

2N4123, 2N4124

General Purpose Transistors

NPN Silicon

Features

- Pb-Free Packages are Available*

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	30 25	Vdc
Collector-Base Voltage	V_{CBO}	40 30	Vdc
Emitter-Base Voltage	V_{EBO}	5.0	Vdc
Collector Current - Continuous	I_C	200	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	625 5.0	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	1.5 12	W mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	200	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	83.3	$^\circ\text{C}/\text{W}$

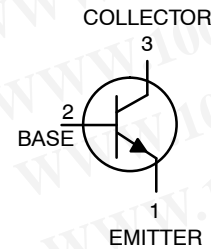
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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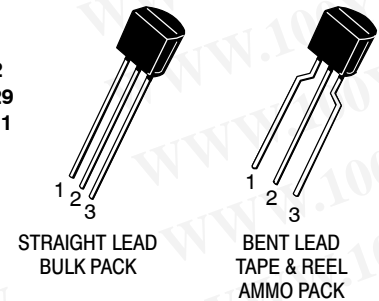


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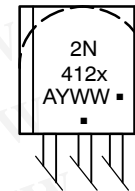
TO-92
CASE 29
STYLE 1



STRAIGHT LEAD
BULK PACK

BENT LEAD
TAPE & REEL
AMMO PACK

MARKING DIAGRAM



x = 3 or 4

A = Assembly Location

Y = Year

WW = Work Week

■ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
2N4123RLRM	TO-92	2000 / Tape & Ammo
2N4124G	TO-92 (Pb-Free)	5000 Units / Bulk

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

2N4123, 2N4124

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Breakdown Voltage (Note 1) (I _C = 1.0 mA _{dc} , I _E = 0)	2N4123 2N4124 V _{(BR)CEO}	30 25	– –	V _{dc}
Collector–Base Breakdown Voltage (I _C = 10 μA _{dc} , I _E = 0)	2N4123 2N4124 V _{(BR)CBO}	40 30	– –	V _{dc}
Emitter–Base Breakdown Voltage (I _E = 10 μA _{dc} , I _C = 0)	V _{(BR)EBO}	5.0	–	V _{dc}
Collector Cutoff Current (V _{CB} = 20 V _{dc} , I _E = 0)	I _{CBO}	–	50	nA _{dc}
Emitter Cutoff Current (V _{EB} = 3.0 V _{dc} , I _C = 0)	I _{EBO}	–	50	nA _{dc}
ON CHARACTERISTICS				
DC Current Gain (Note 1) (I _C = 2.0 mA _{dc} , V _{CE} = 1.0 V _{dc})	2N4123 2N4124 h _{FE}	50 120	150 360	–
(I _C = 50 mA _{dc} , V _{CE} = 1.0 V _{dc})	2N4123 2N4124	25 60	– –	–
Collector–Emitter Saturation Voltage (Note 1) (I _C = 50 mA _{dc} , I _B = 5.0 mA _{dc})	V _{CE(sat)}	–	0.3	V _{dc}
Base–Emitter Saturation Voltage (Note 1) (I _C = 50 mA _{dc} , I _B = 5.0 mA _{dc})	V _{BE(sat)}	–	0.95	V _{dc}
SMALL–SIGNAL CHARACTERISTICS				
Current–Gain – Bandwidth Product (I _C = 10 mA _{dc} , V _{CE} = 20 V _{dc} , f = 100 MHz)	2N4123 2N4124 f _T	250 300	– –	MHz
Input Capacitance (V _{EB} = 0.5 V _{dc} , I _C = 0, f = 1.0 MHz)	C _{ibo}	–	8.0	pF
Collector–Base Capacitance (I _E = 0, V _{CB} = 5.0 V, f = 1.0 MHz)	C _{cb}	–	4.0	pF
Small–Signal Current Gain (I _C = 2.0 mA _{dc} , V _{CE} = 10 V _{dc} , R _S = 10 k Ω, f = 1.0 kHz)	2N4123 2N4124 h _{fe}	50 120	200 480	–
Current Gain – High Frequency (I _C = 10 mA _{dc} , V _{CE} = 20 V _{dc} , f = 100 MHz)	2N4123 2N4124 h _{fe}	2.5 3.0	– –	–
(I _C = 2.0 mA _{dc} , V _{CE} = 10 V, f = 1.0 kHz)	2N4123	50	200	–
(I _C = 2.0 mA _{dc} , V _{CE} = 10 V, f = 1.0 kHz)	2N4124	120	480	–
Noise Figure (I _C = 100 μA _{dc} , V _{CE} = 5.0 V _{dc} , R _S = 1.0 k Ω, f = 1.0 kHz)	2N4123 2N4124 NF	– –	6.0 5.0	dB

