNP
MPS6651
MPS6652*

Voltage and current are negative
for PNP transistors

*Motorola Preferred Device



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_{CB0}	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/°C
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	1.5 12	Watts 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	$R_{\theta JA}^{(1)}$	200	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	°C/W

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage ($I_C = 1.0 \text{ mAdc}, I_B = 0$)	$V_{(BR)CEO}$	25 40	— —	Vdc
Collector–Base Breakdown Voltage ($I_C = 100 \mu\text{Adc}, I_E = 0$)	$V_{(BR)CBO}$	25 40	— —	Vdc
Emitter–Base Breakdown Voltage ($I_E = 10 \mu\text{Adc}, I_C = 0$)	$V_{(BR)EBO}$	4.0	—	Vdc
Collector Cutoff Current ($V_{CE} = 25 \text{ Vdc}, I_B = 0$) ($V_{CE} = 30 \text{ Vdc}, I_B = 0$)	I_{CES}	— —	0.1 0.1	μAdc
Collector Cutoff Current ($V_{CB} = 25 \text{ Vdc}, I_E = 0$) ($V_{CB} = 30 \text{ Vdc}, I_E = 0$)	I_{CBO}	— —	0.1 0.1	μAdc

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

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

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted) (Continued)

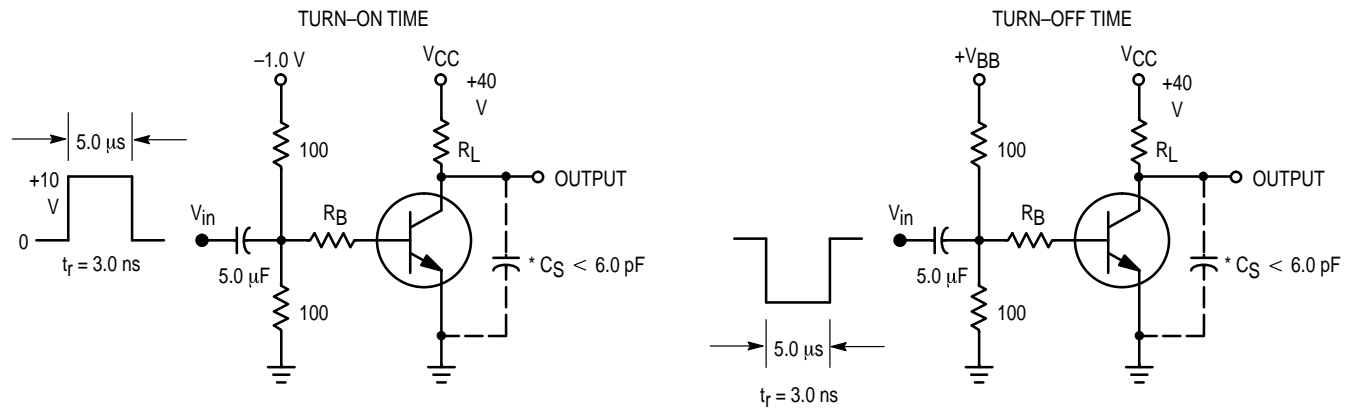
Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS				
DC Current Gain ($I_C = 100\text{ mAdc}$, $V_{CE} = 1.0\text{ Vdc}$) ($I_C = 500\text{ mAdc}$, $V_{CE} = 1.0\text{ Vdc}$) ($I_C = 1000\text{ mAdc}$, $V_{CE} = 1.0\text{ Vdc}$)	h_{FE}	50 50 30	— — —	—
Collector–Emitter Saturation Voltage ($I_C = 1000\text{ mAdc}$, $I_B = 100\text{ mAdc}$)	$V_{CE(sat)}$	—	0.6	Vdc
Base–Emitter On Voltage ($I_C = 500\text{ mAdc}$, $V_{CE} = 1.0\text{ Vdc}$)	$V_{BE(on)}$	—	1.2	Vdc

