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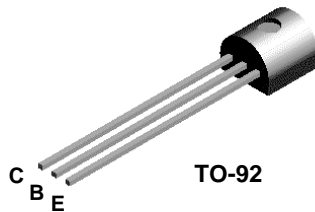


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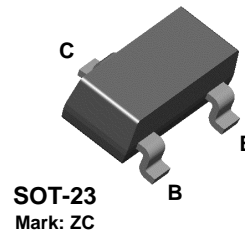
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## 2N4124



## MMBT4124



### NPN 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.

#### Absolute Maximum Ratings\* TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
$V_{CE0}$	Collector-Emitter Voltage	25	V
$V_{CBO}$	Collector-Base Voltage	30	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	°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 TA = 25°C unless otherwise noted

Symbol	Characteristic	Max		Units
		2N4124	*MMBT4124	
$P_D$	Total Device Dissipation	625	350	mW
	Derate above 25°C	5.0	2.8	mW/°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case	83.3		°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	200	357	°C/W

\*Device mounted on FR-4 PCB 1.6" X 1.6" X 0.06."

## NPN General Purpose Amplifier (continued)

2N4124 / MMBT4124

### Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
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#### OFF CHARACTERISTICS

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 1.0 \text{ mA}, I_B = 0$	25		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 10 \text{ } \mu\text{A}, I_E = 0$	30		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_C = 10 \text{ } \mu\text{A}, I_C = 0$	5.0		V
$I_{CBO}$	Collector Cutoff Current	$V_{CB} = 20 \text{ V}, I_E = 0$		50	nA
$I_{EBO}$	Emitter Cutoff Current	$V_{EB} = 3.0 \text{ V}, I_C = 0$		50	nA

#### ON CHARACTERISTICS\*

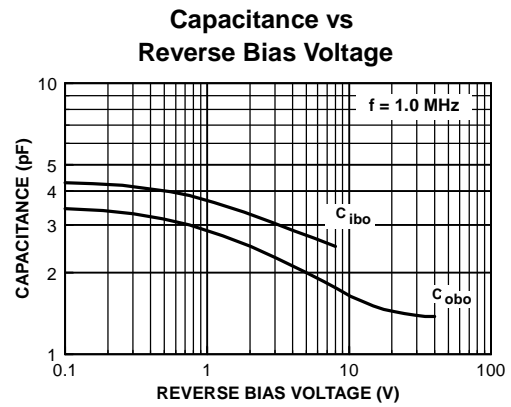
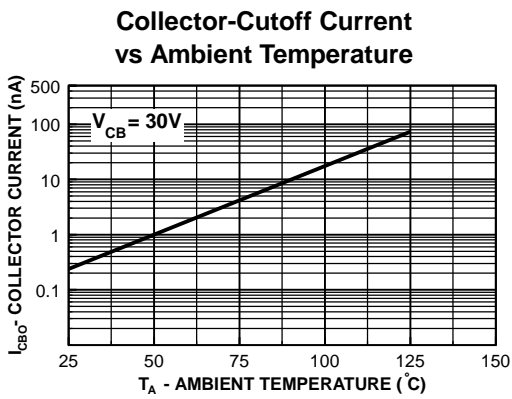
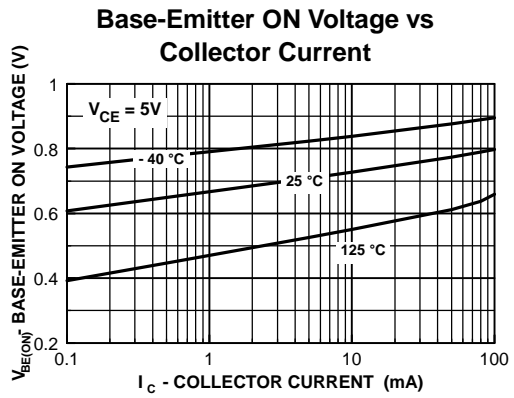
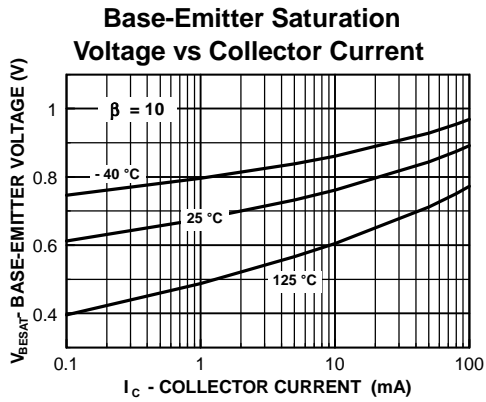
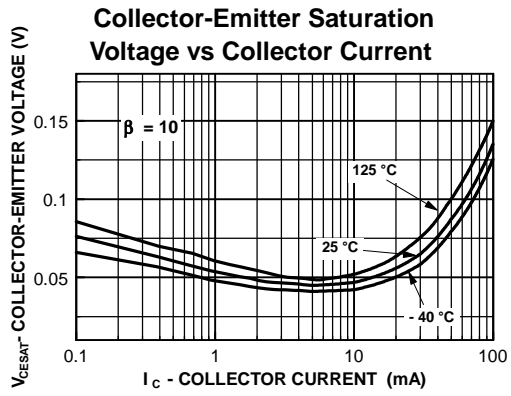
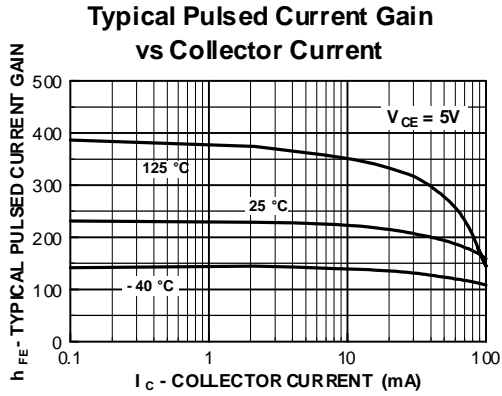
$h_{FE}$	DC Current Gain	$I_C = 2.0 \text{ mA}, V_{CE} = 1.0 \text{ V}$ $I_C = 50 \text{ mA}, V_{CE} = 1.0 \text{ V}$	120 60	360	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$		0.3	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$		0.95	V

