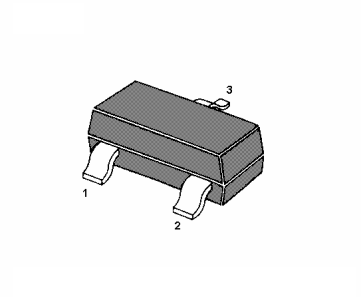
MMBT3904

NPN Silicon General Purpose Transistor
for switching and amplifier applications.

As complementary types the PNP transistors MMBT3906 is recommended.



1. Base 2. Emitter 3. Collector

SOT-23 Plastic Package

Absolute Maximum Ratings (T_a = 25 °C)

Parameter	Symbol	Value	Unit
Collector Base Voltage	V_{CBO}	60	V
Collector Emitter Voltage	V_{CEO}	40	V
Emitter Base Voltage	V_{EBO}	6	V
Collector Current Continuous	I_C	200	mA
Total Device Dissipation	P_{tot}	200 [1)]	mW
Derate above 25 °C		1.8	mW/ °C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	417	°C/W
Junction and Storage Temperature Range	T_J,T_s	-55 to +150	°C

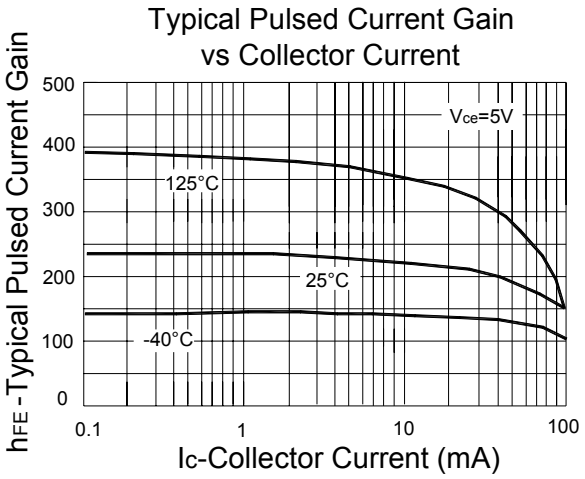
[1)] FR-5=1×0.75×0.062 in.

