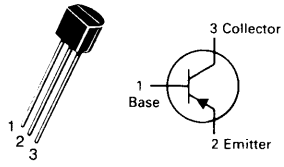
MPS536

CASE 29-04, STYLE 2
TO-92 (TO-226AA)



HIGH FREQUENCY TRANSISTOR

PNP SILICON

2

MAXIMUM RATINGS

Rating	Symbol	MPS536	Unit
Collector-Emitter Voltage	V_{CEO}	10	Vdc
Collector-Base Voltage	V_{CBO}	15	Vdc
Emitter-Base Voltage	V_{EBO}	4.5	Vdc
Collector Current — Continuous	I_C	30	mA
Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	625 5.0	mW mW/°C
Storage Temperature	T_{stg}	−65 to +150	°C

*Free air

ELECTRICAL CHARACTERISTICS (T_C = 25°C *For both package types unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 2.0 mA, I_B = 0)	$V_{(BR)CEO}$	10	—	—	Vdc
Collector-Base Breakdown Voltage (I_C = 100 μA, I_E = 0)	$V_{(BR)CBO}$	15	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 μA, I_C = 0)	$V_{(BR)EBO}$	4.5	—	—	Vdc
Collector Cutoff Current (V_{CB} = 10 Vdc, I_E = 0)	I_{CBO}	—	—	10	nAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 20 mA, V_{CE} = 5.0 V)	h_{FE}	20	—	200	—
DYNAMIC CHARACTERISTICS					
Current Gain-Bandwidth Product (I_C = 20 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 GHz)	f_T	—	4.5	—	GHz
Collector-Base Capacitance (V_{CB} = 5.0 Vdc, I_E = 0, f = 1.0 MHz)	C_{cb}	—	0.8	1.2	pF
FUNCTIONAL TESTS					
Gain @ Noise Figure (I_C = 10 mAdc, V_{CE} = 5.0 Vdc) f = 500 MHz f = 1.0 GHz	G_{NF}	— —	14 8.0	— —	dB
Noise Figure (I_C = 10 mAdc, V_{CE} = 5.0 Vdc) f = 500 MHz f = 1.0 GHz	NF	— —	4.5 6.0	— —	dB

2

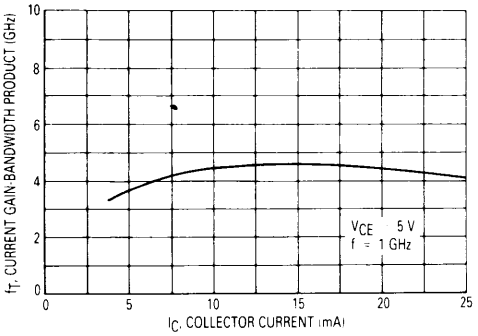


Figure 1. Current Gain-Bandwidth Product versus Collector Current

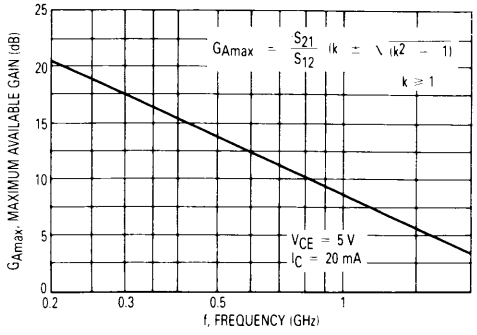


Figure 2. Maximum Available Gain (G_{Amax}) versus Frequency

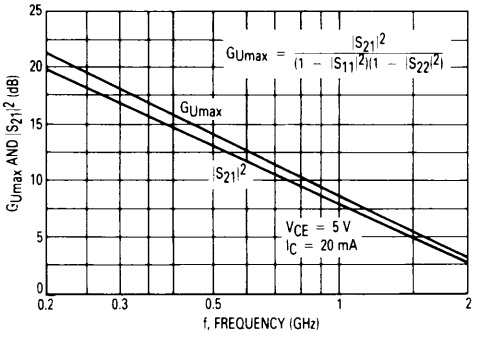


Figure 3. Maximum Unilateral Gain (G_{Umax}) and Insertion Gain ($|S_{21}|^2$) versus Frequency

