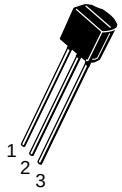
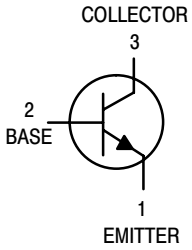
Low Noise Transistor
NPN Silicon

MPSA18

ON Semiconductor Preferred Device



CASE 29–11, STYLE 1
TO–92 (TO–226AA)



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	45	Vdc
Collector–Base Voltage	V_{CBO}	45	Vdc
Emitter–Base Voltage	V_{EBO}	6.5	Vdc
Collector Current — Continuous	I_C	200	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	$R_{\theta JA}$(1)	200	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	°C/W

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage(2) (I_C = 10 mAdc, I_B = 0)	$V_{(BR)CEO}$	45	—	—	Vdc
Collector–Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0)	$V_{(BR)CBO}$	45	—	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)	$V_{(BR)EBO}$	6.5	—	—	Vdc
Collector Cutoff Current (V_{CB} = 30 Vdc, I_E = 0)	I_{CBO}	—	1.0	50	nAdc

1. $R_{\theta JA}$ is measured with the device soldered into a typical printed circuit board.
2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

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

March, 2001 – Rev. 1
Publication Order Number:
MPSA18/D

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

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS[2]					
DC Current Gain	h_{FE}				—
(I_C = 10 μAdc, V_{CE} = 5.0 Vdc)		400	580	—	
(I_C = 100 μAdc, V_{CE} = 5.0 Vdc)		500	850	—	
(I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc)		500	1100	—	
(I_C = 10 mAdc, V_{CE} = 5.0 Vdc)		500	1150	1500	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$				Vdc
(I_C = 10 mAdc, I_B = 0.5 mAdc)		—	—	0.2	
(I_C = 50 mAdc, I_B = 5.0 mAdc)		—	0.08	0.3	
Base–Emitter On Voltage	$V_{BE(on)}$	—	0.6	0.7	Vdc
(I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc)					
SMALL–SIGNAL CHARACTERISTICS					
Current–Gain — Bandwidth Product	f_T	100	160	—	MHz
(I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 100 MHz)					
Collector–Base Capacitance	C_{cb}	—	1.7	3.0	pF
(V_{CB} = 5.0 Vdc, I_E = 0, f = 1.0 MHz)					
Emitter–Base Capacitance	C_{eb}	—	5.6	6.5	pF
(V_{EB} = 0.5 Vdc, I_C = 0, f = 1.0 MHz)					
Noise Figure	NF				dB
(I_C = 100 μAdc, V_{CE} = 5.0 Vdc, R_S = 10 kΩ, f = 1.0 kHz)		—	0.5	1.5	
(I_C = 100 μAdc, V_{CE} = 5.0 Vdc, R_S = 1.0 kΩ, f = 100 Hz)		—	4.0	—	
Equivalent Short Circuit Noise Voltage	V_T	—	6.5	—	$nV/\sqrt{Hz}$
(I_C = 100 μAdc, V_{CE} = 5.0 Vdc, R_S = 1.0 kΩ, f = 100 Hz)					

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

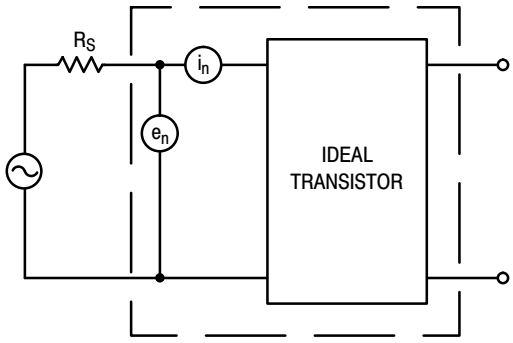


Figure 1. Transistor Noise Model

NOISE CHARACTERISTICS

(V_{CE} = 5.0 Vdc, T_A = 25°C)

