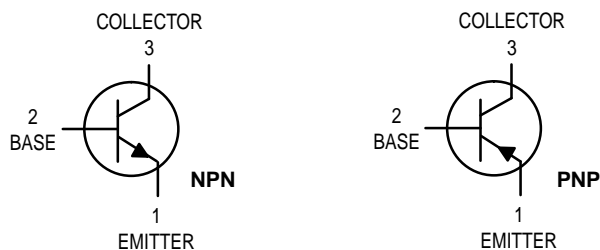


# Amplifier Transistors



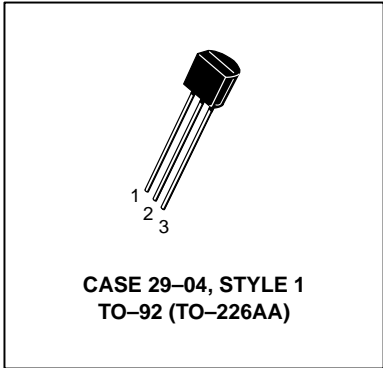
**NPN**  
**MPS8098**  
**MPS8099\***  
**PNP**  
**MPS8598**  
**MPS8599\***

Voltage and current are negative  
for PNP transistors

\*Motorola Preferred Device

## MAXIMUM RATINGS

Rating	Symbol	MPS8098 MPS8598	MPS8099 MPS8599	Unit
Collector–Emitter Voltage	$V_{CEO}$	60	80	Vdc
Collector–Base Voltage	$V_{CBO}$	60	80	Vdc
		<b>MPS8099</b>	<b>MPS8598 MPS8599</b>	
Emitter–Base Voltage	$V_{EBO}$	6.0	5.0	Vdc
Collector Current – Continuous	$I_C$	500		mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	625	5.0	mW mW/°C
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	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	$R_{\theta JA}$	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
----------------	--------	-----	-----	------

## OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage <sup>(1)</sup> ( $I_C = 10 \text{ mAdc}, I_B = 0$ )	MPS8098, MPS8598 MPS8099, MPS8599	$V_{(BR)CEO}$	60 80	— —	Vdc
Collector–Base Breakdown Voltage ( $I_C = 100 \mu\text{Adc}, I_E = 0$ )	MPS8098, MPS8598 MPS8099, MPS8599	$V_{(BR)CBO}$	60 80	— —	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 10 \mu\text{Adc}, I_C = 0$ )	MPS8098, MPS8099 MPS8598, MPS8599	$V_{(BR)EBO}$	6.0 5.0	— —	Vdc
Collector Cutoff Current ( $V_{CE} = 60 \text{ Vdc}, I_B = 0$ )		$I_{CES}$	—	0.1	$\mu\text{Adc}$
Collector Cutoff Current ( $V_{CB} = 60 \text{ Vdc}, I_E = 0$ ) ( $V_{CB} = 80 \text{ Vdc}, I_E = 0$ )	MPS8098, MPS8598 MPS8099, MPS8599	$I_{CBO}$	— —	0.1 0.1	$\mu\text{Adc}$
Emitter Cutoff Current ( $V_{EB} = 6.0 \text{ Vdc}, I_C = 0$ ) ( $V_{EB} = 4.0 \text{ Vdc}, I_C = 0$ )	MPS8098, MPS8099 MPS8598, MPS8599	$I_{EBO}$	— —	0.1 0.1	$\mu\text{Adc}$

1. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle = 2.0%.

