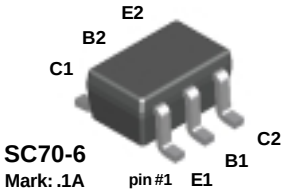
FAIRCHILD
SEMICONDUCTOR TM

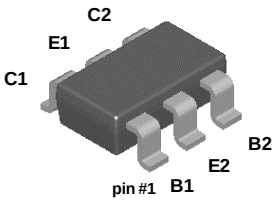
FFB3904



SC70-6
Mark: .1A

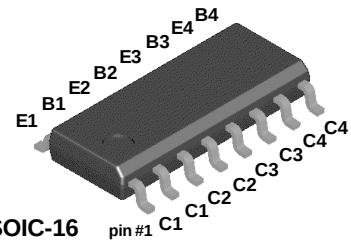
NOTE: The pinouts are symmetrical; pin 1 and pin 4 are interchangeable. Units inside the carrier can be of either orientation and will not affect the functionality of the device.

FMB3904



SuperSOT™-6
Mark: .1A
Dot denotes pin #1

MMPQ3904



SOIC-16
Mark: MMPQ3904

NPN Multi-Chip General Purpose Amplifier

This device is designed as a general purpose amplifier and switch. The useful dynamic range extends to 100 mA as a switch and to 100 MHz as an amplifier. Sourced from Process 23.

Absolute Maximum Ratings*

T_A = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V_{CEO}	Collector-Emitter Voltage	40	V
V_{CBO}	Collector-Base Voltage	60	V
V_{EBO}	Emitter-Base Voltage	6.0	V
I_C	Collector Current - Continuous	200	mA
T_J, T_{stg}	Operating and Storage Junction Temperature Range	-55 to +150	°C

*These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

NOTES:
1) These ratings are based on a maximum junction temperature of 150 degrees C.
2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
3) All voltages (V) and currents (A) are negative polarity for PNP transistors.

Thermal Characteristics

T_A = 25°C unless otherwise noted

Symbol	Characteristic	Max			Units
		FFB3904	FMB3904	MMPQ3904	
P_D	Total Device Dissipation Derate above 25°C	300 2.4	700 5.6	1,000 8.0	mW mW/°C
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient Effective 4 Die Each Die	415	180	 125 240	°C/W °C/W °C/W

NPN Multi-Chip General Purpose Amplifier
(continued)

Electrical Characteristics
T_A = 25°C unless otherwise noted

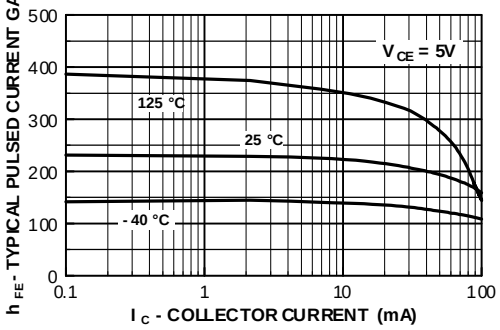
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	I_C = 1.0 mA, I_B = 0	40			V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	I_C = 10 µA, I_E = 0	60			V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	I_E = 10 µA, I_C = 0	6.0			V
I_{BL}	Base Cutoff Current	V_{CE} = 30 V, V_{EB} = 0			50	nA
I_{CEX}	Collector Cutoff Current	V_{CE} = 30 V, V_{EB} = 0			50	nA
ON CHARACTERISTICS*						
h_{FE}	DC Current Gain	I_C = 0.1 mA, V_{CE} = 1.0 V	40			
		MMPQ3904	30			
		I_C = 1.0 mA, V_{CE} = 1.0 V	70			
		MMPQ3904	50			
		I_C = 10 mA, V_{CE} = 1.0 V	100		300	
		MMPQ3904	75			
		I_C = 50 mA, V_{CE} = 1.0 V	60			
		I_C = 100 mA, V_{CE} = 1.0 V	30			
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = 10 mA, I_B = 1.0 mA			0.2	V
		I_C = 50 mA, I_B = 5.0 mA			0.3	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	I_C = 10 mA, I_B = 1.0 mA	0.65		0.85	V
		I_C = 50 mA, I_B = 5.0 mA			0.95	V
SMALL SIGNAL CHARACTERISTICS (MMPQ3904 only)						
f_T	Current Gain - Bandwidth Product	I_C = 10 mA, V_{CE} = 20 V, f = 100 MHz		250		MHz
C_{obo}	Output Capacitance	V_{CB} = 5.0 V, I_E = 0, f = 140 kHz		4.0		pF
C_{ibo}	Input Capacitance	V_{EB} = 0.5 V, I_C = 0, f = 140 kHz		8.0		pF

