



Micro Commercial Components



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# MMBT3904

## NPN General Purpose Amplifier

### Features

- Halogen free available upon request by adding suffix "-HF"
- Capable of 350mWatts of Power Dissipation and 200mA Ic.
- Operating and Storage Junction Temperatures: -55°C to 150°C
- Surface Mount SOT-23 Package
- Lead Free Finish/RoHS Compliant ("P" Suffix designates RoHS Compliant. See ordering information)
- Epoxy meets UL 94 V-0 flammability rating
- Moisture Sensitivity Level 1
- Marking Code: 1AM
- Thermal Resistance Junction to Ambient: 357 °C/W
- Thermal Resistance Junction to Case: 185 °C/W

### Electrical Characteristics @ 25°C Unless Otherwise Specified

Symbol	Parameter	Min	Max	Units
<b>OFF CHARACTERISTICS</b>				
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage* ( $I_C=1.0mA$ , $I_B=0$ )	40		Vdc
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage ( $I_C=10\mu A$ , $I_E=0$ )	60		Vdc
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage ( $I_E=10\mu A$ , $I_C=0$ )	6.0		Vdc
$I_{CBO}$	Collector Cutoff Current ( $V_{CB}=30Vdc$ , $V_{BE}=3.0Vdc$ )		50	nAdc
$I_{CEX}$	Collector Cutoff Current ( $V_{CE}=30Vdc$ , $V_{BE}=3.0Vdc$ )		50	nAdc

### ON CHARACTERISTICS

$\beta_{FE}$	DC Current Gain* ( $I_C=0.1mA$ , $V_{CE}=1.0Vdc$ ) ( $I_C=1.0mA$ , $V_{CE}=1.0Vdc$ ) ( $I_C=10mA$ , $V_{CE}=1.0Vdc$ ) ( $I_C=50mA$ , $V_{CE}=1.0Vdc$ ) ( $I_C=100mA$ , $V_{CE}=1.0Vdc$ )	40 70 100 60 30	300	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage ( $I_C=10mA$ , $I_B=1.0mA$ ) ( $I_C=50mA$ , $I_B=5.0mA$ )		0.2 0.3	Vdc
$V_{BE(sat)}$	Base-Emitter Saturation Voltage ( $I_C=10mA$ , $I_B=1.0mA$ ) ( $I_C=50mA$ , $I_B=5.0mA$ )	0.65	0.85 0.95	Vdc

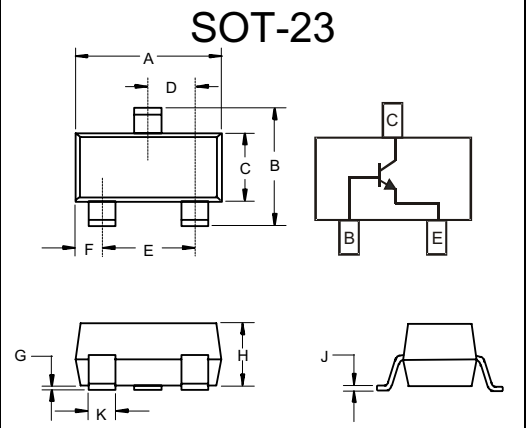
### SMALL-SIGNAL CHARACTERISTICS

$f_T$	Current Gain-Bandwidth Product ( $I_C=10mA$ , $V_{CE}=20Vdc$ , $f=100MHz$ )	300		MHz
$C_{obo}$	Output Capacitance ( $V_{CB}=5.0Vdc$ , $I_E=0$ , $f=1.0MHz$ )		4.0	pF
$C_{ibo}$	Input Capacitance ( $V_{BE}=0.5Vdc$ , $I_C=0$ , $f=1.0MHz$ )		8.0	pF
NF	Noise Figure ( $I_C=100\mu A$ , $V_{CE}=5.0Vdc$ , $R_S=1.0k\Omega$ , $f=10Hz$ to $15.7kHz$ )		5.0	dB

### SWITCHING CHARACTERISTICS

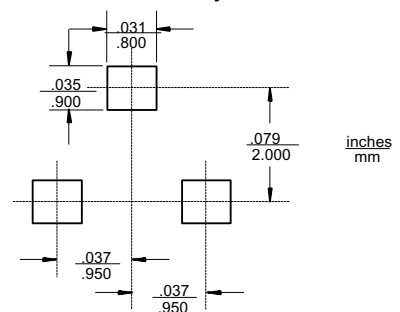
$t_d$	Delay Time	( $V_{CC}=3.0Vdc$ , $V_{BE}=0.5Vdc$ )	35	ns
$t_r$	Rise Time	( $I_C=10mA$ , $I_{B1}=1.0mA$ )	35	ns
$t_s$	Storage Time	( $V_{CC}=3.0Vdc$ , $I_C=10mA$ )	200	ns
$t_f$	Fall Time	( $I_{B1}=I_{B2}=1.0mA$ )	50	ns