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

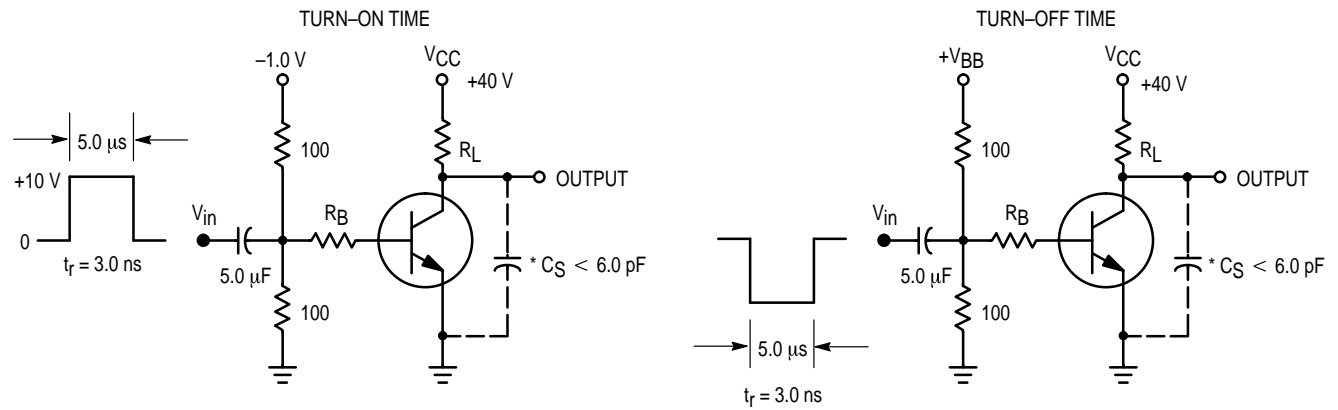
**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Max	Unit
<b>ON CHARACTERISTICS(1)</b>				
DC Current Gain ( $I_C = 1.0\text{ mAdc}$ , $V_{CE} = 5.0\text{ Vdc}$ ) ( $I_C = 10\text{ mAdc}$ , $V_{CE} = 5.0\text{ Vdc}$ ) ( $I_C = 100\text{ mAdc}$ , $V_{CE} = 5.0\text{ Vdc}$ )	$h_{FE}$	100 100 75	300 — —	—
Collector–Emitter Saturation Voltage ( $I_C = 100\text{ mAdc}$ , $I_B = 5.0\text{ mAdc}$ ) ( $I_C = 100\text{ mAdc}$ , $I_B = 10\text{ mAdc}$ )	$V_{CE(sat)}$	— —	0.4 0.3	Vdc
Base–Emitter On Voltage ( $I_C = 1.0\text{ mAdc}$ , $V_{CE} = 5.0\text{ Vdc}$ ) ( $I_C = 10\text{ mAdc}$ , $V_{CE} = 5.0\text{ Vdc}$ )	$V_{BE(on)}$	0.5 0.6	0.7 0.8	Vdc
		MPS8098, MPS8598 MPS8099, MPS8599		

**SMALL–SIGNAL CHARACTERISTICS**

Current–Gain — Bandwidth Product ( $I_C = 10\text{ mAdc}$ , $V_{CE} = 5.0\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$f_T$	150	—	MHz
Output Capacitance ( $V_{CB} = 5.0\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{obo}$	— —	6.0 8.0	pF
Input Capacitance ( $V_{EB} = 0.5\text{ Vdc}$ , $I_C = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ibo}$	— —	25 30	pF
		MPS8098, MPS8099 MPS8598, MPS8599		

1. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle = 2.0%.