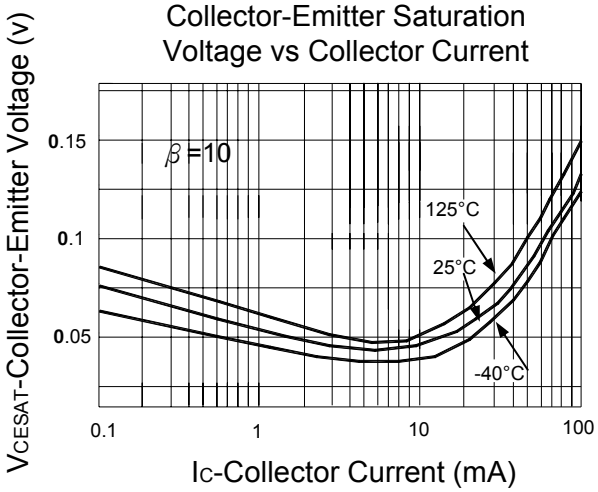
Characteristics at T_{amb} = 25 °C

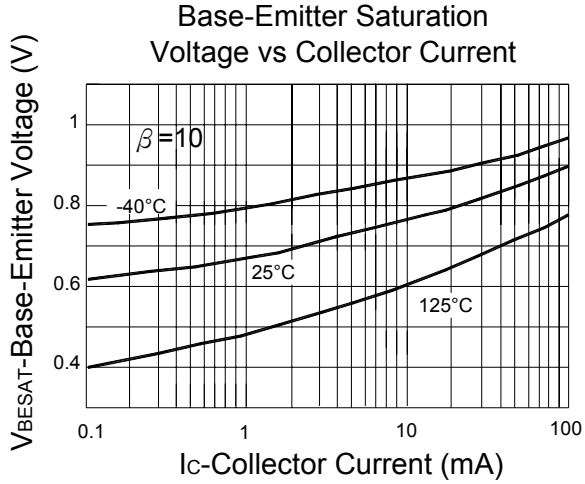
Parameter	Symbol	Min.	Max.	Unit
DC Current Gain				
at V_{CE} = 1 V, I_C = 0.1 mA	h_{FE}	40	-	-
at V_{CE} = 1 V, I_C = 1 mA	h_{FE}	70	-	-
at V_{CE} = 1 V, I_C = 10 mA	h_{FE}	100	300	-
at V_{CE} = 1 V, I_C = 50 mA	h_{FE}	60	-	-
at V_{CE} = 1 V, I_C = 100 mA	h_{FE}	30	-	-
Collector Emitter Saturation Voltage				
at I_C = 10 mA, I_B = 1 mA	V_{CEsat}	-	0.2	V
at I_C = 50 mA, I_B = 5 mA	V_{CEsat}	-	0.3	V
Base Emitter Saturation Voltage				
at I_C = 10 mA, I_B = 1 mA	V_{BEsat}	0.65	0.85	V
at I_C = 50 mA, I_B = 5 mA	V_{BEsat}	-	0.95	V
Collector Cutoff Current at V_{CB} = 30 V	I_{CBO}	-	50	nA
Base Cutoff Current at V_{EB} = 6 V	I_{EBO}	-	50	nA
Collector Base Breakdown Voltage at I_C = 10 µA	$V_{(BR)CBO}$	60	-	V
Collector Emitter Breakdown Voltage at I_C = 1 mA	$V_{(BR)CEO}$	40	-	V
Emitter Base Breakdown Voltage at I_E = 10 µA	$V_{(BR)EBO}$	6	-	V
Current Gain Bandwidth Product at V_{CE} = 20 V, I_C = 10 mA, f = 100 MHz	f_T	300	-	MHz
Output Capacitance at V_{CB} = 5 V, I_E = 0, f = 1 MHz	C_{obo}	-	4	pF
Input Capacitance at V_{EB} = 0.5 V, I_C = 0, f = 1 MHz	C_{ibo}	-	8	pF
Input Impedance at I_C = 1 mA, V_{CE} = 10 V, f = 1 KHz	h_{ie}	1	10	KOhms
Voltage Feedback Ratio at I_C = 1 mA, V_{CE} = 10 V, f = 1 KHz	h_{re}	0.5	8	X 10^{-4}
Small-Signal Current Gain at I_C = 1 mA, V_{CE} = 10 V, f = 1 KHz	h_{fe}	100	400	-

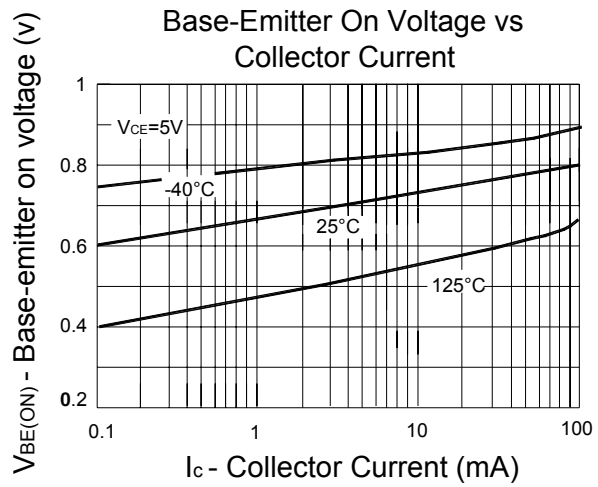
Characteristics at T_{amb}=25 °C

Output Admittance at I_C = 1 mA, V_{CE} = 10 V, f = 1 KHz		h_{oe}	1	40	µmhos
Noise Figure at I_C = 1 µA, V_{CE} = 5 V, R_S = 1 Kohms, f = 1 KHz		NF	-	5	dB
Delay Time	V_{CC} = 3 V, V_{BE} = -0.5 V,	t_d	-	35	ns
Rise Time	I_C = 10 mA, I_{B1} = 1 mA	t_r	-	35	ns
Storage Time	V_{CC} = 3 V, I_C = 10 mA,	t_s	-	200	ns
Fall Time	I_{B1} = I_{B2} = 1 mA	t_f	-	50	ns

