

# Amplifier Transistors

## MAXIMUM RATINGS

Rating	Symbol	MPS8098 MPS8598	MPS8099 MPS8599	Unit
Collector–Emitter Voltage	$V_{CE0}$	60	80	Vdc
Collector–Base Voltage	$V_{CB0}$	60	80	Vdc
Emitter–Base Voltage	$V_{EB0}$	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

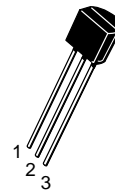
## THERMAL CHARACTERISTICS

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

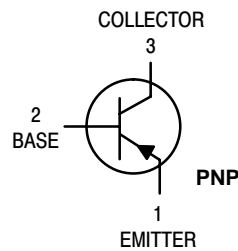
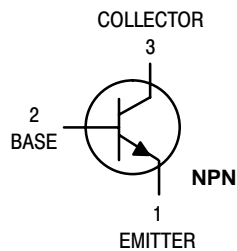
**NPN**  
**MPS8098**  
**MPS8099\***  
**PNP**  
**MPS8598**  
**MPS8599\***

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 MPS8098 MPS8099 PNP MPS8598 MPS8599

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector–Emitter Breakdown Voltage <sup>(1)</sup> (I <sub>C</sub> = 10 mA <sub>dc</sub> , I <sub>B</sub> = 0)	MPS8098, MPS8598 MPS8099, MPS8599	V <sub>(BR)CEO</sub>	60 80	— —	V <sub>dc</sub>
Collector–Base Breakdown Voltage (I <sub>C</sub> = 100 μA <sub>dc</sub> , I <sub>E</sub> = 0)	MPS8098, MPS8598 MPS8099, MPS8599	V <sub>(BR)CBO</sub>	60 80	— —	V <sub>dc</sub>
Emitter–Base Breakdown Voltage (I <sub>E</sub> = 10 μA <sub>dc</sub> , I <sub>C</sub> = 0)	MPS8098, MPS8099 MPS8598, MPS8599	V <sub>(BR)EBO</sub>	6.0 5.0	— —	V <sub>dc</sub>
Collector Cutoff Current (V <sub>CE</sub> = 60 V <sub>dc</sub> , I <sub>B</sub> = 0)		I <sub>CES</sub>	—	0.1	μA <sub>dc</sub>
Collector Cutoff Current (V <sub>CB</sub> = 60 V <sub>dc</sub> , I <sub>E</sub> = 0) (V <sub>CB</sub> = 80 V <sub>dc</sub> , I <sub>E</sub> = 0)	MPS8098, MPS8598 MPS8099, MPS8599	I <sub>CBO</sub>	— —	0.1 0.1	μA <sub>dc</sub>
Emitter Cutoff Current (V <sub>EB</sub> = 6.0 V <sub>dc</sub> , I <sub>C</sub> = 0) (V <sub>EB</sub> = 4.0 V <sub>dc</sub> , I <sub>C</sub> = 0)	MPS8098, MPS8099 MPS8598, MPS8599	I <sub>EBO</sub>	— —	0.1 0.1	μA <sub>dc</sub>

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle = 2.0%.

## ON CHARACTERISTICS<sup>(1)</sup>

DC Current Gain (I <sub>C</sub> = 1.0 mA <sub>dc</sub> , V <sub>CE</sub> = 5.0 V <sub>dc</sub> ) (I <sub>C</sub> = 10 mA <sub>dc</sub> , V <sub>CE</sub> = 5.0 V <sub>dc</sub> ) (I <sub>C</sub> = 100 mA <sub>dc</sub> , V <sub>CE</sub> = 5.0 V <sub>dc</sub> )		h <sub>FE</sub>	100 100 75	300 — —	—
Collector–Emitter Saturation Voltage (I <sub>C</sub> = 100 mA <sub>dc</sub> , I <sub>B</sub> = 5.0 mA <sub>dc</sub> ) (I <sub>C</sub> = 100 mA <sub>dc</sub> , I <sub>B</sub> = 10 mA <sub>dc</sub> )		V <sub>CE(sat)</sub>	— —	0.4 0.3	V <sub>dc</sub>
Base–Emitter On Voltage (I <sub>C</sub> = 1.0 mA <sub>dc</sub> , V <sub>CE</sub> = 5.0 V <sub>dc</sub> ) (I <sub>C</sub> = 10 mA <sub>dc</sub> , V <sub>CE</sub> = 5.0 V <sub>dc</sub> )	MPS8098, MPS8598 MPS8099, MPS8599	V <sub>BE(on)</sub>	0.5 0.6	0.7 0.8	V <sub>dc</sub>

