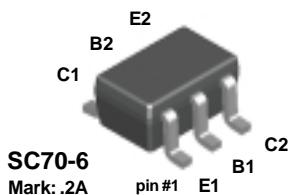
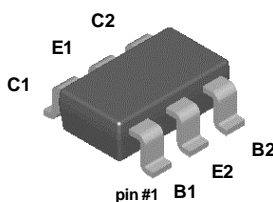


FFB3906



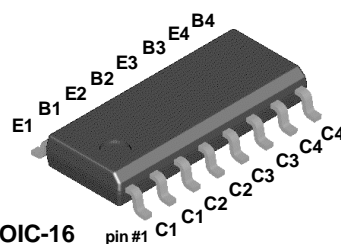
SC70-6
Mark: .2A

FMB3906



SuperSOT™-6
Mark: .2A

MMPQ3906



SOIC-16
Mark: MMPQ3906

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.

PNP Multi-Chip General Purpose Amplifier

This device is designed for general purpose amplifier and switching applications at collector currents of 10 μ A to 100 mA. Sourced from Process 66.

Absolute Maximum Ratings*

$T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Units
V_{CEO}	Collector-Emitter Voltage	40	V
V_{CBO}	Collector-Base Voltage	40	V
V_{EBO}	Emitter-Base Voltage	5.0	V
I_C	Collector Current - Continuous	200	mA
T_J, T_{stg}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

*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.

Thermal Characteristics

$T_A = 25^\circ\text{C}$ unless otherwise noted

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

PNP Multi-Chip General Purpose Amplifier

(continued)

Electrical Characteristics

$T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage*	$I_C = 1.0\text{ mA}, I_B = 0$	40			V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 10\ \mu\text{A}, I_E = 0$	40			V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 10\ \mu\text{A}, I_C = 0$	5.0			V
I_{BL}	Base Cutoff Current	$V_{CE} = 30\text{ V}, V_{BE} = 3.0\text{ V}$			50	nA
I_{CEX}	Collector Cutoff Current	$V_{CE} = 30\text{ V}, V_{BE} = 3.0\text{ V}$			50	nA

ON CHARACTERISTICS

h_{FE}	DC Current Gain *	IC = 0.1 mA, VCE = 1.0 V	60			
		IC = 1.0 mA, VCE = 1.0 V	80			
		IC = 10 mA, VCE = 1.0 V	100			
		IC = 50 mA, VCE = 1.0 V	60			
		IC = 100 mA, VCE = 1.0 V	30			
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 10\text{ mA}, I_B = 1.0\text{ mA}$ $I_C = 50\text{ mA}, I_B = 5.0\text{ mA}$			0.25 0.4	V V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = 10\text{ mA}, I_B = 1.0\text{ mA}$ $I_C = 50\text{ mA}, I_B = 5.0\text{ mA}$	0.65		0.85 0.95	V V

SMALL SIGNAL CHARACTERISTICS

f_T	Current Gain - Bandwidth Product	IC = 10 mA, VCE = 20 V, f = 100 MHz		450		MHz
C_{obo}	Output Capacitance	$V_{CB} = 5.0\text{ V}, I_E = 0,$ f = 100 kHz		3.0		pF
C_{ibo}	Input Capacitance	$V_{EB} = 0.5\text{ V}, I_C = 0,$ f = 100 kHz		8.0		pF
NF	Noise Figure (except MMPQ3906)	$I_C = 100\ \mu\text{A}, V_{CE} = 5.0\text{ V},$ $R_S = 1.0\text{ k}\Omega, f = 10\text{ Hz to } 15.7\text{ kHz}$		2.5		dB

SWITCHING CHARACTERISTICS

t_d	Delay Time	VCC = 3.0 V, VBE = 0.5 V,		15		ns
t_r	Rise Time	$I_C = 10\text{ mA}, I_{B1} = 1.0\text{ mA}$		20		ns
t_s	Storage Time	$V_{CC} = 3.0\text{ V}, I_C = 10\text{ mA}$		110		ns
t_f	Fall Time	$I_{B1} = I_{B2} = 1.0\text{ mA}$		40		ns

*Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$

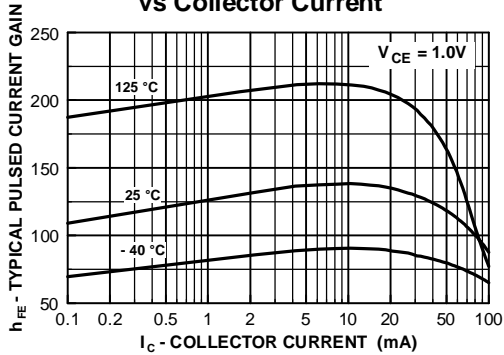
Spice Model

PNP (Is=1.41f Xti=3 Eg=1.11 Vaf=18.7 Bf=180.7 Ne=1.5 Ise=0 Ikf=80m Xtb=1.5 Br=4.977 Nc=2 Isc=0 Ikr=0 Rc=2.5 Cjc=9.728p Mjc=.5776 Vjc=.75 Fc=.5 Cje=8.063p Mje=.3677 Vje=.75 Tr=33.42n Tf=179.3p ltf=.4 Vtf=4 Xtf=6 Rb=10)