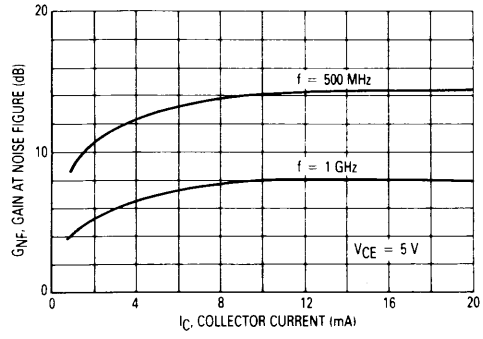


Figure 4. Gain at Noise Figure versus Collector Current

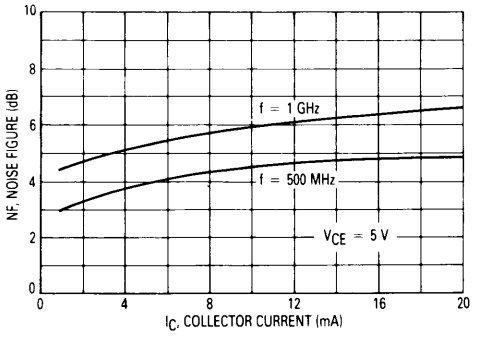


Figure 5. Noise Figure versus Collector Current

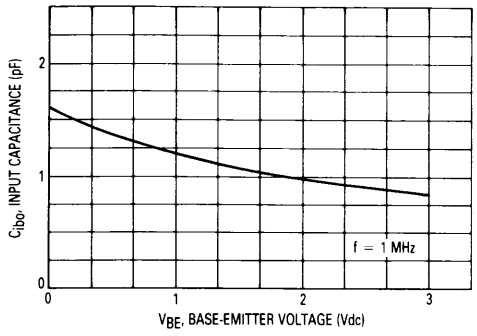
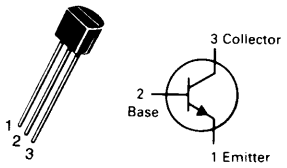


Figure 6. Input Capacitance versus Emitter-Base Voltage

MPS929
MPS930A

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



AMPLIFIER TRANSISTOR

NPN SILICON

Refer to MPS3903 for additional graphs.

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	$R_{\theta JC}$	83.3	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	°C/W

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)	MPS929 MPS930A	$V_{(BR)CBO}$	 45 60	 — —	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)	MPS929 MPS930A	$V_{(BR)EBO}$	 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)	MPS929 MPS930A	I_{CBO}	 — —	 10 2.0	nAdc
Collector Cutoff Current (V_{CE} = 45 Vdc, V_{BE} = 0)	MPS929 MPS930A	I_{CES}	 — —	 10 2.0	nAdc
(V_{CE} = 45 Vdc, V_{BE} = 0, T_A = 125°C)	MPS929 MPS930A		 — —	 10 2.0	μAdc
Emitter Cutoff Current (V_{EB} = 5.0 Vdc, I_C = 0)	MPS929 MPS930A	I_{EBO}	 — —	 10 2.0	nAdc
ON CHARACTERISTICS					
DC Current Gain(1) (I_C = 1.0 μAdc, V_{CE} = 5.0 Vdc)	MPS930A	h_{FE}	 60	 —	—
(I_C = 10 μAdc, V_{CE} = 5.0 Vdc)	MPS929 MPS930A		 40 100	 120 300	
(I_C = 10 μAdc, V_{CE} = 5.0 Vdc, T_A = −55°C)	MPS929 MPS930A		 10 30	 — —	
(I_C = 500 μAdc, V_{CE} = 5.0 Vdc)	MPS929 MPS930A		 60 150	 — —	
(I_C = 10 mAdc, V_{CE} = 5.0 Vdc)	MPS929 MPS930A		 — —	 350 600	