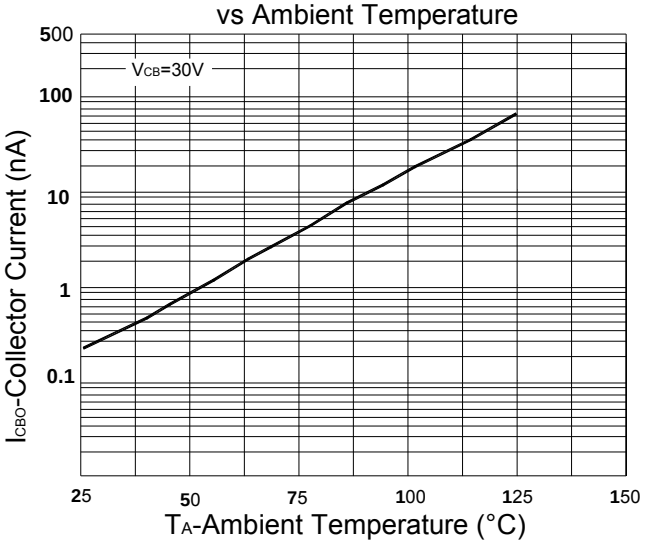




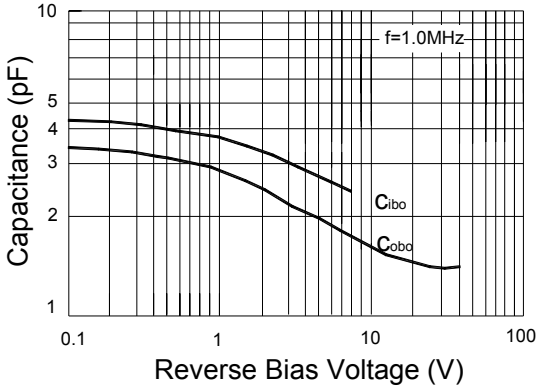




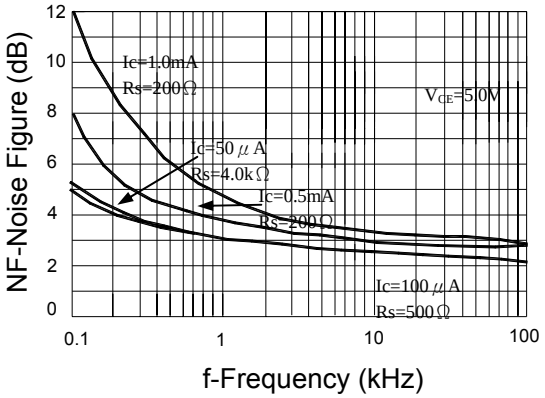
Collector-Cutoff Current
vs Ambient Temperature