#### SMALL SIGNAL CHARACTERISTICS

$f_T$	Current Gain - Bandwidth Product	$I_C = 10 \text{ mA}, V_{CE} = 20 \text{ V},$ $f = 100 \text{ MHz}$	300		MHz
$C_{obo}$	Output Capacitance	$V_{CB} = 5.0 \text{ V}, I_E = 0,$ $f = 100 \text{ kHz}$		4.0	pF
$C_{ibo}$	Input Capacitance	$V_{BE} = 0.5 \text{ V}, I_C = 0,$ $f = 1.0 \text{ kHz}$		8.0	pF
$C_{cb}$	Collector-Base Capacitance	$V_{CB} = 5.0 \text{ V}, I_E = 0,$ $f = 100 \text{ kHz}$		4.0	pF
$h_{fe}$	Small-Signal Current Gain	$V_{CE} = 10 \text{ V}, I_C = 2.0 \text{ mA},$ $f = 1.0 \text{ kHz}$	120	480	
NF	Noise Figure	$I_C = 100 \text{ } \mu\text{A}, V_{CE} = 5.0 \text{ V},$ $R_S = 1.0 \text{ k}\Omega, f = 10 \text{ Hz to } 15.7 \text{ kHz}$		5.0	dB

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

Typical Characteristics



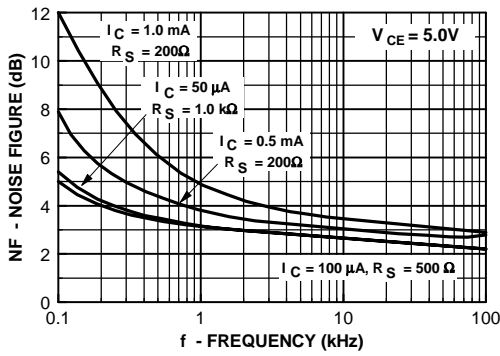
# NPN General Purpose Amplifier

(continued)