SMALL–SIGNAL CHARACTERISTICS

Current–Gain — Bandwidth Product ($I_C = 50\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$, $f = 100\text{ MHz}$)	f_T	100	—	MHz
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{obo}	—	30	pF

SWITCHING CHARACTERISTICS

Delay Time	$(V_{CC} = 40\text{ Vdc}$, $I_C = 500\text{ mAdc}$, $I_{B1} = 50\text{ mAdc}$, $t_p \geq 300\text{ ns}$ Duty Cycle)	t_d	—	25	ns
Rise Time		t_r	—	30	ns
Storage Time		t_s	—	250	ns
Fall Time		t_f	—	50	ns



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

Figure 1. Switching Time Test Circuits

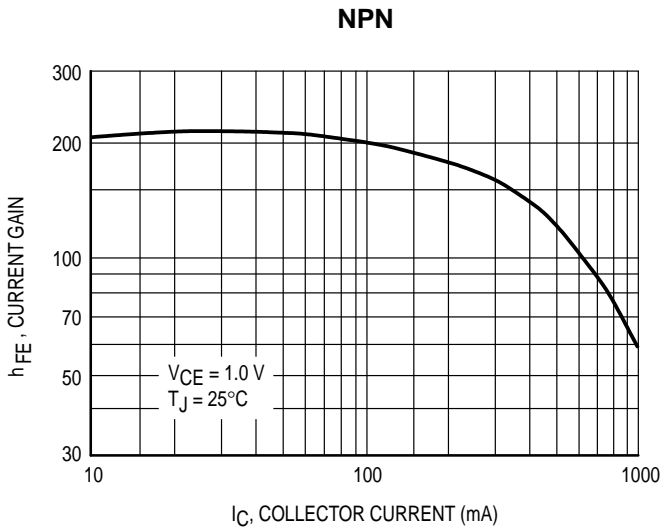


Figure 2. MPS6601/6602 DC Current Gain

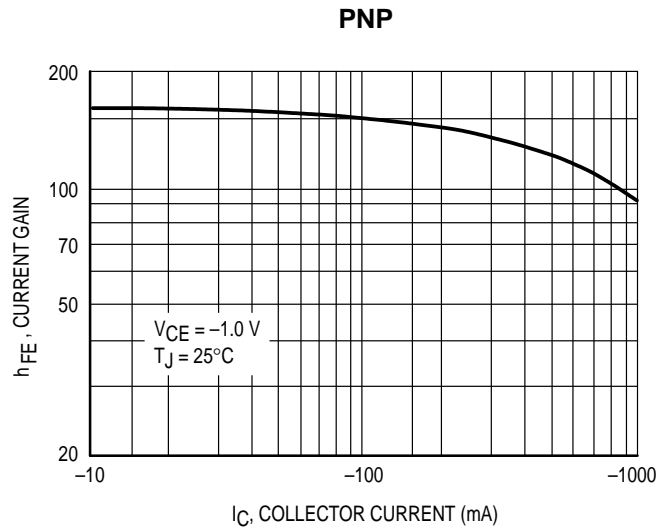


Figure 3. MPS6651/6652 DC Current Gain

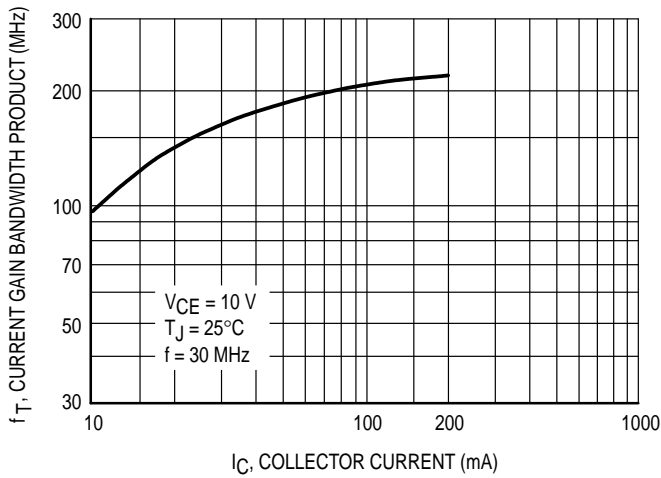