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

Characteristic		Symbol	Min	Max	Unit
Collector-Emitter Saturation Voltage(1) (I_C = 10 mAdc, I_B = 0.5 mAdc)	MPS929 MPS930A	$V_{CE(sat)}$	— —	1.0 0.5	Vdc
Base-Emitter Saturation Voltage(1) (I_C = 10 mAdc, I_B = 0.5 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 μAdc, V_{CE} = 5.0 Vdc, f = 30 MHz)	MPS929 MPS930A	f_T	30 45	— —	MHz
Output Capacitance (V_{CB} = 5.0 Vdc, I_E = 0, f = 1.0 MHz)	MPS929 MPS930A	C_{obo}	— —	8.0 6.0	pF
Input Impedance (I_E = 1.0 mAdc, V_{CB} = 5.0 Vdc, f = 1.0 kHz)		h_{ib}	25	32	Ohms
Voltage Feedback Ratio (I_E = 1.0 mAdc, V_{CB} = 5.0 Vdc, f = 1.0 kHz)		h_{rb}	—	600	X 10^{-6}
Small-Signal Current Gain (I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 kHz)	MPS929 MPS930A	h_{fe}	60 150	350 600	—
Output Admittance (I_E = 1.0 mAdc, V_{CB} = 5.0 Vdc, f = 1.0 kHz)		h_{ob}	—	1.0	μmho
Noise Figure (I_C = 10 μAdc, V_{CE} = 5.0 Vdc, R_S = 10 kohms, f = 10 Hz to 15.7 kHz)	MPS929 MPS930A	NF	— —	4.0 3.0	dB

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

TYPICAL CHARACTERISTICS

FIGURE 1 – DC CURRENT GAIN

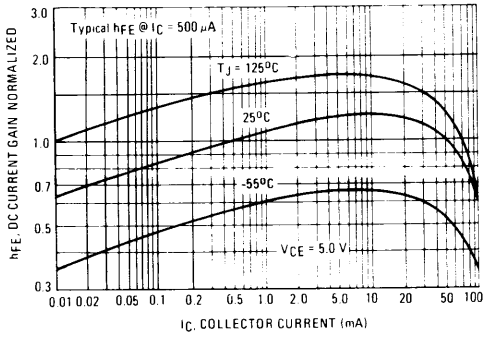


FIGURE 2 – "ON" VOLTAGES

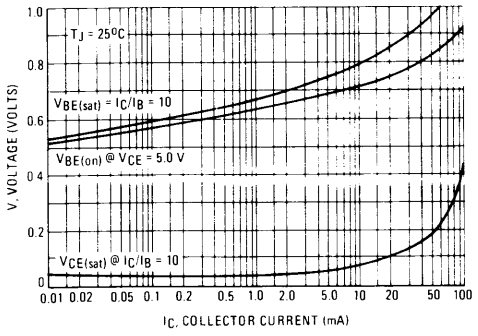


FIGURE 3 – COLLECTOR SATURATION REGION

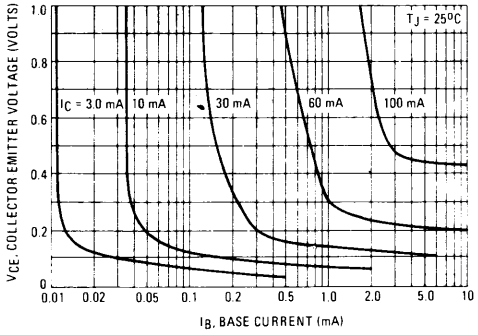


FIGURE 4 – TEMPERATURE COEFFICIENTS

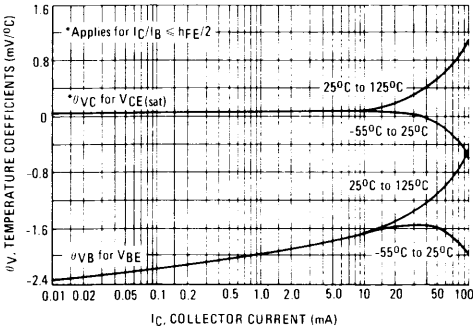


FIGURE 5 – CURRENT-GAIN – BANDWIDTH PRODUCT

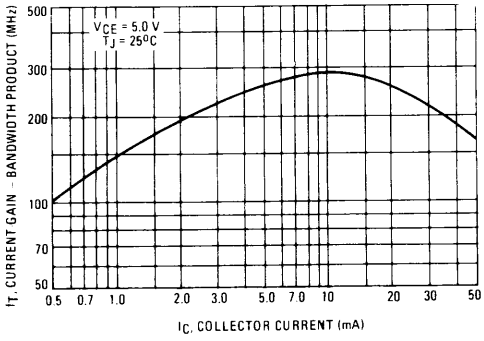


FIGURE 6 – CAPACITANCES