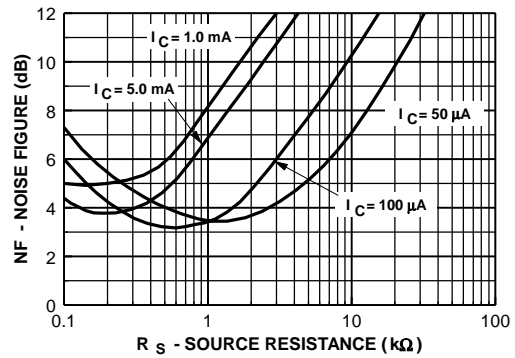
2N4124 / MMBT4124

## Typical Characteristics (continued)

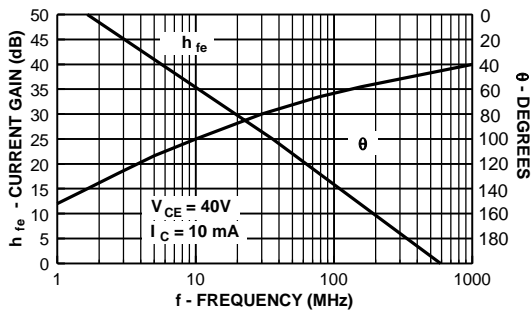
**Noise Figure vs Frequency**



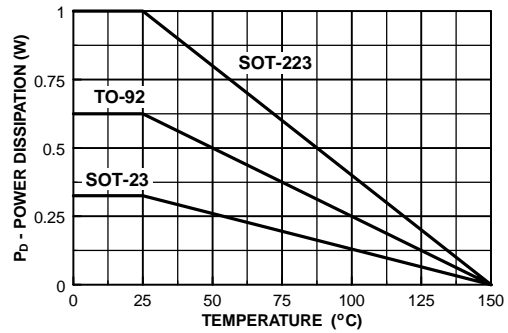
**Noise Figure vs Source Resistance**



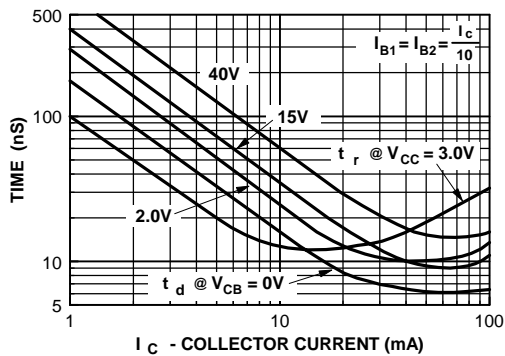
**Current Gain and Phase Angle vs Frequency**



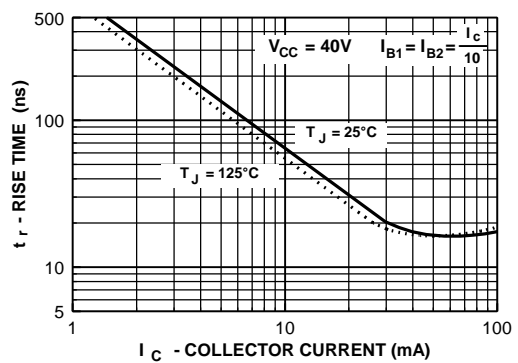
**Power Dissipation vs Ambient Temperature**



**Turn-On Time vs Collector Current**

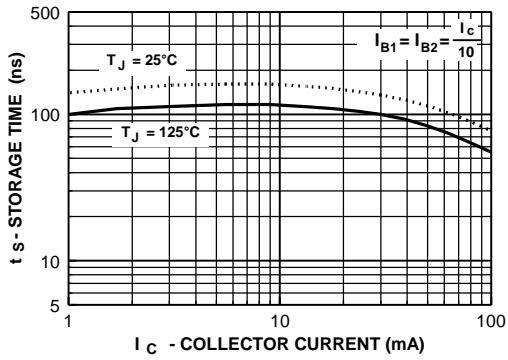


**Rise Time vs Collector Current**

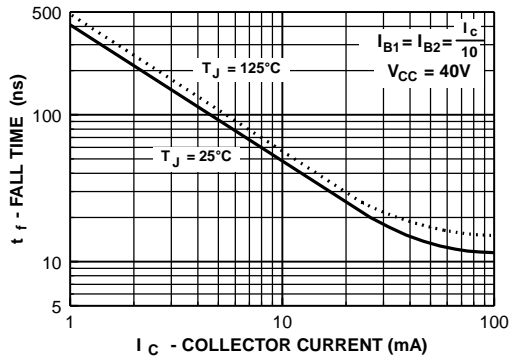


Typical Characteristics (continued)