Figure 4. Current Gain Bandwidth Product

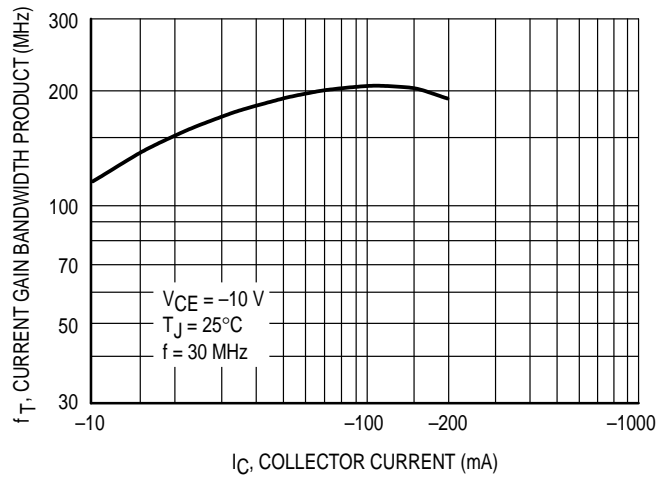


Figure 5. Current Gain Bandwidth Product

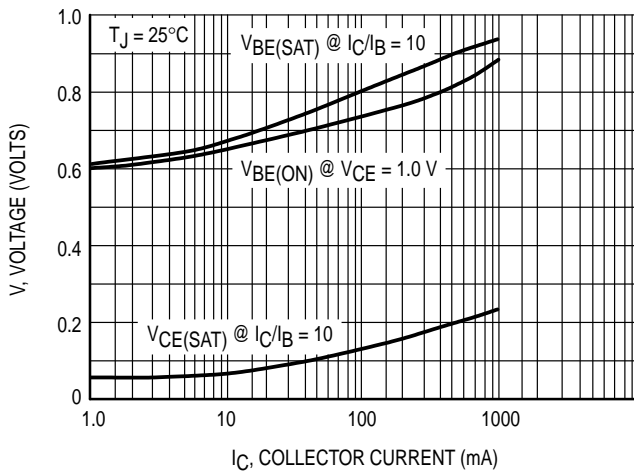


Figure 6. On Voltages

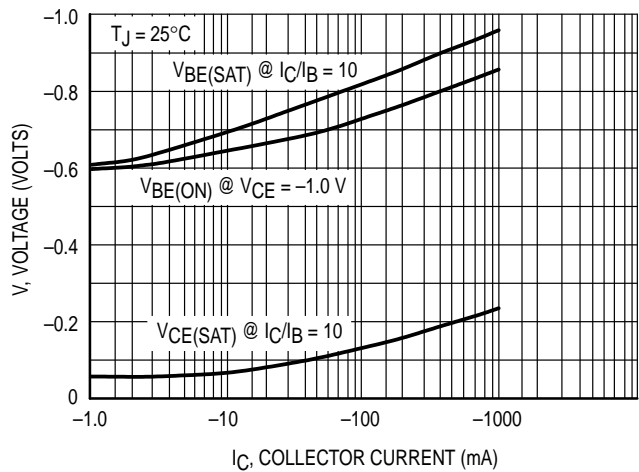


Figure 7. On Voltages

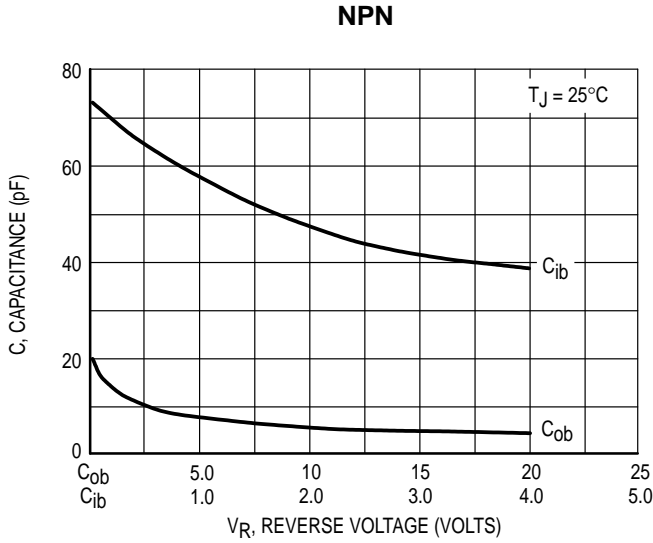


Figure 8. Capacitance

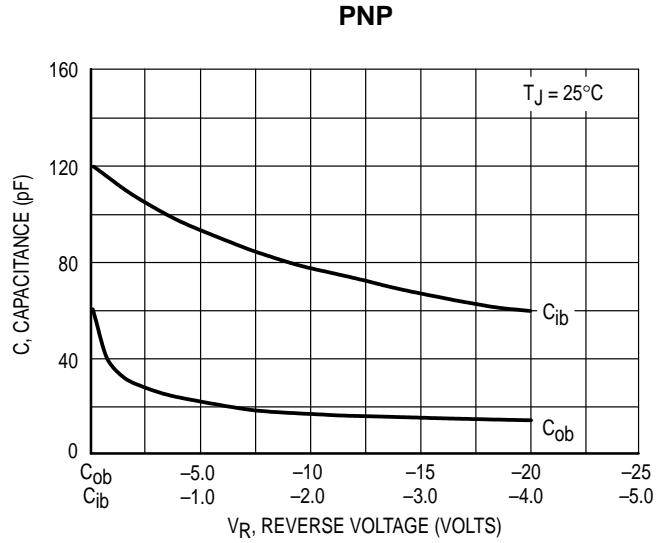


Figure 9. Capacitance