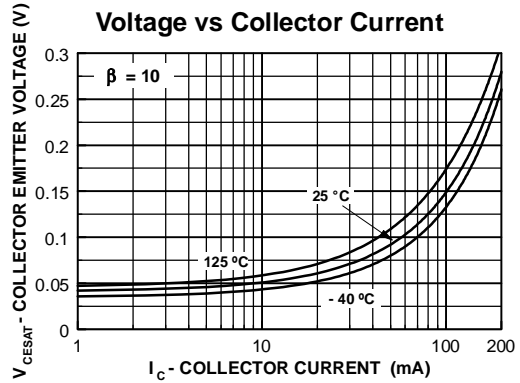
FFB3906 / FMB3906 / MMPQ3906

Typical Characteristics

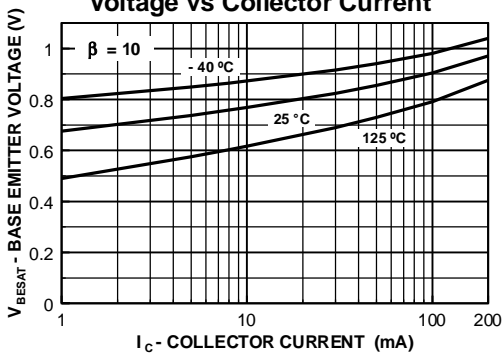
Typical Pulsed Current Gain vs Collector Current



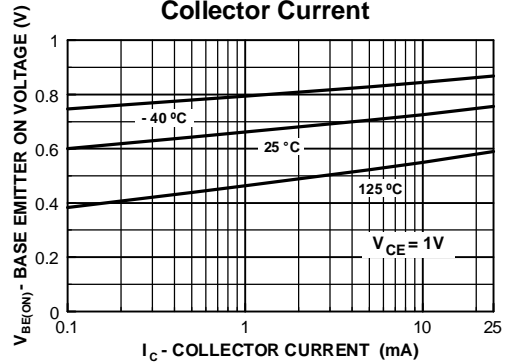
Collector-Emitter Saturation Voltage vs Collector Current



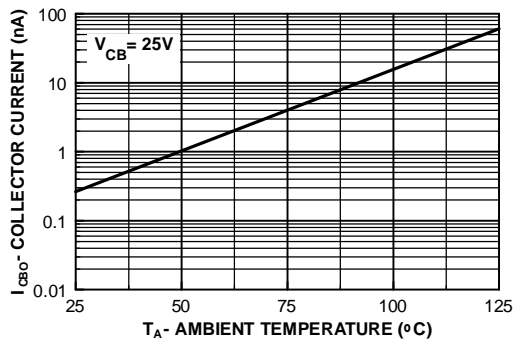
Base-Emitter Saturation Voltage vs Collector Current



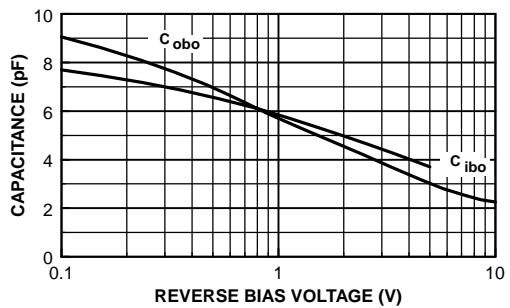
Base Emitter ON Voltage vs Collector Current



Collector-Cutoff Current vs Ambient Temperature



Common-Base Open Circuit Input and Output Capacitance vs Reverse Bias Voltage



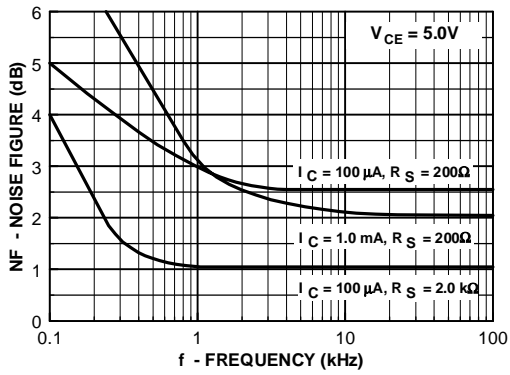
PNP Multi-Chip General Purpose Amplifier

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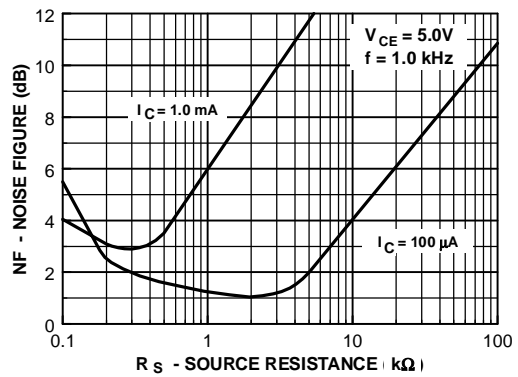
FFB3906 / FMB3906 / MMPQ3906

Typical Characteristics (continued)