1. Pulse Test: Pulse Width = 300 μs, Duty Cycle = 2.0%.

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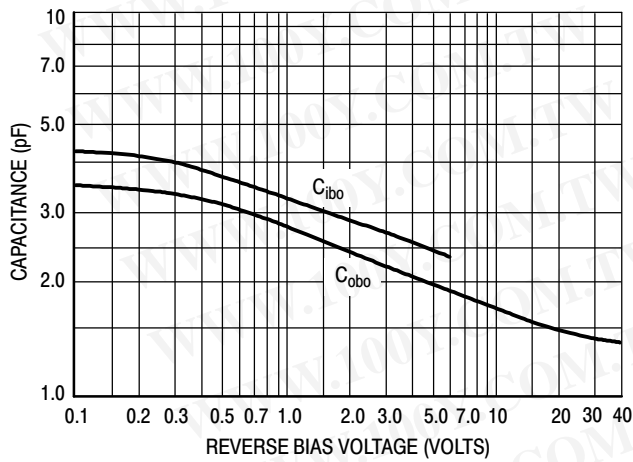


Figure 1. Capacitance

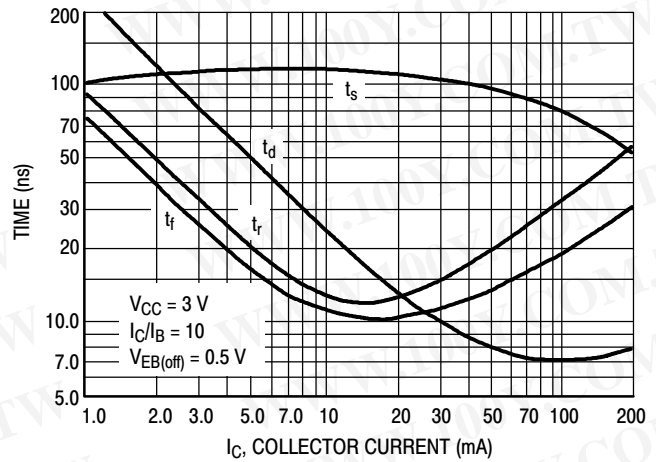


Figure 2. Switching Times

AUDIO SMALL-SIGNAL CHARACTERISTICS

NOISE FIGURE

($V_{CE} = 5 \text{ Vdc}$, $T_A = 25^\circ\text{C}$)