NOISE VOLTAGE

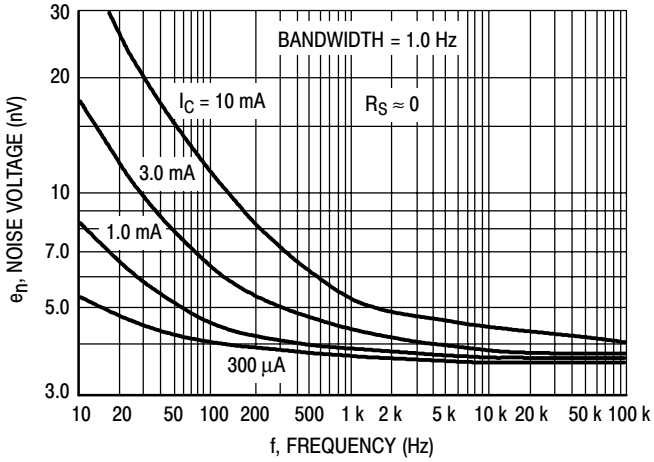


Figure 2. Effects of Frequency

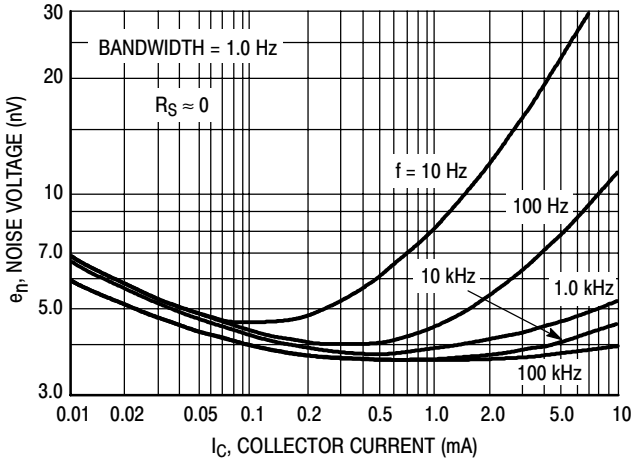


Figure 3. Effects of Collector Current

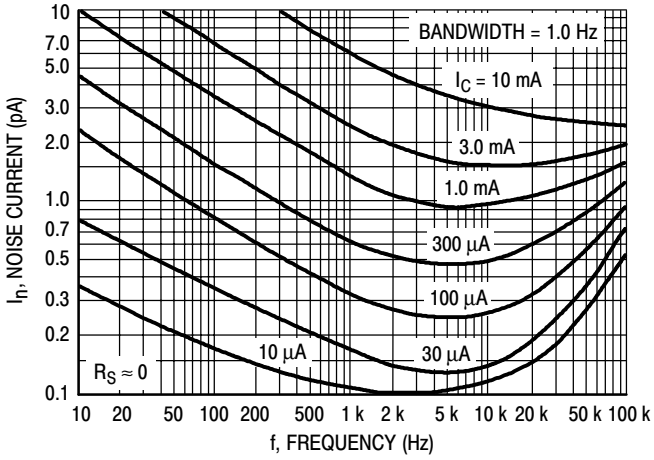


Figure 4. Noise Current

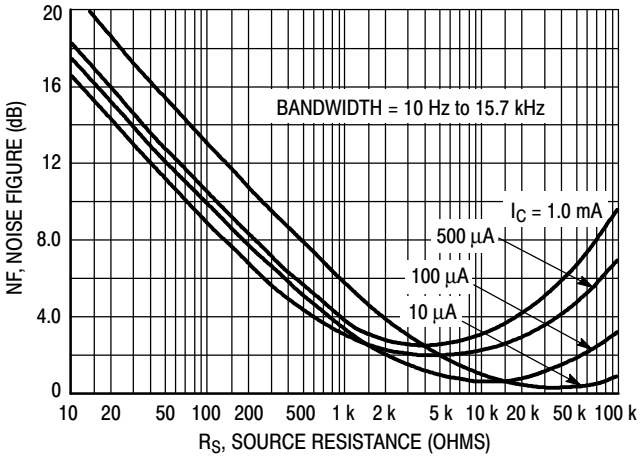