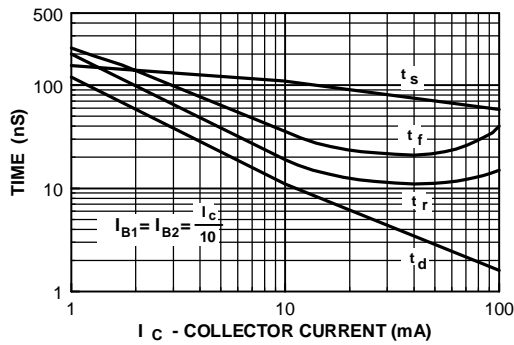
Noise Figure vs Frequency



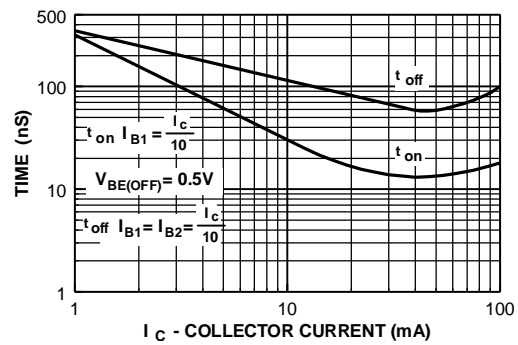
Noise Figure vs Source Resistance



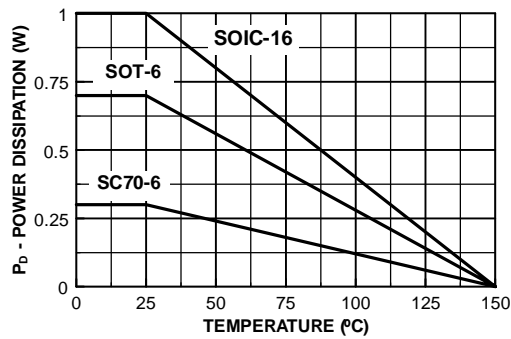
Switching Times vs Collector Current



Turn On and Turn Off Times vs Collector Current



Power Dissipation vs Ambient Temperature

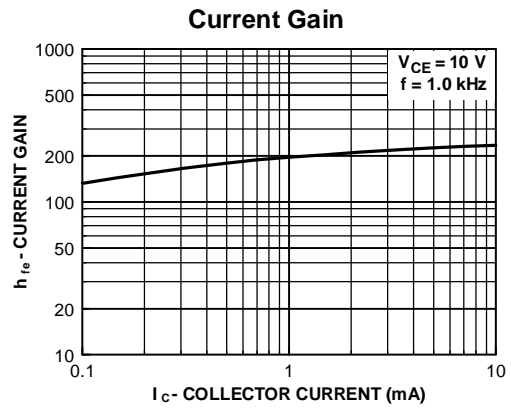
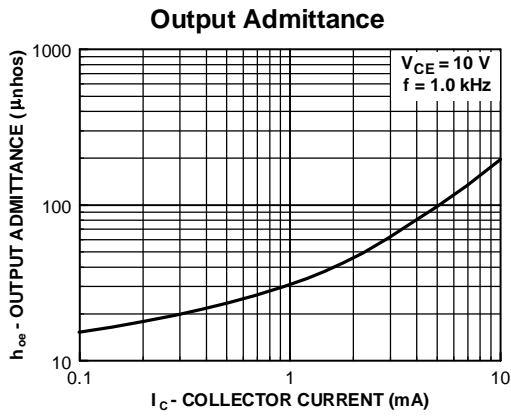
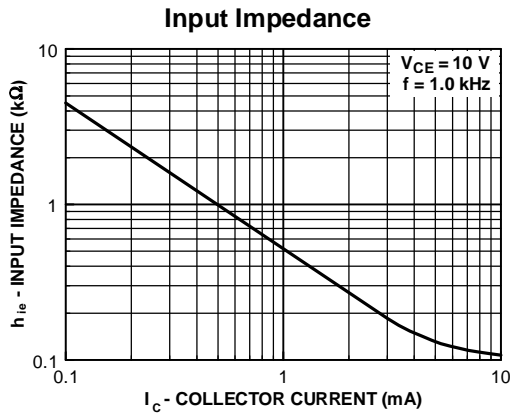
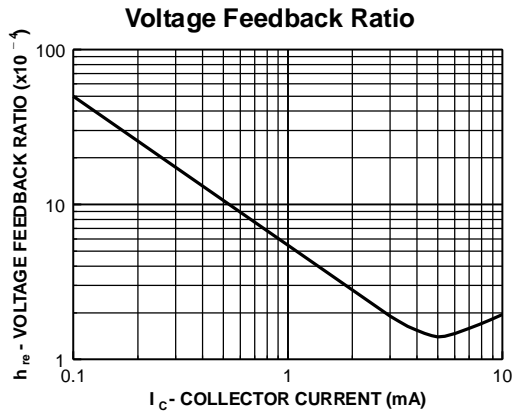


PNP Multi-Chip General Purpose Amplifier

(continued)

FFB3906 / FMB3906 / MMPQ3906

Typical Characteristics (continued)



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