

MOTOROLA SC (XSTRS/R F)

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6367254 MOTOROLA SC (XSTRS/R F)

96D 81766 D

T-29-21

MAXIMUM RATINGS

Rating	Symbol	MPS929	MPS930A	Unit
Collector-Emitter Voltage	V _{CEO}	45		Vdc
Collector-Base Voltage	V _{CBO}	45	60	Vdc
Emitter-Base Voltage	V _{EBO}	5.0	6.0	Vdc
Collector Current — Continuous	I _C	100		mAdc
Total Device Dissipation @ T _A = 25°C Derate above 25°C	P _D	625 5.0		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 _{θJC}	83.3	°C/W
Thermal Resistance, Junction to Ambient	R _{θJA}	200	°C/W

**MPS929
MPS930A**

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

AMPLIFIER TRANSISTOR

NPN SILICON

Refer to MPS3903 for additional graphs.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage(1) (I _C = 10 mAdc, I _B = 0)	V _{(BR)CEO}	45	—	Vdc
Collector-Base Breakdown Voltage (I _C = 10 μAdc, I _E = 0)	V _{(BR)CBO}	45 60	—	Vdc
Emitter-Base Breakdown Voltage (I _E = 10 μAdc, I _C = 0)	V _{(BR)EBO}	5.0 6.0	—	Vdc
Collector Cutoff Current (V _{CE} = 5.0 Vdc, I _B = 0)	I _{CEO}	—	2.0	nAdc
Collector Cutoff Current (V _{CB} = 45 Vdc, I _E = 0)	I _{CBO}	—	10 2.0	nAdc
Collector Cutoff Current (V _{CE} = 45 Vdc, V _{BE} = 0)	I _{CES}	—	10 2.0	nAdc
(V _{CE} = 45 Vdc, V _{BE} = 0, T _A = 125°C)		—	10 2.0	μAdc
Emitter Cutoff Current (V _{EB} = 5.0 Vdc, I _C = 0)	I _{EBO}	—	10 2.0	nAdc
ON CHARACTERISTICS				
DC Current Gain(1) (I _C = 1.0 μAdc, V _{CE} = 5.0 Vdc)	h _{FE}	60	—	—
(I _C = 10 μAdc, V _{CE} = 5.0 Vdc)		40 100	120 300	
(I _C = 10 μAdc, V _{CE} = 5.0 Vdc, T _A = -55°C)		10 30	—	
(I _C = 500 μAdc, V _{CE} = 5.0 Vdc)		60 150	—	
(I _C = 10 mAdc, V _{CE} = 5.0 Vdc)		—	350 600	

MOTOROLA SMALL-SIGNAL SEMICONDUCTORS



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MPS929, MPS930A

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

Characteristic		Symbol	Min	Max	Unit
Collector-Emitter Saturation Voltage(1) ($I_C = 10 \text{ mAdc}$, $I_B = 0.5 \text{ mAdc}$)	MPS929 MPS930A	$V_{CE(sat)}$	— —	1.0 0.5	Vdc
Base-Emitter Saturation Voltage(1) ($I_C = 10 \text{ mAdc}$, $I_B = 0.5 \text{ mAdc}$)	MPS929 MPS930A	$V_{BE(sat)}$	0.6 0.7	1.0 0.9	Vdc

SMALL-SIGNAL CHARACTERISTICS

Current-Gain — Bandwidth Product ($I_C = 500 \mu\text{Adc}$, $V_{CE} = 5.0 \text{ Vdc}$, $f = 30 \text{ MHz}$)	MPS929 MPS930A	f_T	30 45	— —	MHz
Output Capacitance ($V_{CB} = 5.0 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	MPS929 MPS930A	C_{obo}	— —	8.0 6.0	pF
Input Impedance ($I_E = 1.0 \text{ mAdc}$, $V_{CB} = 5.0 \text{ Vdc}$, $f = 1.0 \text{ kHz}$)		h_{ib}	25	32	Ohms
Voltage Feedback Ratio ($I_E = 1.0 \text{ mAdc}$, $V_{CB} = 5.0 \text{ Vdc}$, $f = 1.0 \text{ kHz}$)		h_{rb}	—	600	$\times 10^{-6}$
Small-Signal Current Gain ($I_C = 1.0 \text{ mAdc}$, $V_{CE} = 5.0 \text{ Vdc}$, $f = 1.0 \text{ kHz}$)	MPS929 MPS930A	h_{fe}	60 150	350 600	—
Output Admittance ($I_E = 1.0 \text{ mAdc}$, $V_{CB} = 5.0 \text{ Vdc}$, $f = 1.0 \text{ kHz}$)		h_{ob}	—	1.0	μmho
Noise Figure ($I_C = 10 \mu\text{Adc}$, $V_{CE} = 5.0 \text{ Vdc}$, $R_S = 10 \text{ kohms}$, $f = 10 \text{ Hz to } 15.7 \text{ kHz}$)	MPS929 MPS930A	NF	— —	4.0 3.0	dB