\*Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2.0\%$



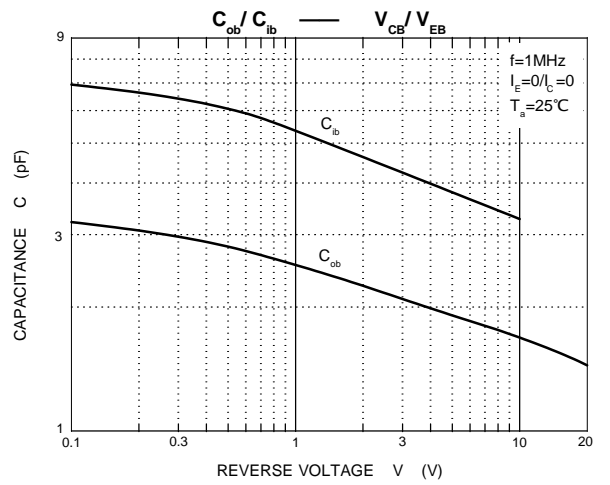
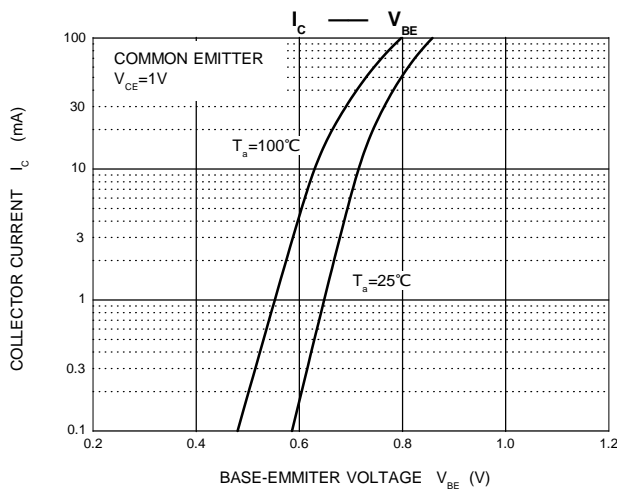
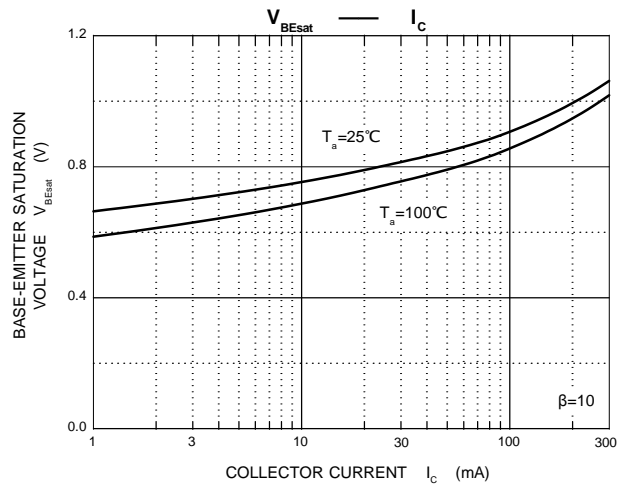
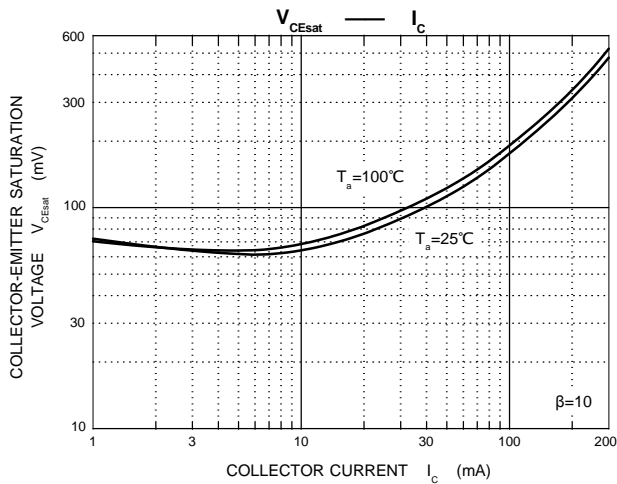
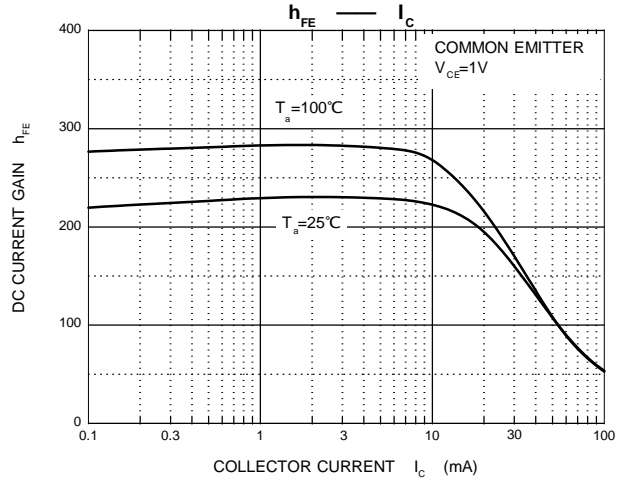
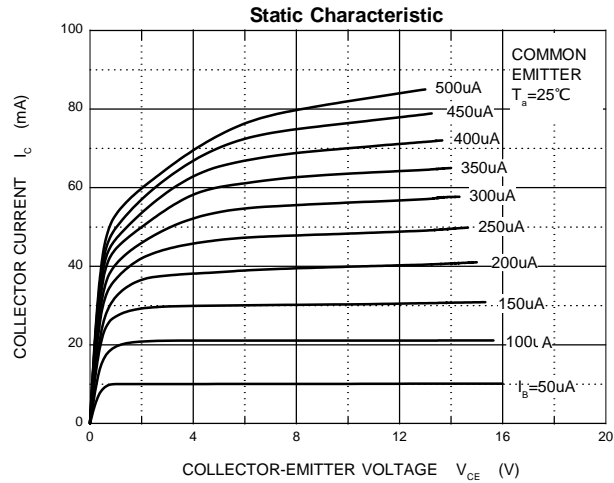
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.110	.120	2.80	3.04	
B	.083	.104	2.10	2.64	
C	.047	.055	1.20	1.40	
D	.035	.041	.89	1.03	
E	.070	.081	1.78	2.05	
F	.018	.024	.45	.60	
G	.0005	.0039	.013	.100	
H	.035	.044	.89	1.12	
J	.003	.007	.085	.180	
K	.015	.020	.37	.51	

