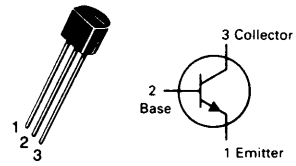
MPS4123
MPS4124

CASE 29-04, STYLE 1
TO-92 (TO-226AA)



AMPLIFIER TRANSISTOR
NPN SILICON

MAXIMUM RATINGS

Rating	Symbol	MPS4123	MPS4124	Unit
Collector-Emitter Voltage	V_{CE}	30	25	Vdc
Collector-Base Voltage	V_{CB}	40	30	Vdc
Emitter-Base Voltage	V_{EB}	5.0		Vdc
Collector Current — Continuous	I_C	200		mAdc
Total Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	625 5.0		mW mW/°C
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	1.5 12		W mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−55 to +150		°C

THERMAL CHARACTERISTICS

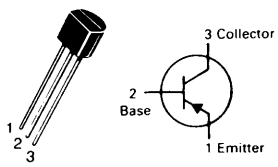
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	°C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted.)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 1.0 mA, I_B = 0)	MPS4123 MPS4124	$V_{(BR)CEO}$	30 25	— —	Vdc
Collector-Base Breakdown Voltage (I_C = 10 μA, I_E = 0)	MPS4123 MPS4124	$V_{(BR)CBO}$	40 30	— —	Vdc
Emitter-Base Breakdown Voltage (I_C = 0, I_E = 10 μA)		$V_{(BR)EBO}$	5.0	—	Vdc
Collector Cutoff Current (V_{CB} = 20 V, I_E = 0)		I_{CBO}	—	50	nAdc
Emitter Cutoff Current (V_{EB} = 3.0 V, I_C = 0)		I_{EBO}	—	50	nAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 2.0 mA, V_{CE} = 1.0 V) (I_C = 50 mA, V_{CE} = 1.0 V)	 MPS4123 MPS4124 MPS4123 MPS4124	h_{FE}	 50 120 25 60	 150 360 — —	—
Collector-Emitter Saturation Voltage (I_C = 50 mA, I_B = 5.0 mA)		$V_{CE(sat)}$	—	0.3	Vdc
Base-Emitter Saturation Voltage (I_C = 50 mA, I_B = 5.0 mA)		$V_{BE(sat)}$	—	0.95	Vdc
SMALL-SIGNAL CHARACTERISTICS					
Current-Gain — Bandwidth Product (I_C = 10 mA, V_{CE} = 20 V, f = 100 MHz)	MPS4123 MPS4124	f_T	100 170	— —	MHz
Output Capacitance (V_{CB} = 5.0 V, I_E = 0, f = 100 kHz)		C_{ob}	—	4.0	pF
Input Capacitance (V_{BE} = 0.5 V, I_C = 0, f = 100 kHz)	MPS4123 MPS4124	C_{ib}	— —	14 13.5	pF
Small-Signal Current Gain (I_C = 2.0 mA, V_{CE} = 1.0 V, f = 1.0 kHz)	MPS4123 MPS4124	h_{fe}	50 120	200 480	—
Noise Figure (I_C = 100 μA, V_{CE} = 5.0 V, R_S = 1.0 kΩ, Noise Bandwidth = 10 Hz to 15.7 kHz)	MPS4123 MPS4124	NF	— —	6.0 5.0	dB

MPS4125
MPS4126

CASE 29-04, STYLE 1
TO-92 (TO-226AA)



AMPLIFIER TRANSISTOR
PNP SILICON

2

MAXIMUM RATINGS

Rating	Symbol	MPS4125	MPS4126	Unit
Collector-Emitter Voltage	V_{CE}	30	25	Vdc
Collector-Base Voltage	V_{CB}	30	25	Vdc
Emitter-Base Voltage	V_{EB}	4.0		Vdc
Collector Current — Continuous	I_C	200		mAdc
Total Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	625 5.0		mW mW/°C
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	1.5 12		W mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−55 to +150		°C

THERMAL CHARACTERISTICS

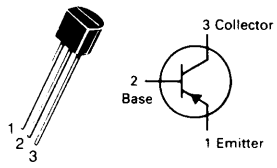
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	°C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted.)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 1.0 mA, I_B = 0)	MPS4125 MPS4126	$V_{(BR)CEO}$	30 25	— —	Vdc
Collector-Base Breakdown Voltage (I_C = 10 μA, I_E = 0)	MPS4125 MPS4126	$V_{(BR)CBO}$	30 25	— —	Vdc
Emitter-Base Breakdown Voltage (I_C = 0, I_E = 10 μA)		$V_{(BR)EBO}$	4.0	—	Vdc
Collector Cutoff Current (V_{CB} = 20 V, I_E = 0)		I_{CBO}	—	50	nAdc
Emitter Cutoff Current (V_{EB} = 3.0 V, I_C = 0)		I_{EBO}	—	50	nAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 2.0 mA, V_{CE} = 1.0 V) (I_C = 50 mA, V_{CE} = 1.0 V)	 MPS4125 MPS4126 MPS4125 MPS4126	h_{FE}	 50 120 25 60	 150 360 — —	—
Collector-Emitter Saturation Voltage (I_C = 50 mA, I_B = 5.0 mA)		$V_{CE(sat)}$	—	0.4	Vdc
Base-Emitter Saturation Voltage (I_C = 50 mA, I_B = 5.0 mA)		$V_{BE(sat)}$	—	0.95	Vdc
SMALL-SIGNAL CHARACTERISTICS					
Current-Gain — Bandwidth Product (I_C = 10 mA, V_{CE} = 20 V, f = 100 MHz)	MPS4125 MPS4126	f_T	150 170	— —	MHz
Output Capacitance (V_{CB} = 5.0 V, I_E = 0, f = 100 kHz)		C_{ob}	—	4.5	pF
Input Capacitance (V_{BE} = 0.5 V, I_C = 0, f = 100 kHz)	MPS4125 MPS4126	C_{ib}	— —	12 11.5	pF
Small-Signal Current Gain (I_C = 2.0 mA, V_{CE} = 1.0 V, f = 1.0 kHz)	MPS4125 MPS4126	h_{fe}	50 120	200 480	—
Noise Figure (I_C = 100 μA, V_{CE} = 5.0 V, R_S = 1.0 kΩ, Noise Bandwidth = 10 Hz to 15.7 kHz)	 MPS4125 MPS4126	NF	 — —	 5.0 4.0	dB