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

TYPICAL CHARACTERISTICS

FIGURE 1 — DC CURRENT GAIN

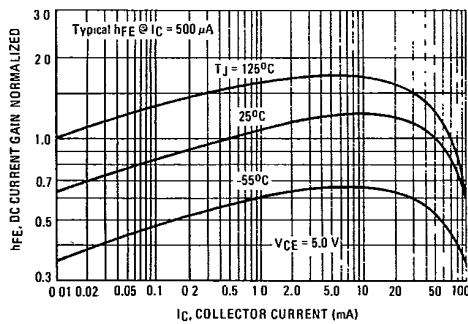
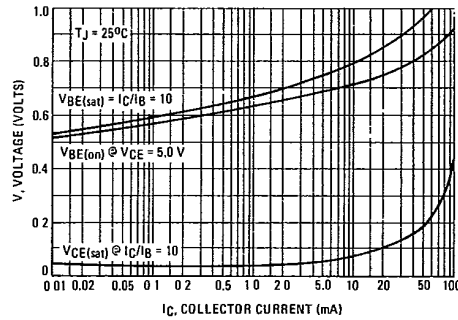


FIGURE 2 — "ON" VOLTAGES



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FIGURE 3 - COLLECTOR SATURATION REGION

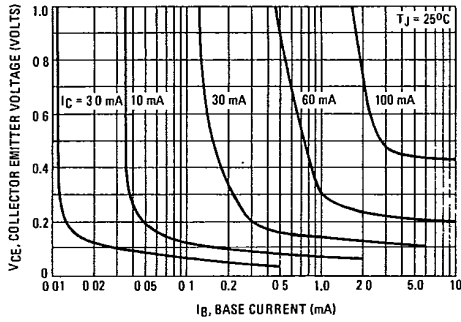


FIGURE 4 - TEMPERATURE COEFFICIENTS

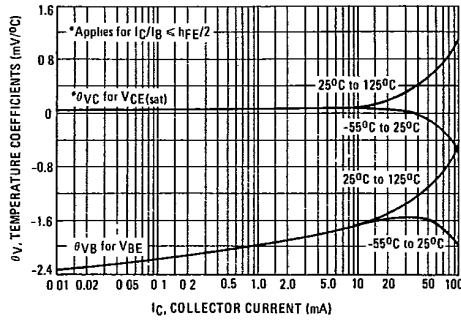


FIGURE 5 - CURRENT-GAIN - BANDWIDTH PRODUCT

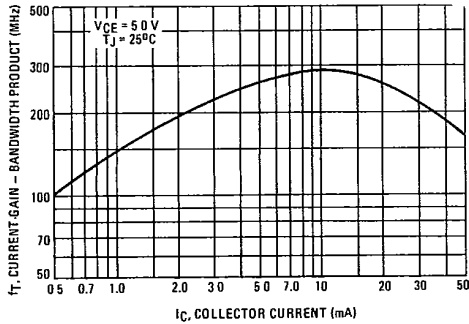
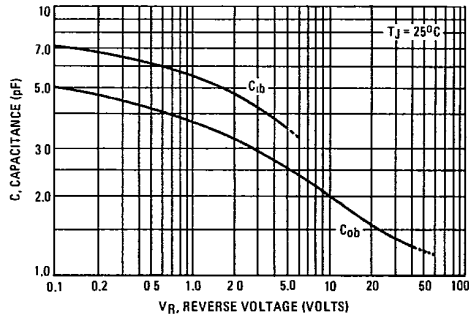