## SMALL–SIGNAL CHARACTERISTICS

Current–Gain — Bandwidth Product (I <sub>C</sub> = 10 mA <sub>dc</sub> , V <sub>CE</sub> = 5.0 V <sub>dc</sub> , f = 100 MHz)		f <sub>T</sub>	150	—	MHz
Output Capacitance (V <sub>CB</sub> = 5.0 V <sub>dc</sub> , I <sub>E</sub> = 0, f = 1.0 MHz)	MPS8098, MPS8099 MPS8598, MPS8599	C <sub>obo</sub>	— —	6.0 8.0	pF
Input Capacitance (V <sub>EB</sub> = 0.5 V <sub>dc</sub> , I <sub>C</sub> = 0, f = 1.0 MHz)	MPS8098, MPS8099 MPS8598, MPS8599	C <sub>ibo</sub>	— —	25 30	pF

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle = 2.0%.

NPN MPS8098 MPS8099 PNP MPS8598 MPS8599

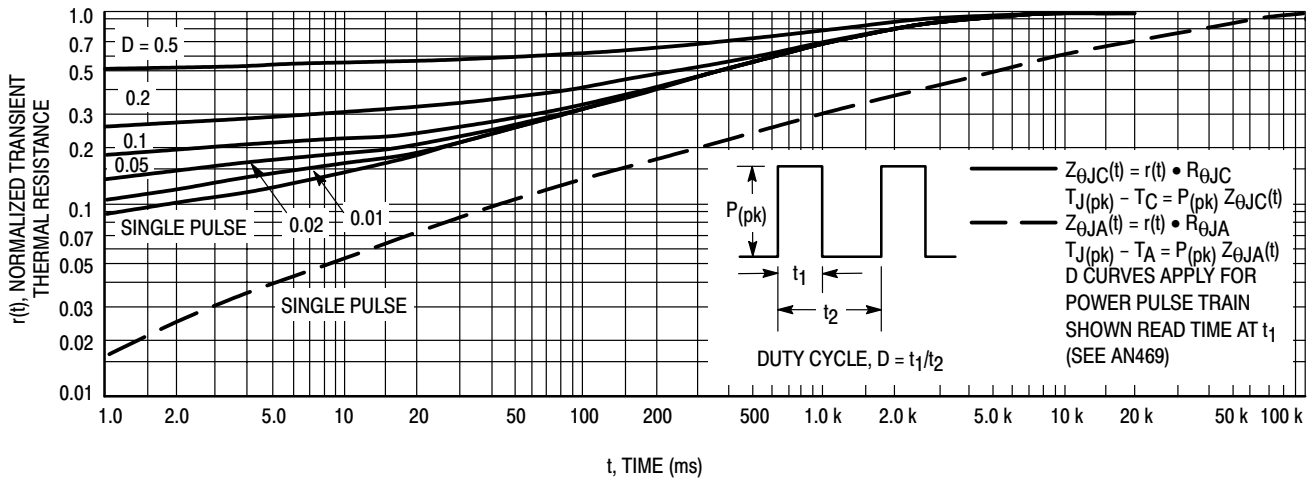
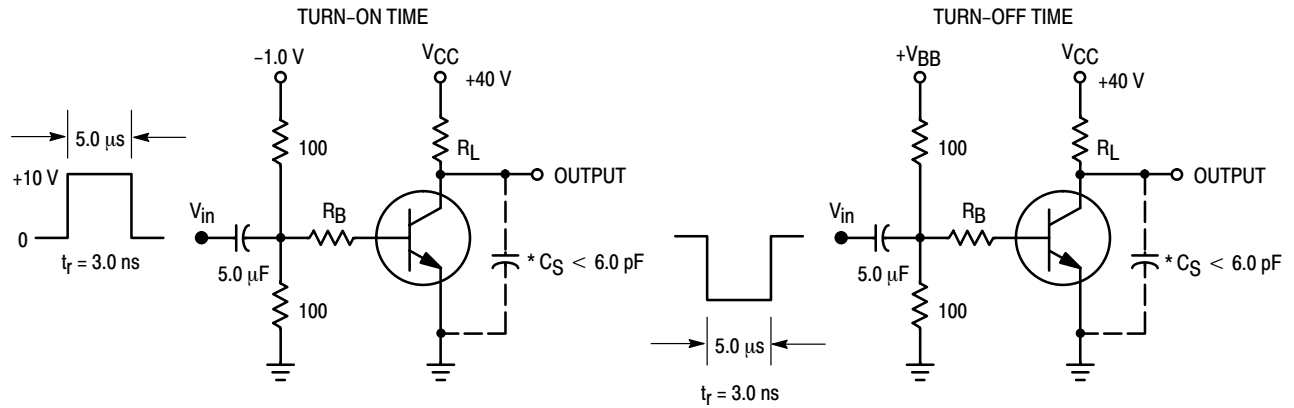