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

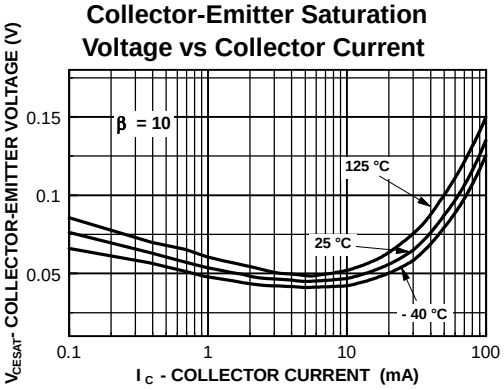
NOTE: All voltages (V) and currents (A) are negative polarity for PNP transistors.

Typical Characteristics

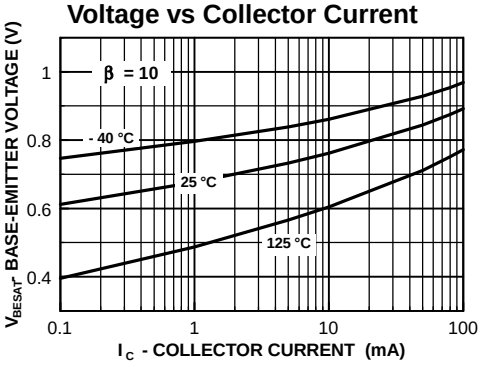
Typical Pulsed Current Gain vs Collector Current



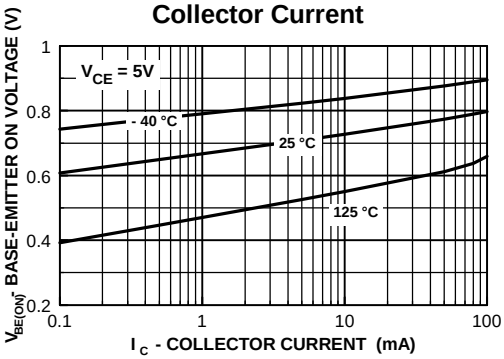
Collector-Emitter Saturation Voltage vs Collector Current



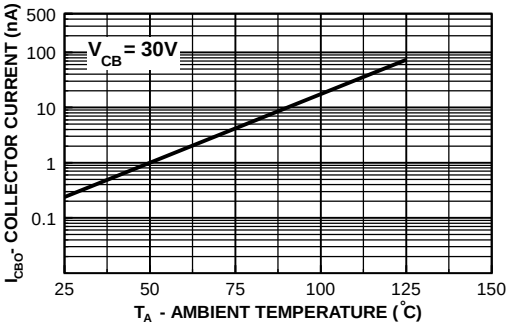
Base-Emitter Saturation Voltage vs Collector Current



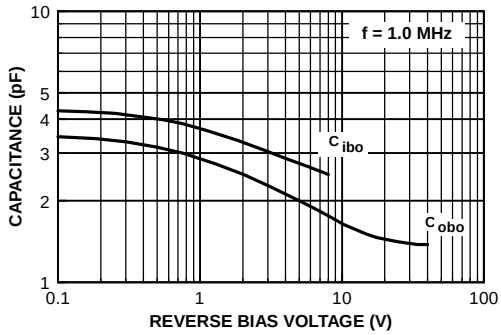
Base-Emitter ON Voltage vs Collector Current



Collector-Cutoff Current vs Ambient Temperature

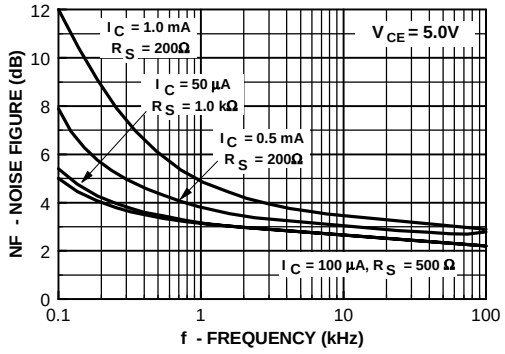


Capacitance vs Reverse Bias Voltage

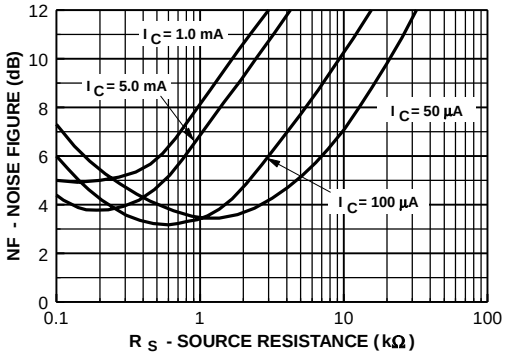


Typical Characteristics (continued)