MPS4258

CASE 29-04, STYLE 1
TO-92 (TO-226AA)



SWITCHING TRANSISTOR

PNP SILICON

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	12	Vdc
Collector-Base Voltage	V_{CBO}	12	Vdc
Emitter-Base Voltage	V_{EBO}	4.5	Vdc
Collector Current — Continuous	I_C	80	mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	625 12	mW mW/°C
Total Device Dissipation @ T_C = 25°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 Case	$R_{\theta JC}$	83.3	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	°C/W

Refer to MPS3640 for graphs.

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

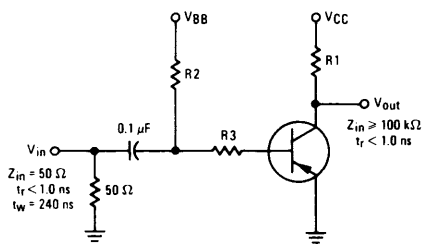
Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage(1) (I_C = 100 μAdc, V_{BE} = 0)	$V_{(BR)CES}$	12	—	Vdc
Collector-Emitter Sustaining Voltage(1) (I_C = 3.0 mAdc, I_B = 0)	$V_{CEO(sus)}$	12	—	Vdc
Collector-Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0)	$V_{(BR)CBO}$	12	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 100 μAdc, I_C = 0)	$V_{(BR)EBO}$	4.5	—	Vdc
Collector Cutoff Current (V_{CE} = 6.0 Vdc, V_{BE} = 0) (V_{CE} = 6.0 Vdc, V_{BE} = 0, T_A = +65°C)	I_{CES}	— —	0.01 5.0	μAdc
ON CHARACTERISTICS(1)				
DC Current Gain (I_C = 1.0 mAdc, V_{CE} = 0.5 Vdc) (I_C = 10 mAdc, V_{CE} = 3.0 Vdc) (I_C = 50 mAdc, V_{CE} = 1.0 Vdc)	h_{FE}	 15 30 30	 — 120 —	—
Collector-Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1.0 mAdc) (I_C = 50 mAdc, I_B = 5.0 mAdc)	$V_{CE(sat)}$	 — —	 0.15 0.5	Vdc
Base-Emitter On Voltage (I_C = 10 mAdc, I_B = 1.0 mAdc) (I_C = 50 mAdc, I_B = 5.0 mAdc)	$V_{BE(sat)}$	 0.75 —	 0.95 1.5	Vdc
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain — Bandwidth Product(2) (I_C = 10 mAdc, V_{CE} = 10 Vdc, f = 100 MHz)	f_T	700	—	MHz
Input Capacitance (V_{BE} = 0.5 Vdc, I_C = 0, f = 1.0 MHz)	C_{ibo}	—	3.5	pF
Collector-Base Capacitance (V_{CB} = 5.0 Vdc, I_E = 0, f = 1.0 MHz)	C_{cb}	—	3.0	pF

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

Characteristic		Symbol	Min	Max	Unit
SWITCHING CHARACTERISTICS					
Turn-On Time	(V_{CC} = 1.5 Vdc, $V_{BE(off)}$ = 0, I_C = 10 mAdc, I_{B1} = 1.0 mAdc)	t_{on}	—	15	ns
Delay Time		t_d	—	10	ns
Rise Time		t_r	—	15	ns
Turn-Off Time	(V_{CC} = 1.5 Vdc, I_C = 10 mAdc, I_{B1} = I_{B2} = 1.0 mAdc)	t_{off}	—	20	ns
Storage Time		t_s	—	20	ns
Fall Time		t_f	—	10	ns
Storage Time ($I_C \approx$ 10 mAdc, $I_{B1} \approx$ 10 mAdc, $I_{B2} \approx$ 10 mAdc)		t_s	—	20	ns

(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.
(2) f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

FIGURE 1 — SWITCHING TIME TEST CIRCUIT



	V_{in} Volts	V_{BB} Volts	V_{CC} Volts	R1 Ohms	R2 Ohms	R3 Ohms	I_C mA	I_{B1} mA	I_{B2} mA
t_{on}	-5.8	GND	-1.5	130	2.2 k	5 k	10	1.0	–
t_{off}	+9.8	-8.0	-1.5	130	2.2 k	5 k	10	1.0	1.0
t_s	+9.0	-10	-3.0	270	510	390	10	10	10