### Suggested Solder Pad Layout

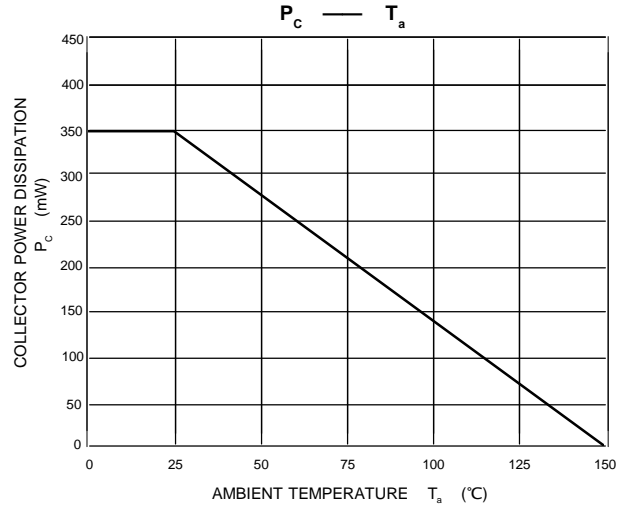
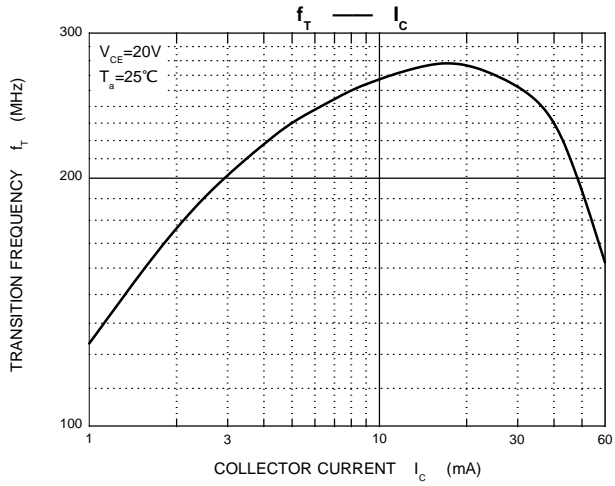


# MMBT3904

## Typical Characteristics



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Ordering Information :

Device	Packing
Part Number-TP	Tape&Reel; 3Kpcs/Reel

Note : Adding "-HF" suffix for halogen free, eg. Part Number-TP-HF

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