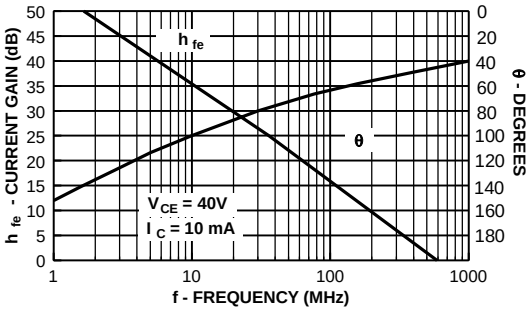
Noise Figure vs Frequency



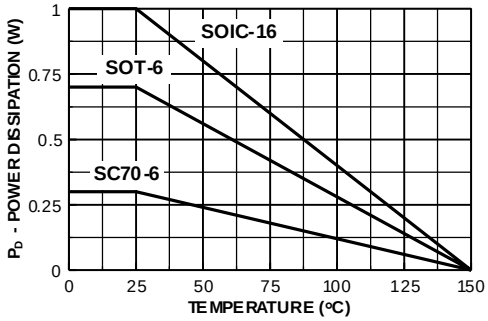
Noise Figure vs Source Resistance



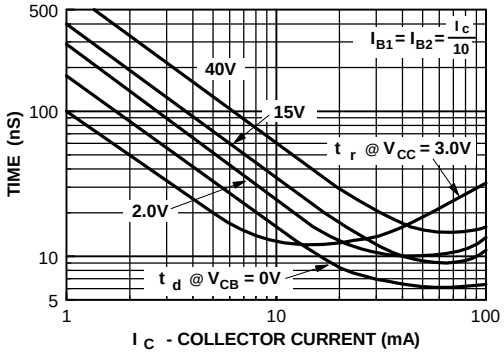
Current Gain and Phase Angle vs Frequency



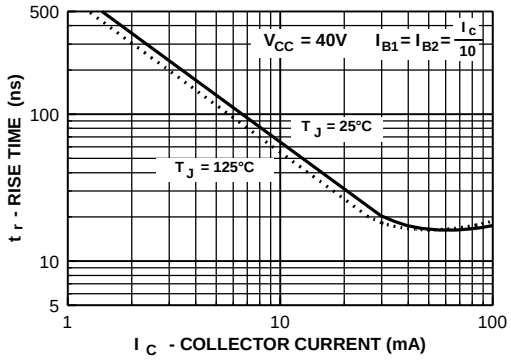
Power Dissipation vs Ambient Temperature



Turn-On Time vs Collector Current

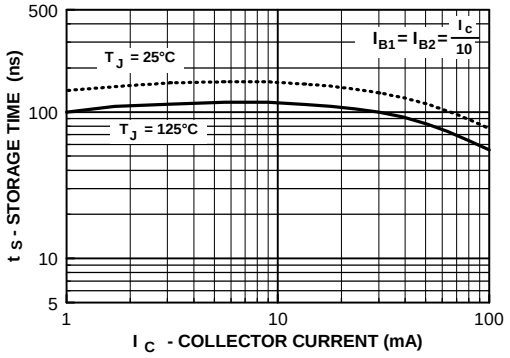


Rise Time vs Collector Current

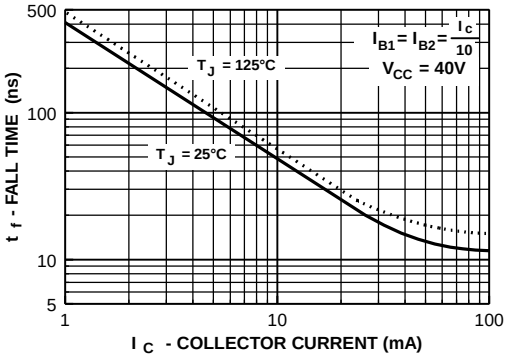


Typical Characteristics (continued)