FIGURE 6 - CAPACITANCES



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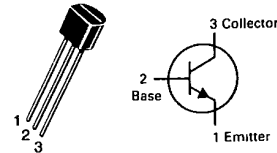
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MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEO}	25	Vdc
Collector-Base Voltage	V _{CB0}	25	Vdc
Emitter-Base Voltage	V _{EBO}	5	Vdc
Collector Current — Continuous	I _C	100	mAdc
Total Device Dissipation @ T _A = 25°C Derate above 25°C	P _D	625 5.0	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 Ambient	R _{θJA}	200	°C/W

**MPS3390, MPS3391,
MPS3396
thru MPS3398**
CASE 29-04, STYLE 1
TO-92 (TO-226AA)
**GENERAL PURPOSE
TRANSISTOR**

NPN SILICON

Refer to 2N3903 for graphs.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I _C = 1.0 mAdc, I _B = 0)	V _{(BR)CEO}	25	—	V
Collector Cutoff Current (V _{CB} = 18 Vdc, I _E = 0)	I _{CB0}	—	0.1	μA
Emitter Cutoff Current (V _{EB} = 5.0 Vdc, I _C = 0)	I _{EBO}	—	0.1	μA
ON CHARACTERISTICS				
DC Current Gain (V _{CE} = 4.5 Vdc, I _C = 2.0 mAdc)	h _{FE}	400 250 90 55 55	800 500 500 500 800	—
SMALL-SIGNAL CHARACTERISTICS				
Output Capacitance (V _{CB} = 10 V, I _E = 0, f = 1.0 MHz)	C _{obo}	—	10	pF
Small-Signal Current Gain (V _{CE} = 4.5 V, I _C = 2.0 mA, f = 1.0 kHz)	h _{fe}	400 250 90 55 55	1250 800 800 800 1250	—

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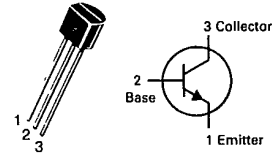
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	25	Vdc
Collector-Base Voltage	V_{CBO}	25	Vdc
Emitter-Base Voltage	V_{EBO}	5.0	Vdc
Collector Current — Continuous	I_C	100	mA _{dc}
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 Case	$R_{\theta JC}$	83.3	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	°C/W

MPS5172

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

AMPLIFIER TRANSISTOR

NPN SILICON

Refer to MPS3903 for graphs.

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ($I_C = 10 \text{ mA}_{dc}, I_B = 0$)	$V_{(BR)CEO}$	25	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 25 \text{ Vdc}, I_E = 0$) ($V_{CB} = 25 \text{ Vdc}, I_E = 0, T_A = 100^\circ\text{C}$)	I_{CBO}	—	—	100 10	nA _{dc} μA_{dc}
Collector Cutoff Current ($V_{CE} = 25 \text{ Vdc}, V_{BE} = 0$)	I_{CES}	—	—	100	nA _{dc}
Emitter Cutoff Current ($V_{BE} = 5.0 \text{ Vdc}, I_C = 0$)	I_{EBO}	—	—	100	nA _{dc}
ON CHARACTERISTICS					
DC Current Gain(1) ($I_C = 10 \text{ mA}_{dc}, V_{CE} = 10 \text{ Vdc}$)	h_{FE}	100	—	500	—
Collector-Emitter Saturation Voltage ($I_C = 10 \text{ mA}_{dc}, I_B = 1.0 \text{ mA}_{dc}$)	$V_{CE(sat)}$	—	—	0.25	Vdc
Base-Emitter Saturation Voltage ($I_C = 10 \text{ mA}_{dc}, I_B = 1.0 \text{ mA}_{dc}$)	$V_{BE(sat)}$	—	0.75	—	Vdc
Base-Emitter On Voltage ($I_C = 10 \text{ mA}_{dc}, V_{CE} = 10 \text{ Vdc}$)	$V_{BE(on)}$	0.5	—	1.2	Vdc
SMALL SIGNAL CHARACTERISTICS					
Current-Gain — Bandwidth Product ($I_C = 2.0 \text{ mA}_{dc}, V_{CE} = 5.0 \text{ Vdc}$)	f_T	—	120	—	MHz
Collector-Base Capacitance ($V_{CB} = 0, I_E = 0, f = 1.0 \text{ MHz}$)	C_{cb}	1.6	—	10	pF
Small Signal Current Gain ($I_C = 10 \text{ mA}_{dc}, V_{CE} = 10 \text{ Vdc}, f = 1.0 \text{ kHz}$)	h_{fe}	100	—	750	—

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