Figure 5. Wideband Noise Figure

100 Hz NOISE DATA

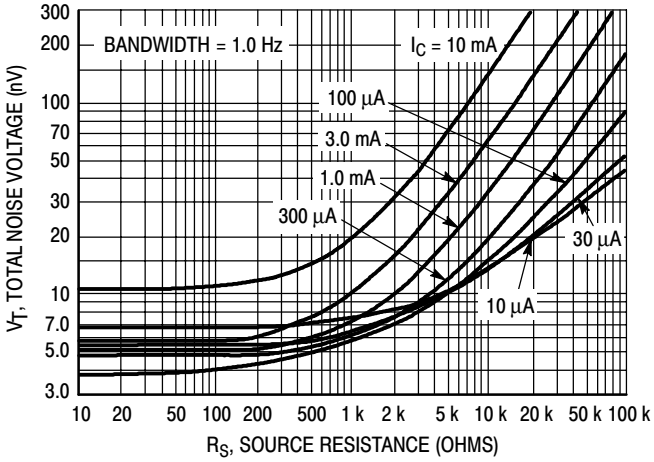


Figure 6. Total Noise Voltage

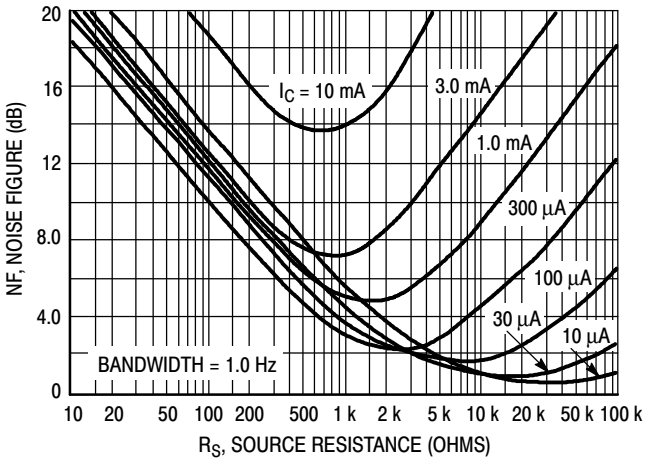


Figure 7. Noise Figure

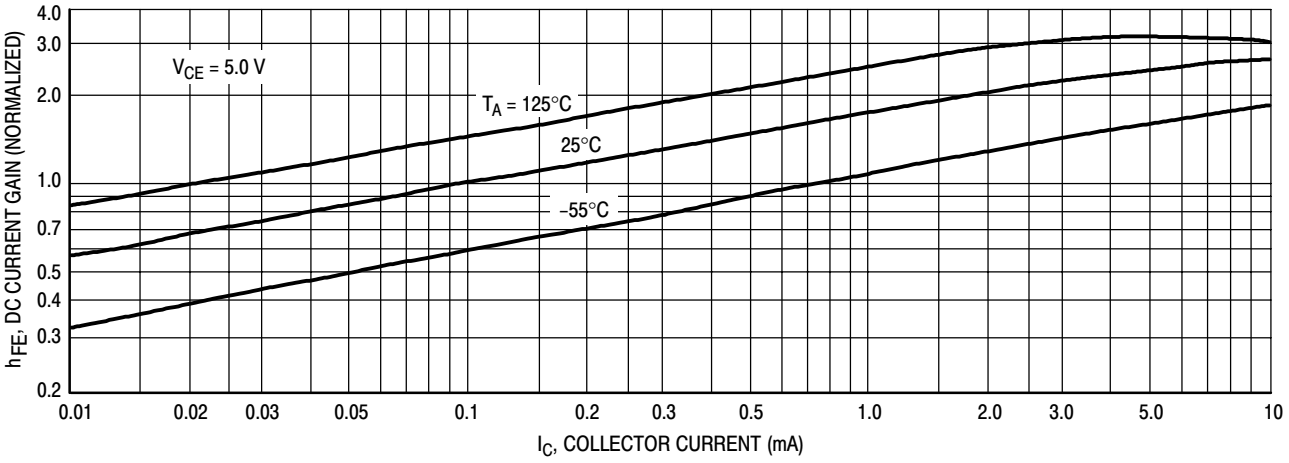


Figure 8. DC Current Gain