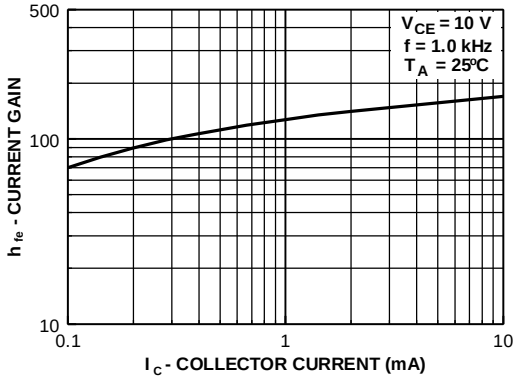
Storage Time vs Collector Current



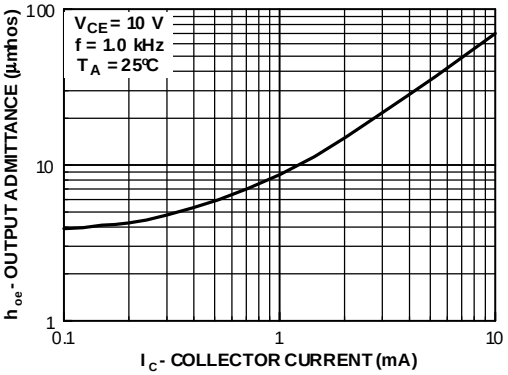
Fall Time vs Collector Current



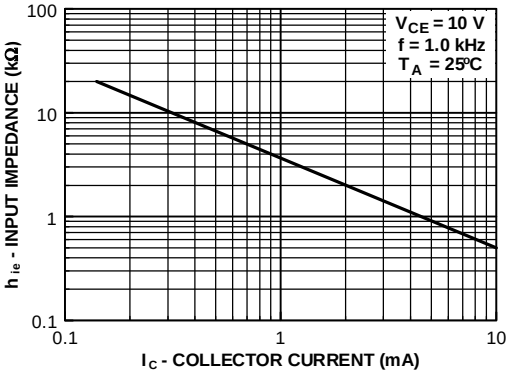
Current Gain



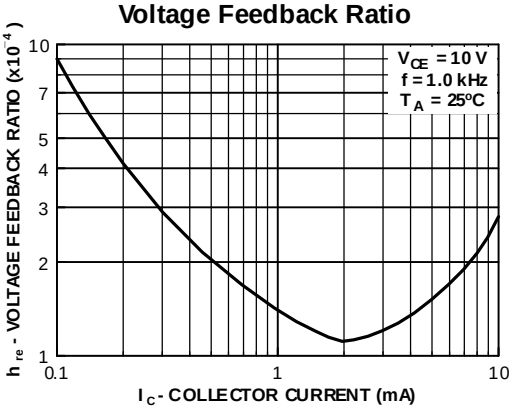
Output Admittance



Input Impedance



Voltage Feedback Ratio



Test Circuits

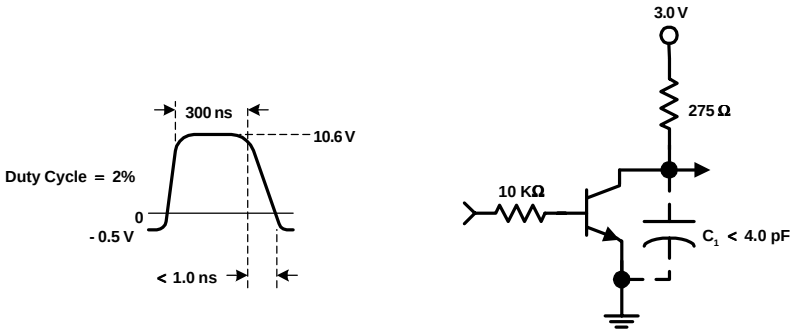


FIGURE 1: Delay and Rise Time Equivalent Test Circuit

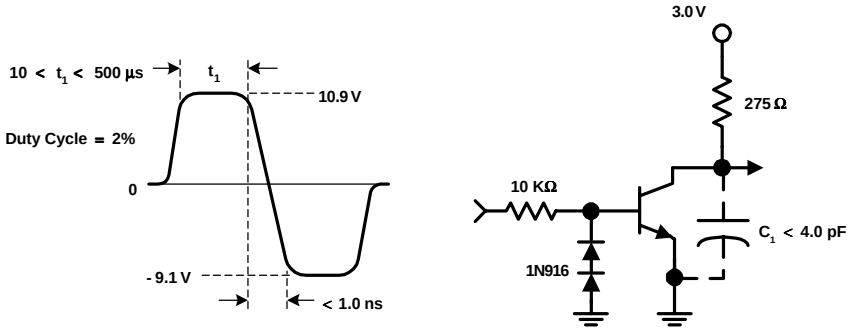


FIGURE 2: Storage and Fall Time Equivalent Test Circuit

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QS™
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SuperSOT™-6
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