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

**Figure 1. Switching Time Test Circuits**

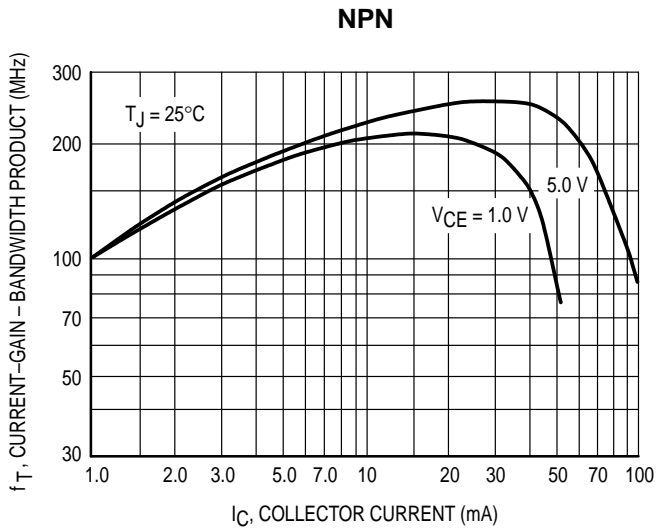


Figure 2. MPS8098/99 Current-Gain — Bandwidth Product

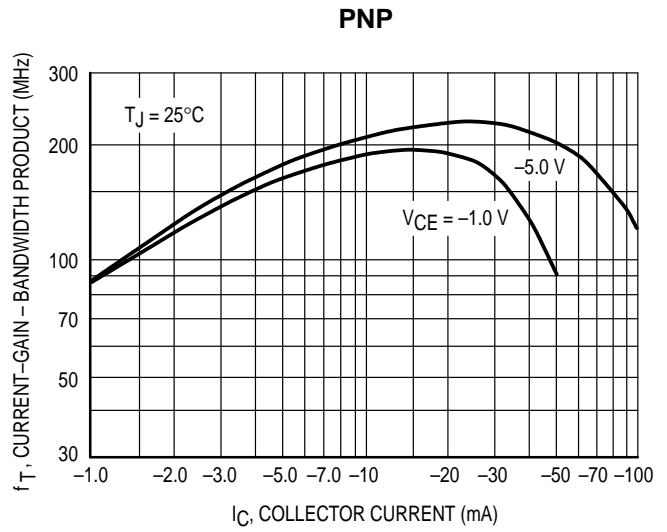


Figure 3. MPS8598/99 Current-Gain — Bandwidth Product

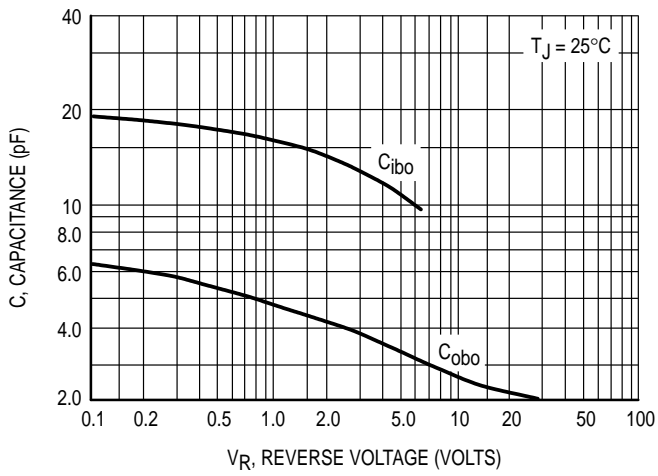


Figure 4. MPS8098/99 Capacitance