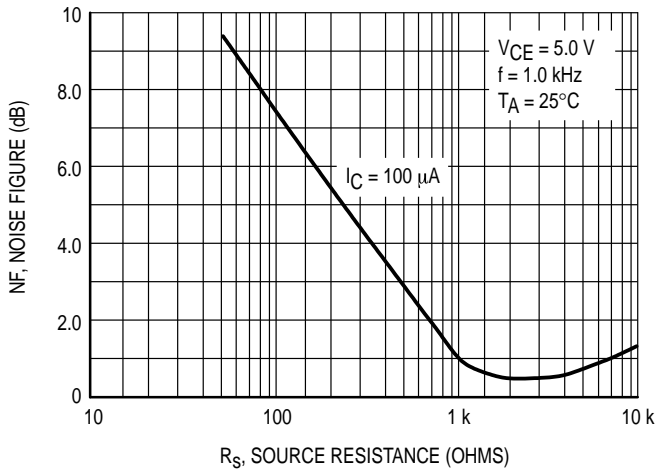


Figure 10. MPS6601/6602 Noise Figure

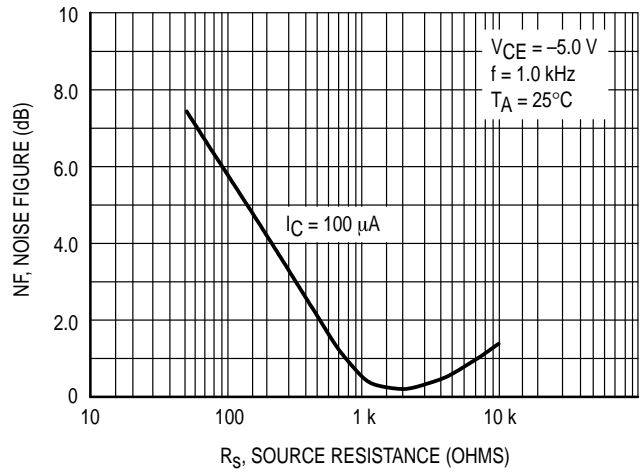


Figure 11. MPS6651/6652 Noise Figure

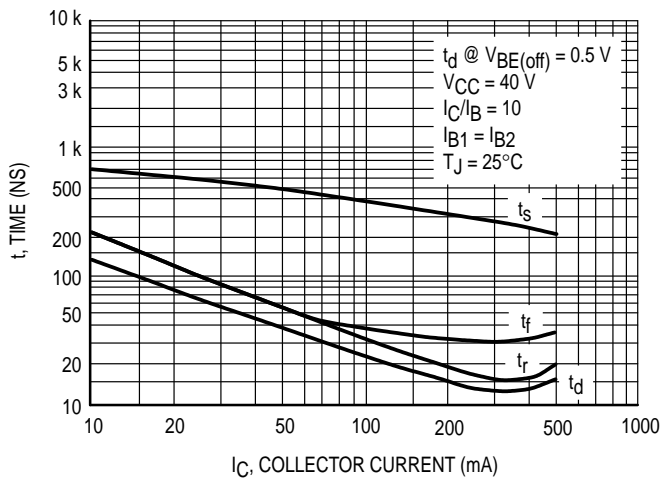


Figure 12. MPS6601/6602 Switching Times

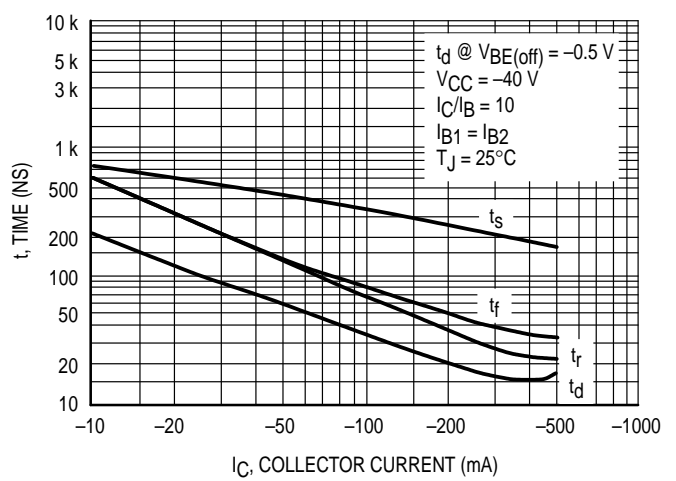


Figure 13. MPS6651/6652 Switching Times

NPN

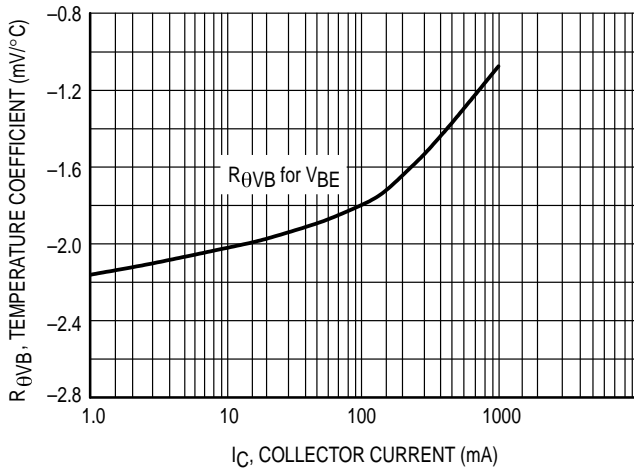