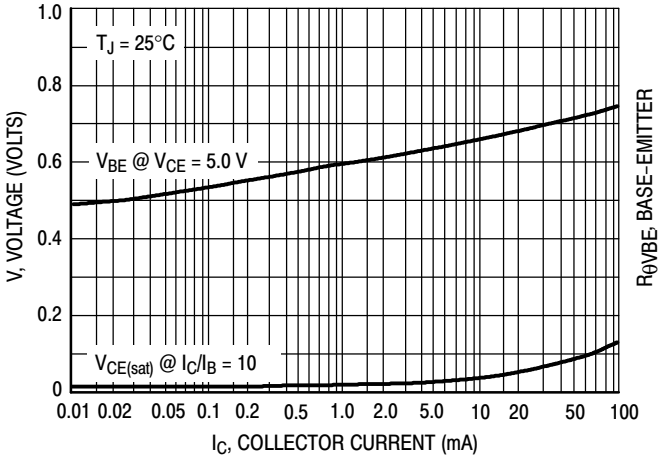


Figure 9. “On” Voltages

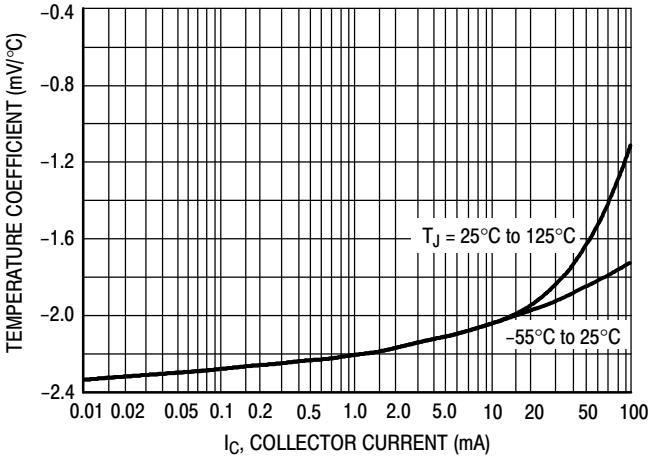


Figure 10. Temperature Coefficients

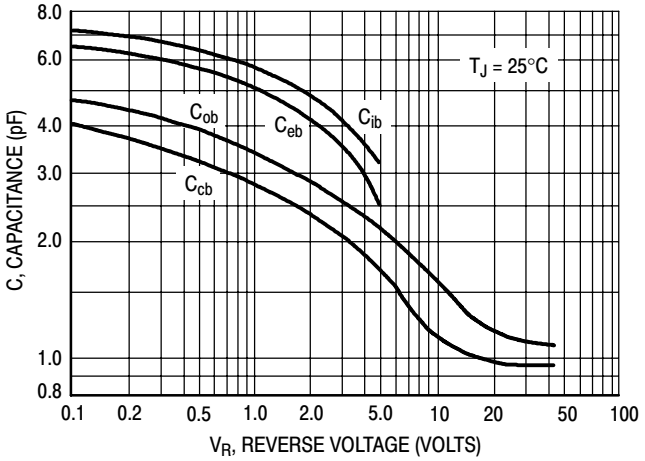


Figure 11. Capacitance

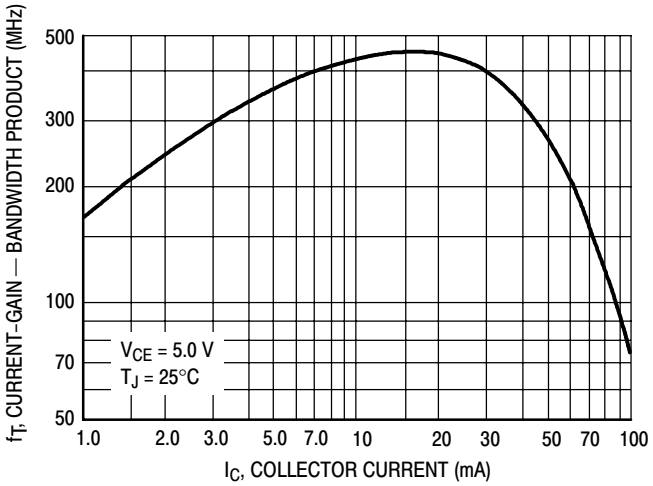


Figure 12. Current−Gain — Bandwidth Product