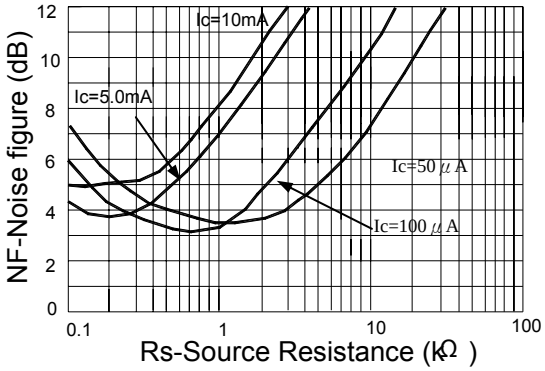
Capacitance vs
Reverse Bias Voltage



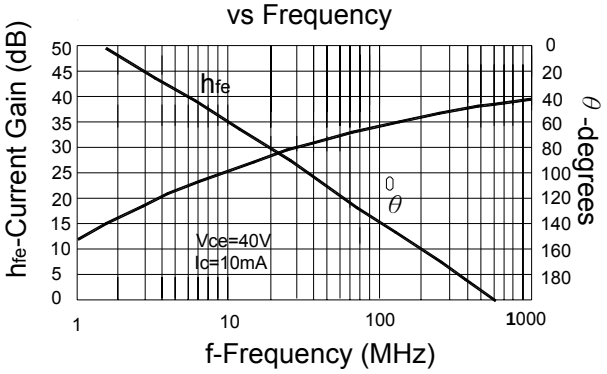
Noise Figure vs Frequency



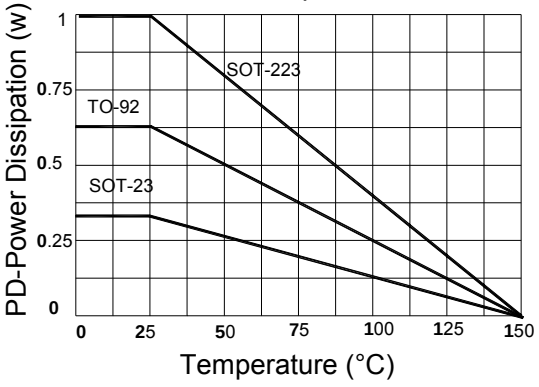
Noise Figure vs Source Resistance



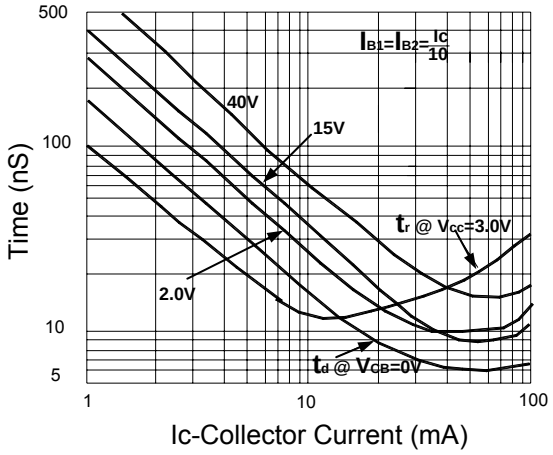
Current Gain And Phase Angle
vs Frequency



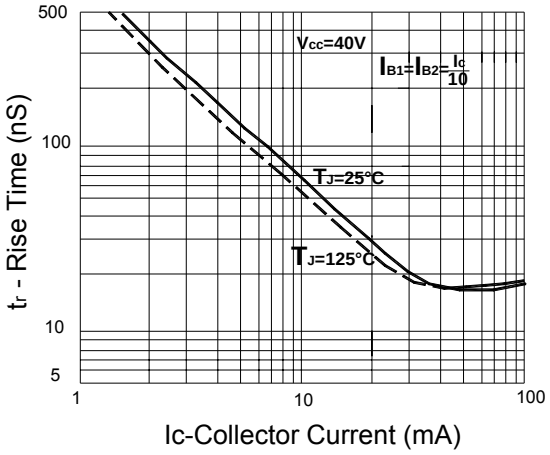
Power Dissipation vs
Ambient Temperature



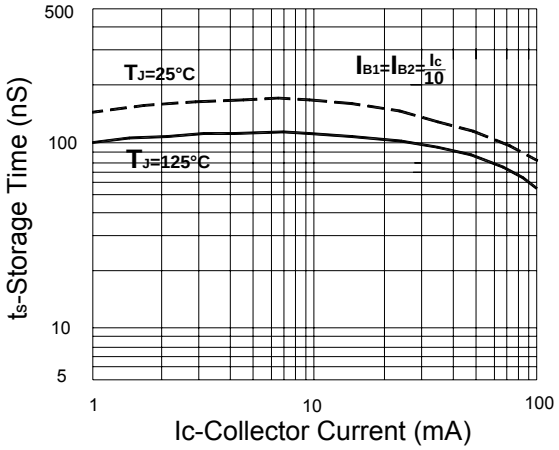
Turn-on Time vs Collector Current



Rise Time vs Collector Current



Storage Time vs Collector Current



Fall Time vs Collector Current