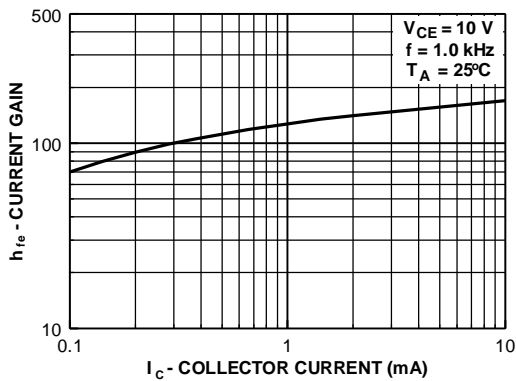
Storage Time vs Collector Current



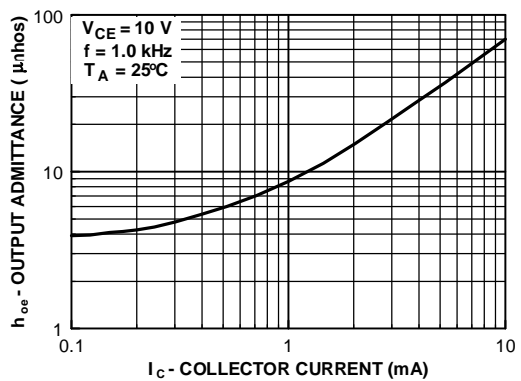
Fall Time vs Collector Current



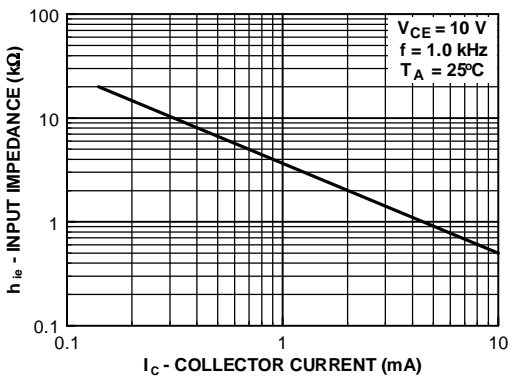
Current Gain



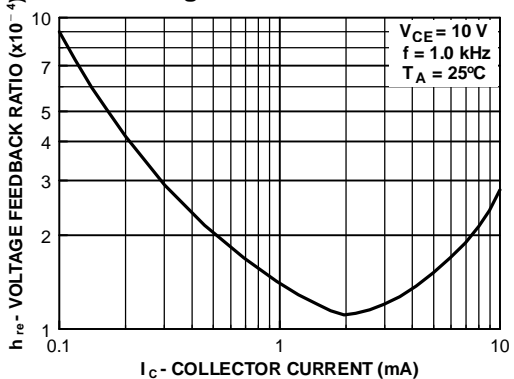
Output Admittance



Input Impedance



Voltage Feedback Ratio



Test Circuits

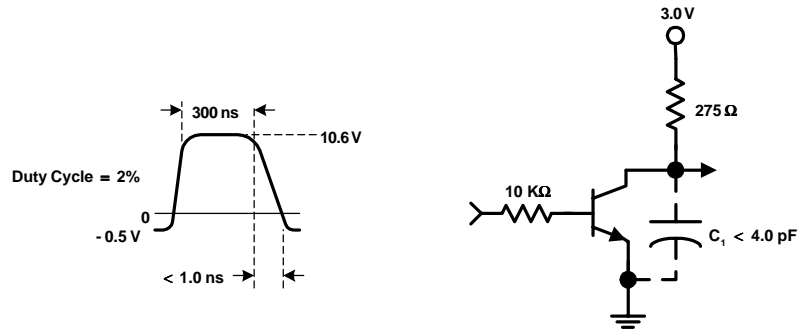


FIGURE 1: Delay and Rise Time Equivalent Test Circuit

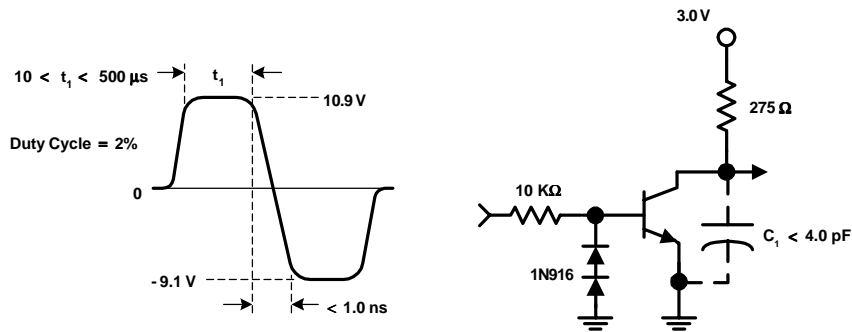


FIGURE 2: Storage and Fall Time Equivalent Test Circuit

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