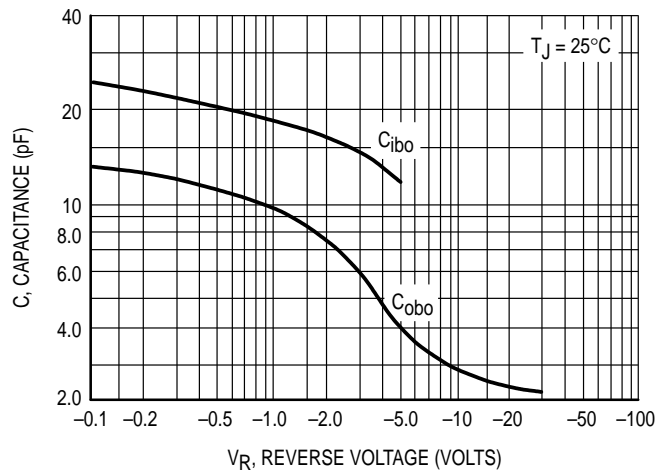


Figure 5. MPS8598/99 Capacitance

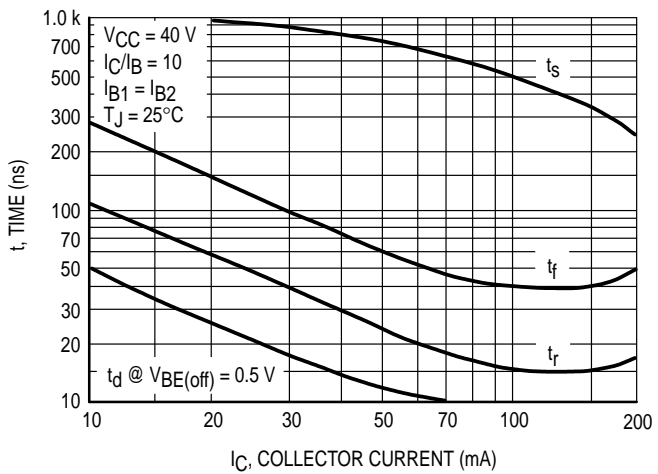


Figure 6. MPS8098/99 Switching Times

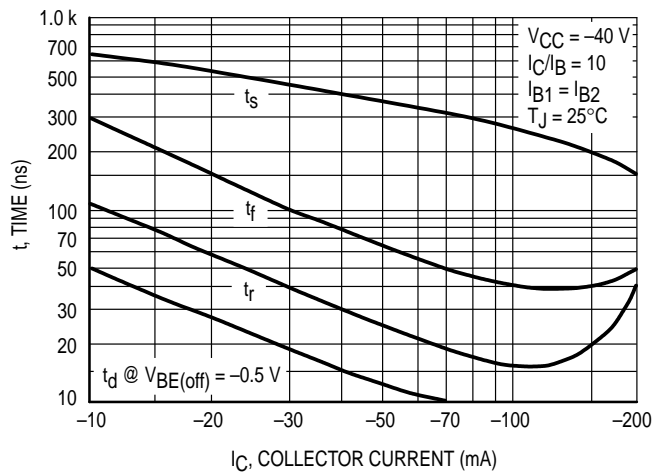


Figure 7. MPS8598/99 Switching Times

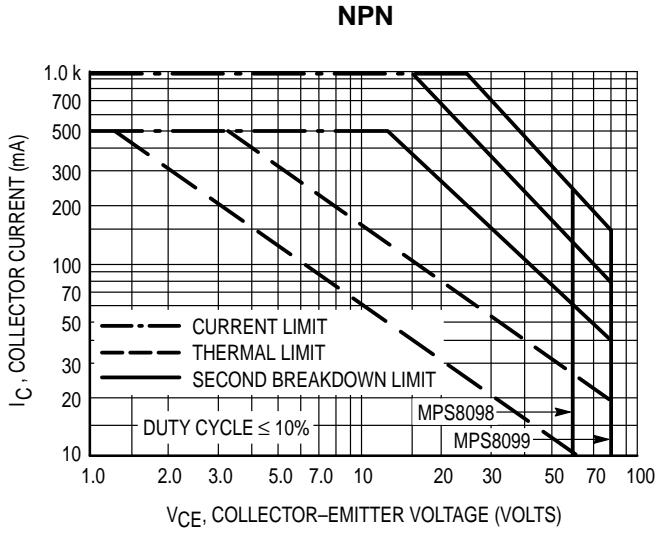


Figure 8. MPS8098/99 Active-Region Safe Operating Area