Figure 1. MPS8098, MPS8099, MPS8598 and MPS8599 Thermal Response



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

Figure 2. Switching Time Test Circuits

NPN MPS8098 MPS8099 PNP MPS8598 MPS8599

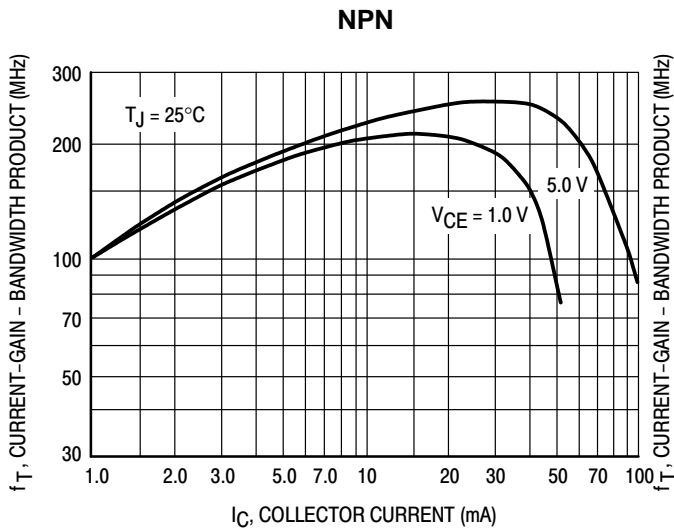


Figure 3. MPS8098/99 Current-Gain — Bandwidth Product

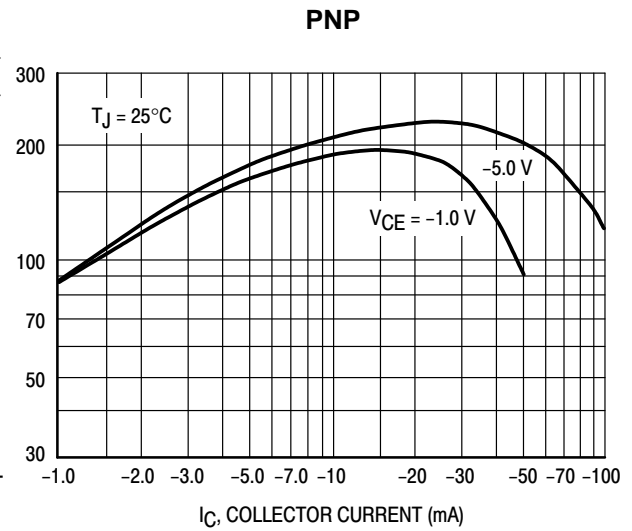


Figure 4. MPS8598/99 Current-Gain — Bandwidth Product

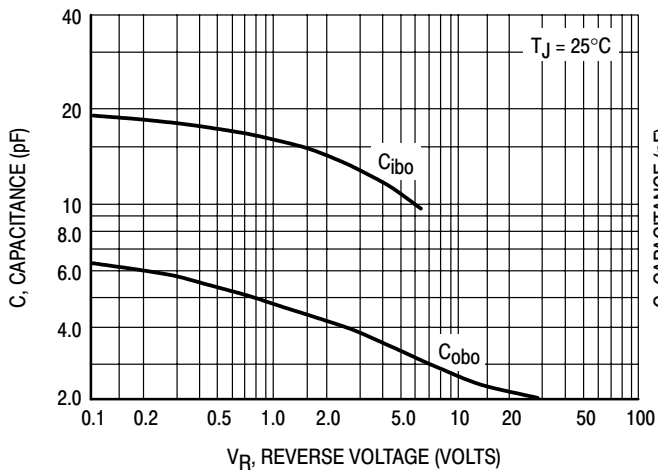


Figure 5. MPS8098/99 Capacitance

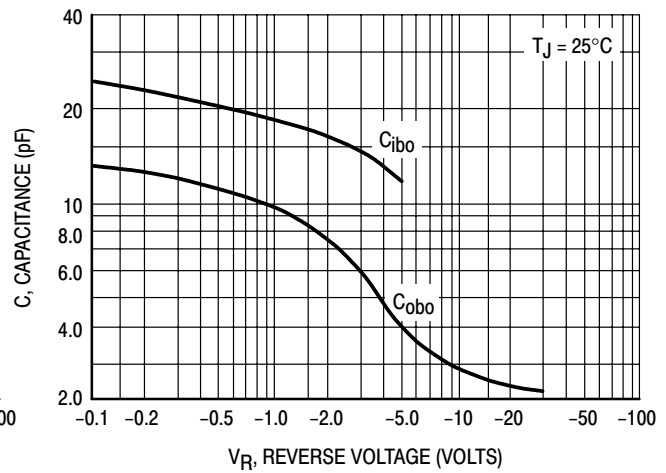


Figure 6. MPS8598/99 Capacitance

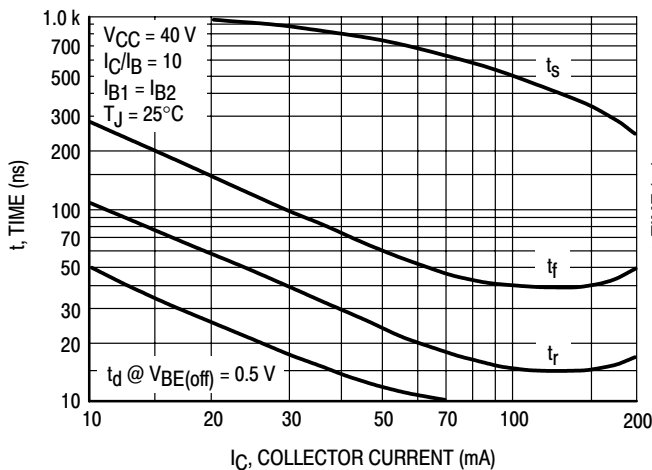