Figure 14. Base-Emitter Temperature Coefficient

PNP

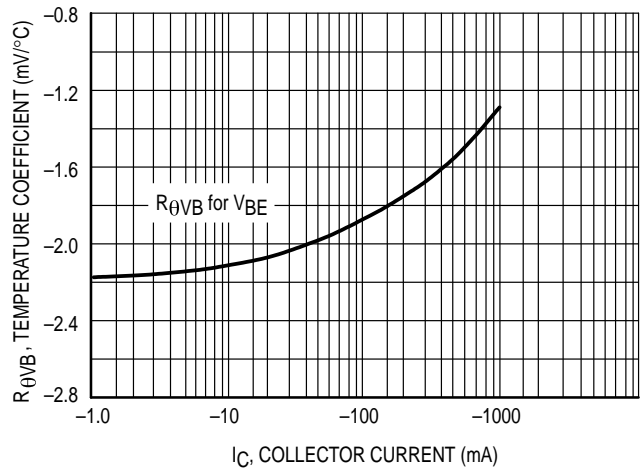


Figure 15. Base-Emitter Temperature Coefficient

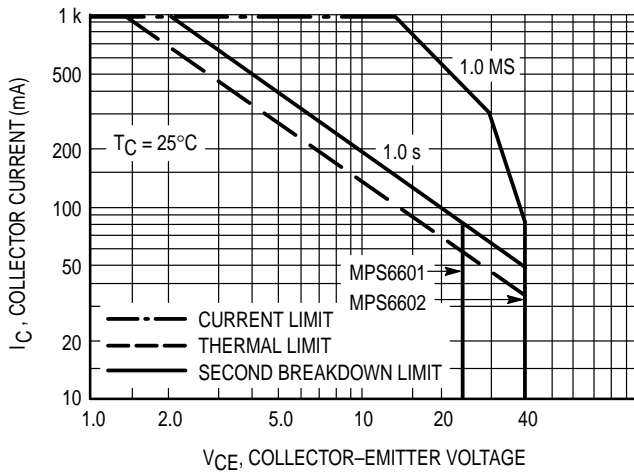


Figure 16. Safe Operating Area

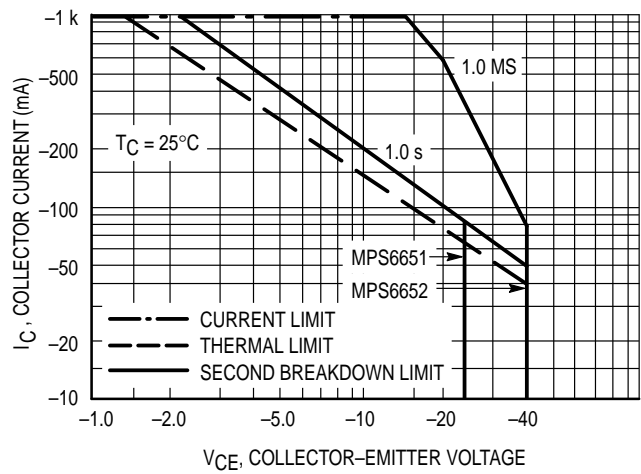


Figure 17. Safe Operating Area

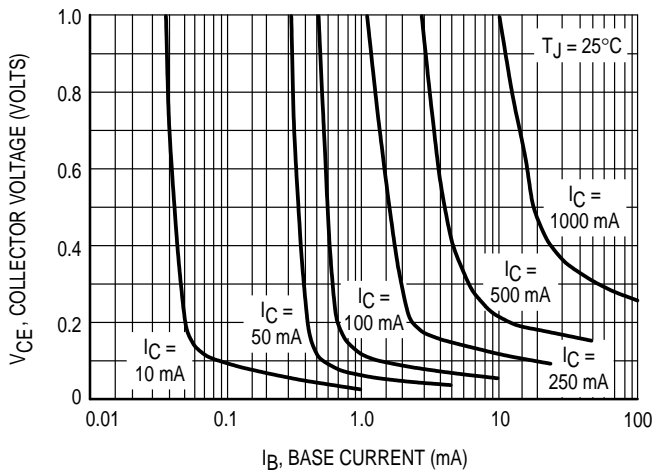


Figure 18. MPS6601/6602 Saturation Region

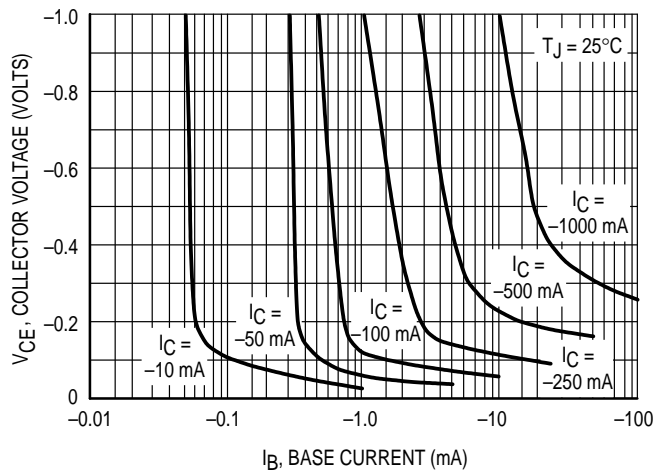