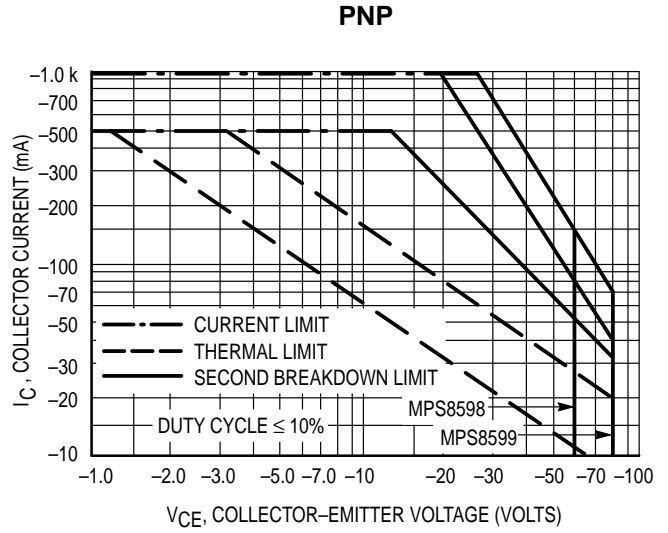


Figure 9. MPS8598/99 Active-Region Safe Operating Area

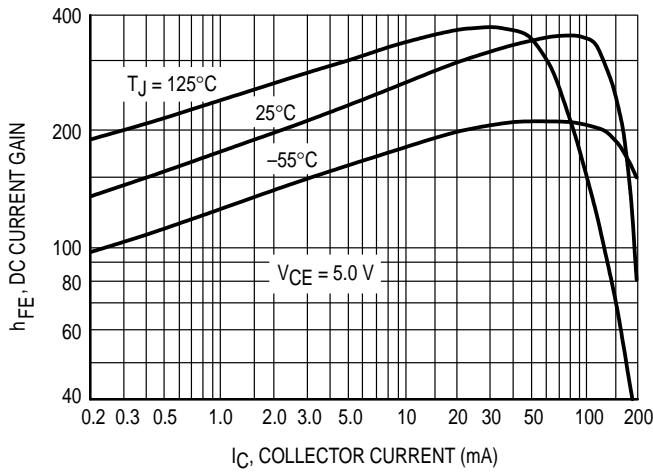


Figure 10. MPS8098/99 DC Current Gain

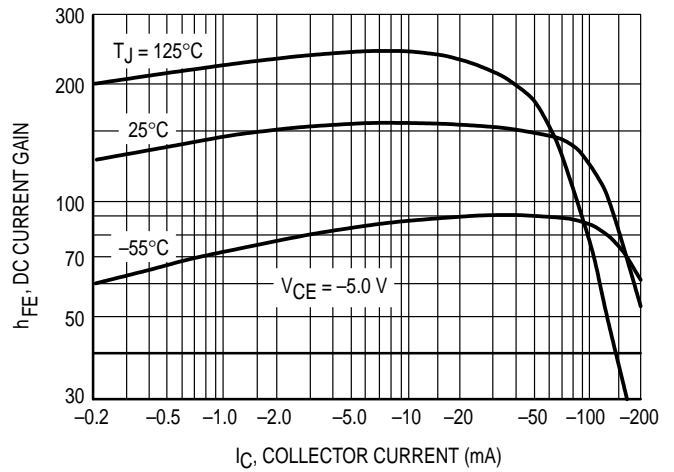


Figure 11. MPS8598/99 DC Current Gain

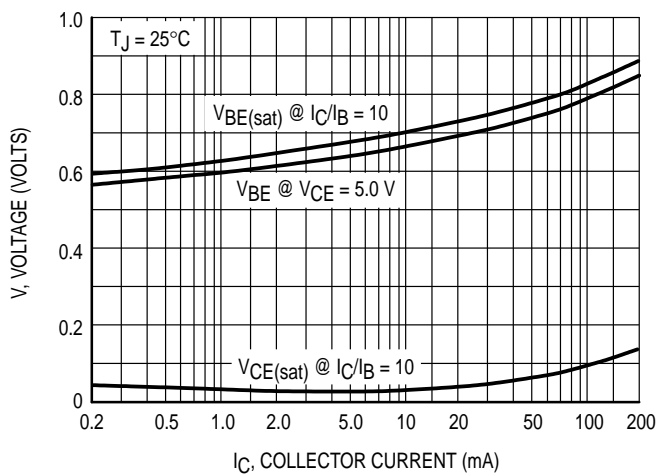


Figure 12. MPS8098/99 "ON" Voltages