Figure 7. MPS8098/99 Switching Times

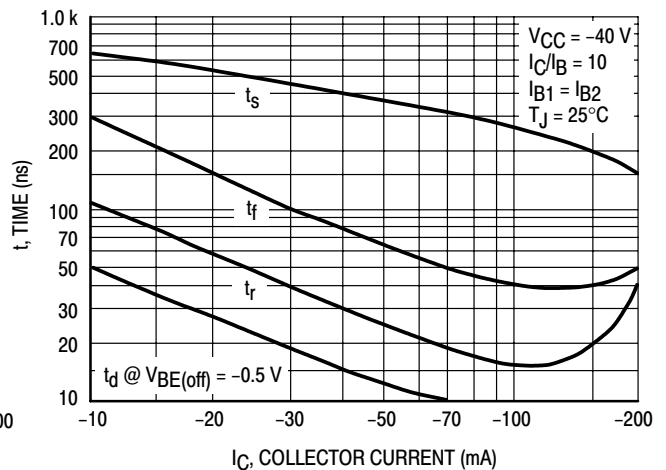


Figure 8. MPS8598/99 Switching Times

NPN MPS8098 MPS8099 PNP MPS8598 MPS8599

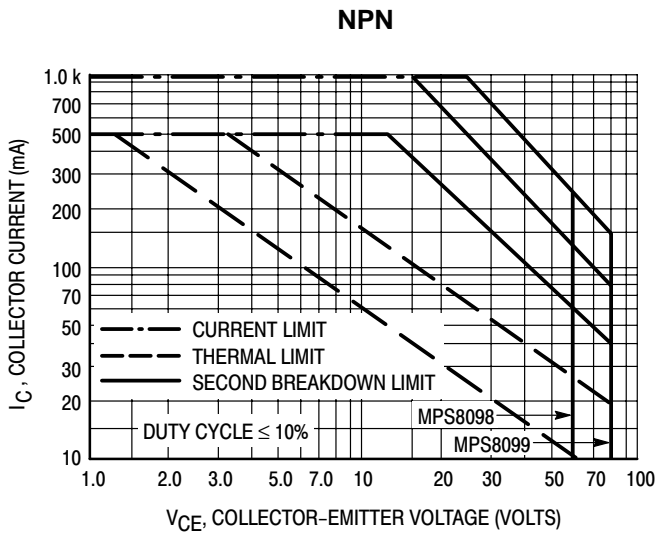


Figure 9. MPS8098/99 Active-Region Safe Operating Area

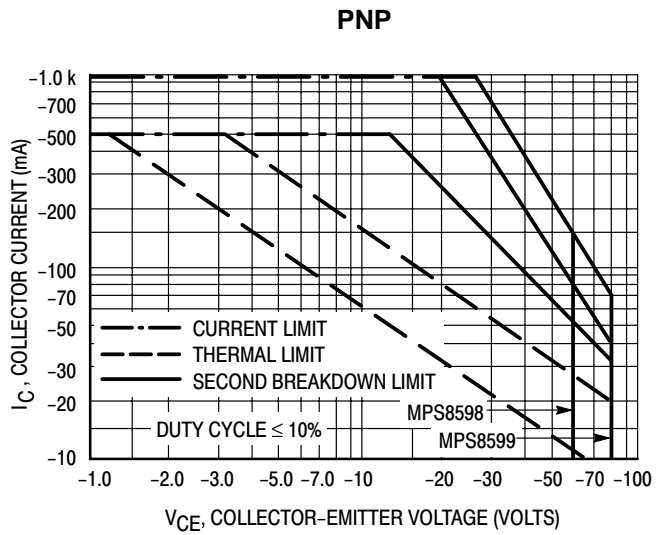


Figure 10. MPS8598/99 Active-Region Safe Operating Area

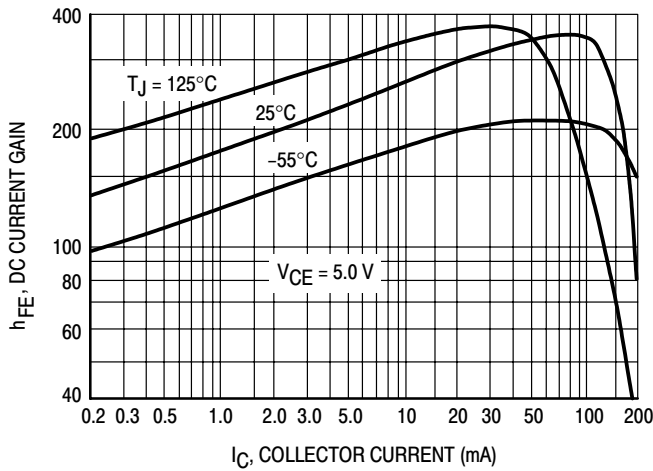


Figure 11. MPS8098/99 DC Current Gain

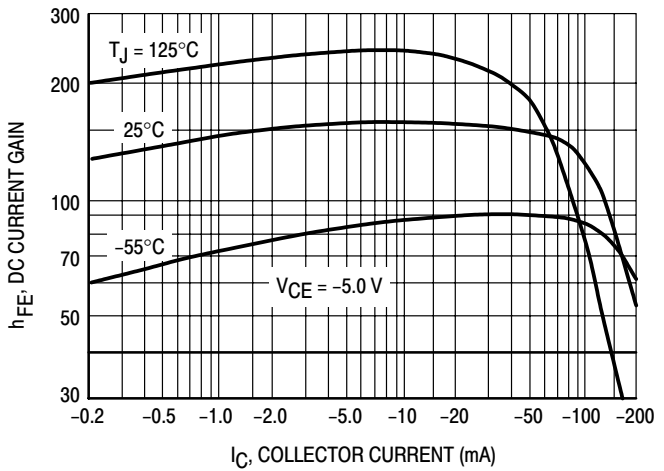


Figure 12. MPS8598/99 DC Current Gain

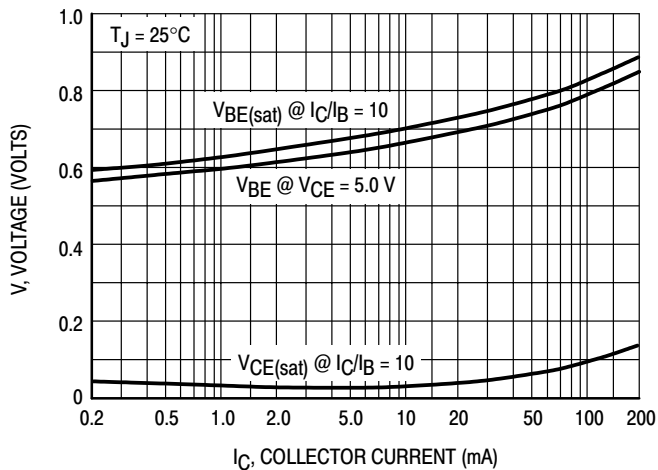


Figure 13. MPS8098/99 "ON" Voltages