Figure 19. MPS6651/6652 Saturation Region

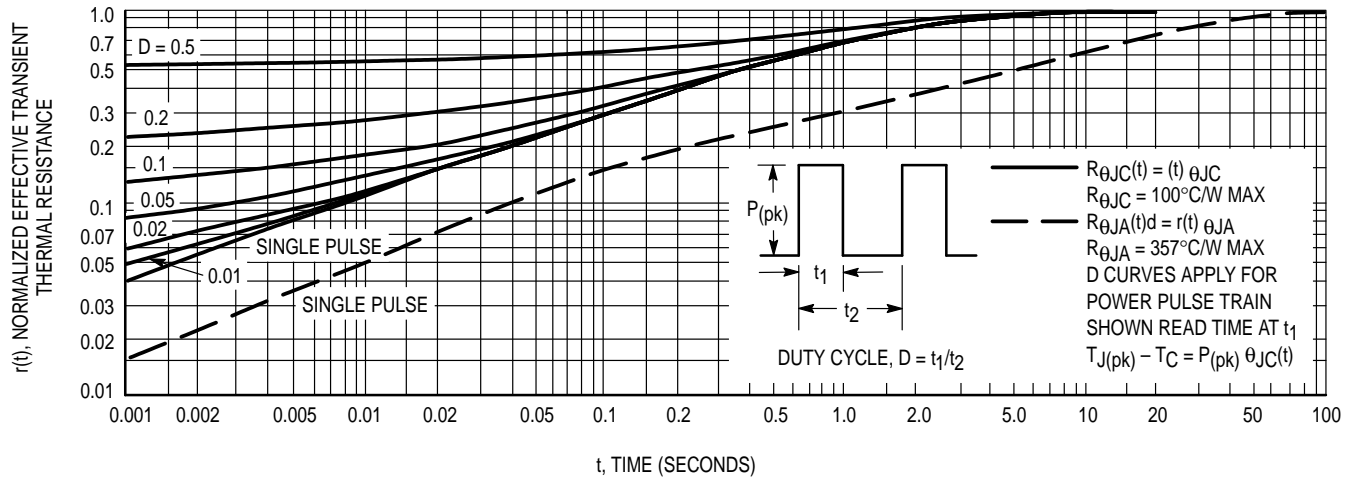
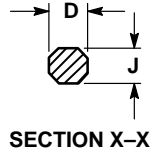
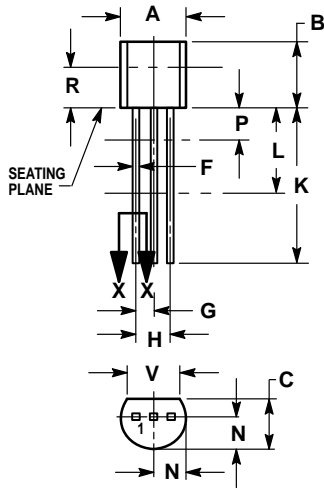


Figure 20. Thermal Response

PACKAGE DIMENSIONS



**CASE 029-04
(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:

- PIN 1. EMITTER
2. BASE
3. COLLECTOR

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