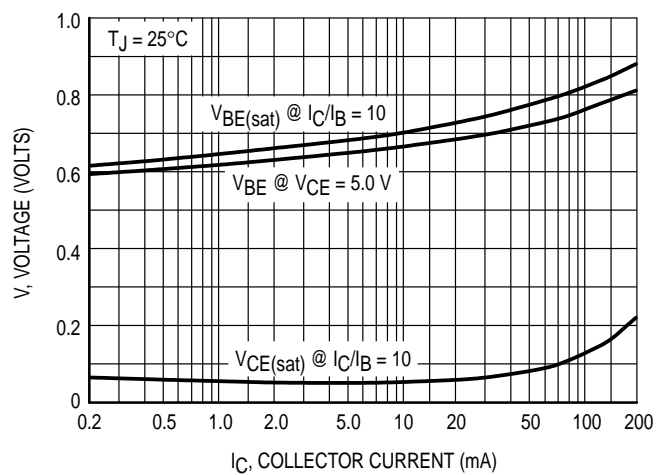


Figure 13. MPS8598/99 "ON" Voltages

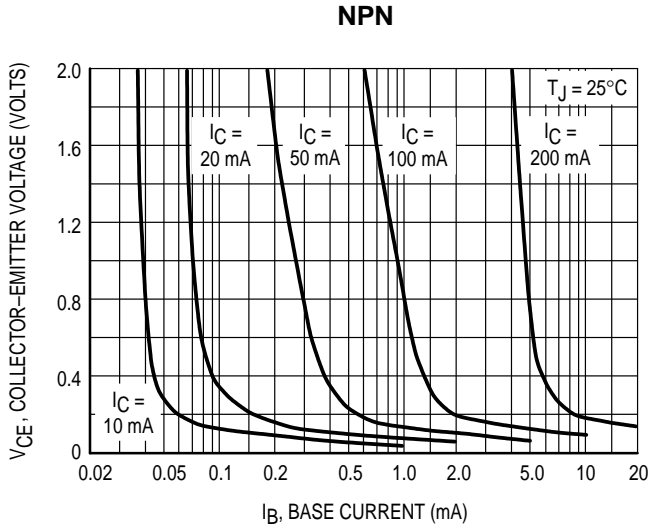


Figure 14. MPS8098/99 Collector Saturation Region

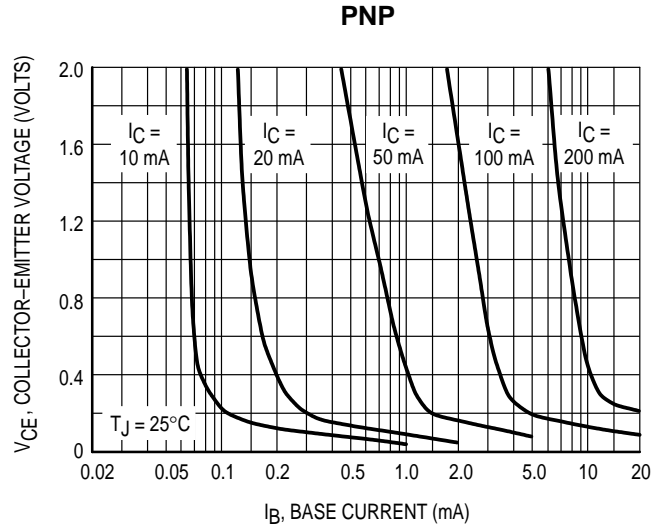


Figure 15. MPS8598/99 Collector Saturation Region

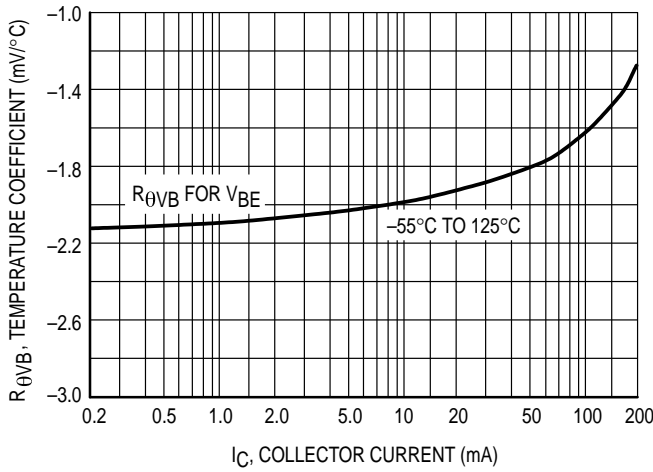


Figure 16. MPS8098/99 Base-Emitter Temperature Coefficient