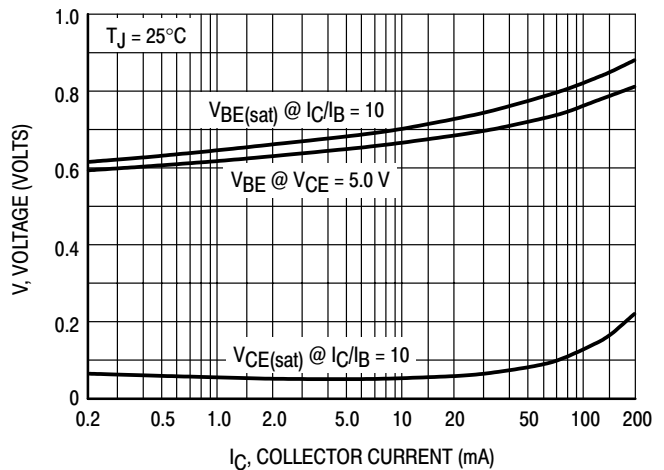


Figure 14. MPS8598/99 "ON" Voltages

NPN MPS8098 MPS8099 PNP MPS8598 MPS8599

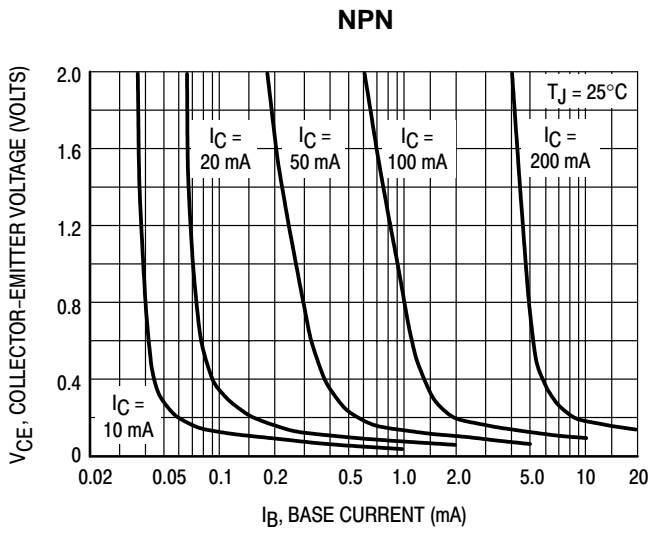


Figure 15. MPS8098/99 Collector Saturation Region

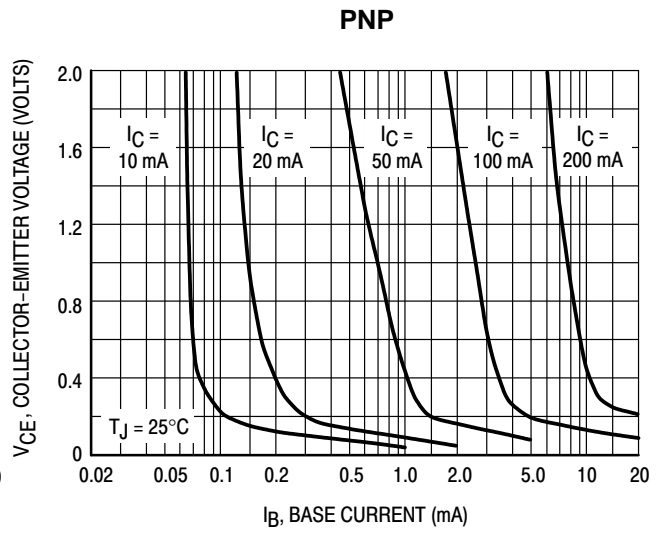


Figure 16. MPS8598/99 Collector Saturation Region

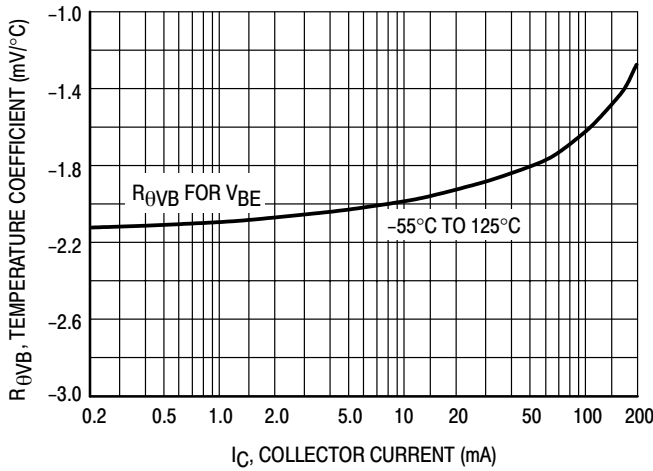


Figure 17. MPS8098/99 Base-Emitter Temperature Coefficient

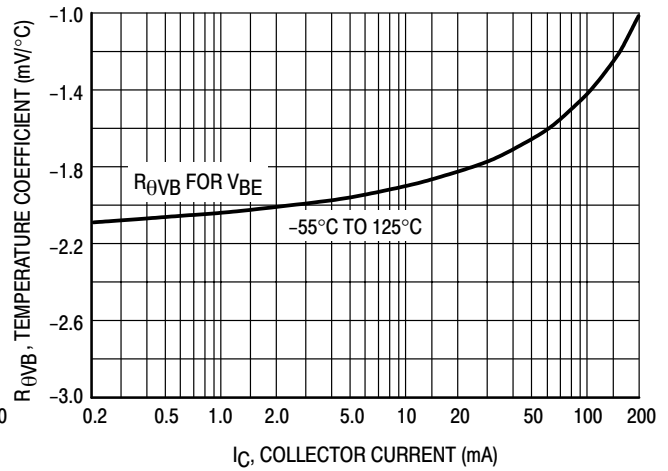
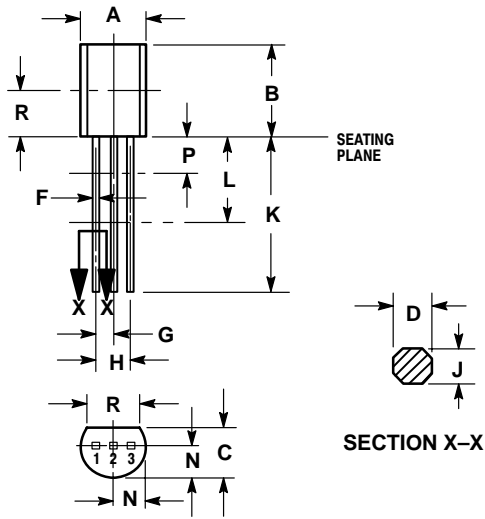


Figure 18. MPS8598/99 Base-Emitter Temperature Coefficient

# NPN MPS8098 MPS8099 PNP MPS8598 MPS8599

## 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. DIMENSIONS 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	4.44	5.21
B	0.290	0.310	7.37	7.87
C	0.125	0.165	3.18	4.19
D	0.018	0.021	0.457	0.533
F	0.016	0.019	0.407	0.482
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.018	0.024	0.46	0.61
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	0.135	---	3.43	---

- YLE 1:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

# NPN MPS8098 MPS8099 PNP MPS8598 MPS8599

**ON Semiconductor** and  are trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer.

## PUBLICATION ORDERING INFORMATION

### Literature Fulfillment:

Literature Distribution Center for ON Semiconductor  
P.O. Box 5163, Denver, Colorado 80217 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** ONlit@hibbertco.com

**N. American Technical Support:** 800-282-9855 Toll Free USA/Canada

**JAPAN:** ON Semiconductor, Japan Customer Focus Center  
4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo, Japan 141-0031  
**Phone:** 81-3-5740-2700  
**Email:** r14525@onsemi.com

**ON Semiconductor Website:** <http://onsemi.com>

For additional information, please contact your local Sales Representative.