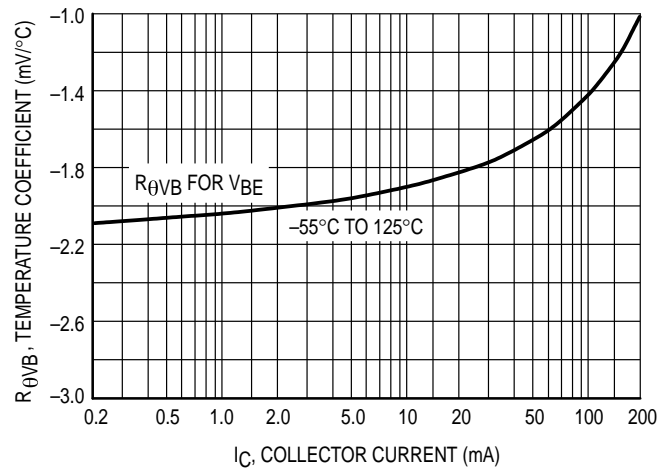


Figure 17. MPS8598/99 Base-Emitter Temperature Coefficient

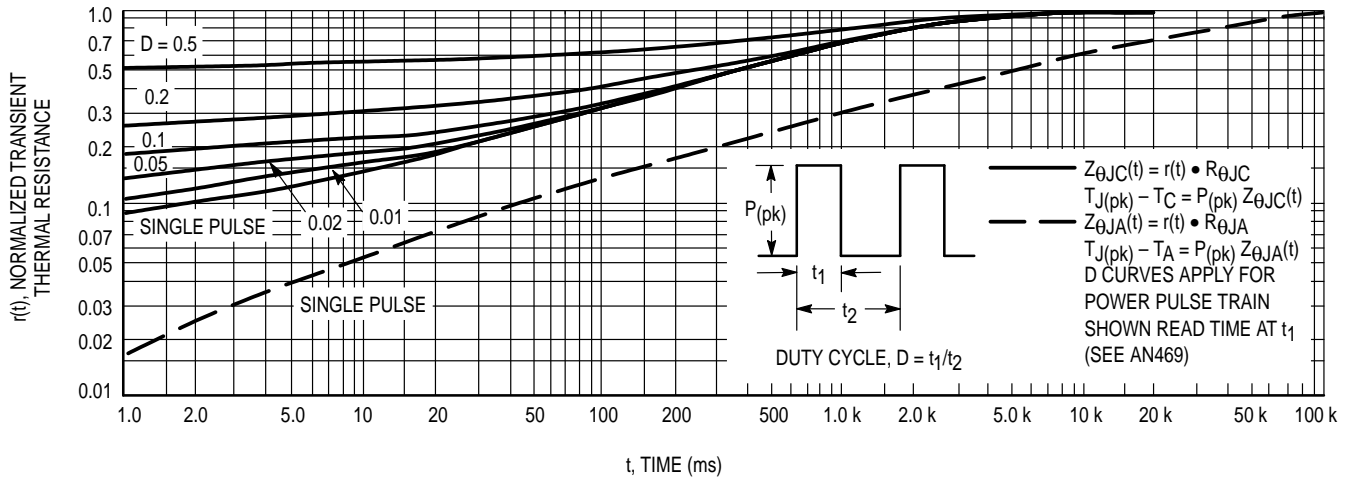


Figure 18. MPS8098, MPS8099, MPS8598 and MPS8599 Thermal Response

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:

1. EMITTER
2. BASE
3. COLLECTOR

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