Bandwidth = 1.0 Hz

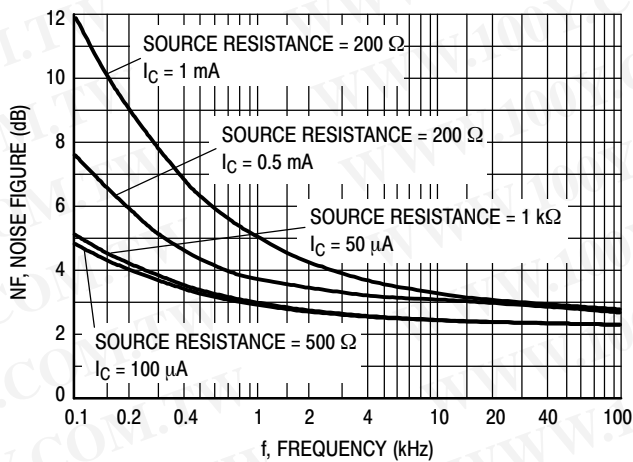


Figure 3. Frequency Variations

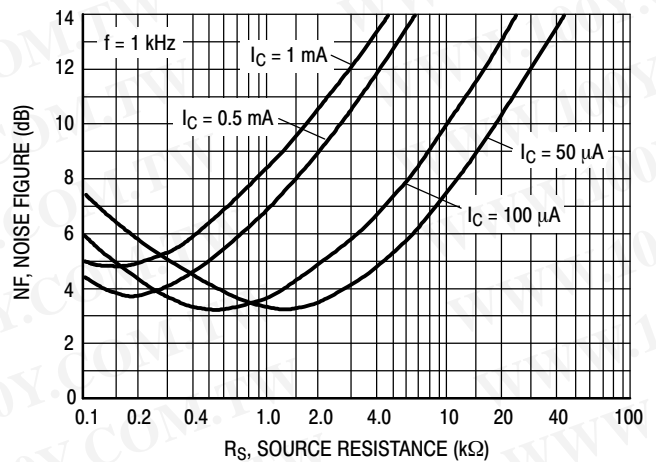


Figure 4. Source Resistance

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h PARAMETERS

($V_{CE} = 10\text{ V}$, $f = 1\text{ kHz}$, $T_A = 25^\circ\text{C}$)

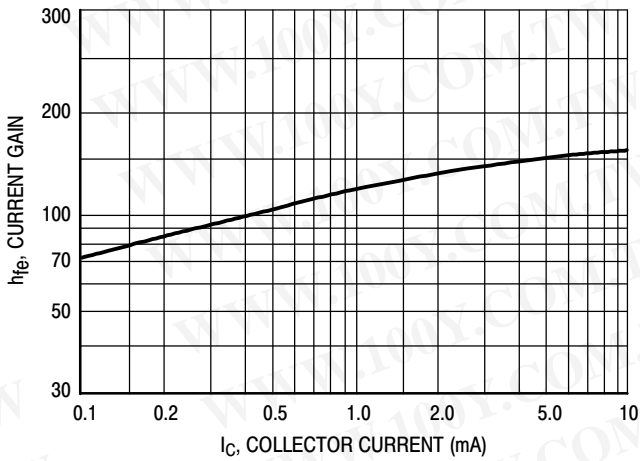


Figure 5. Current Gain

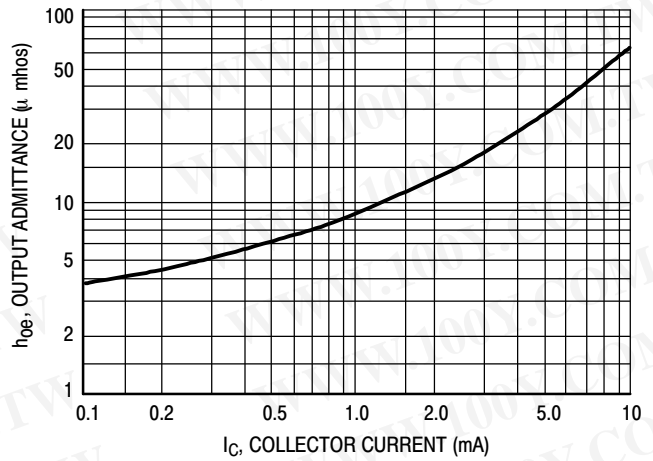


Figure 6. Output Admittance

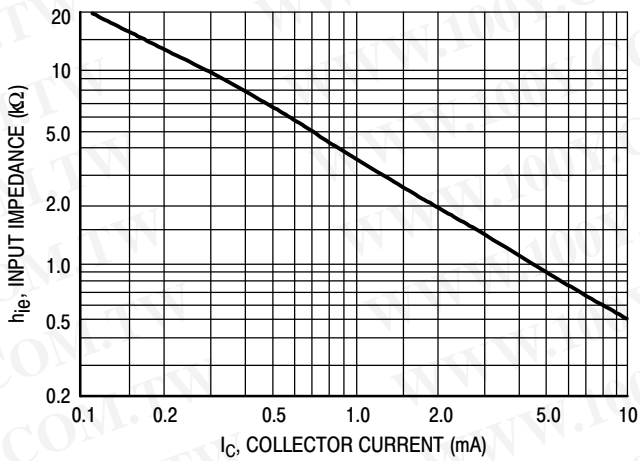


Figure 7. Input Impedance

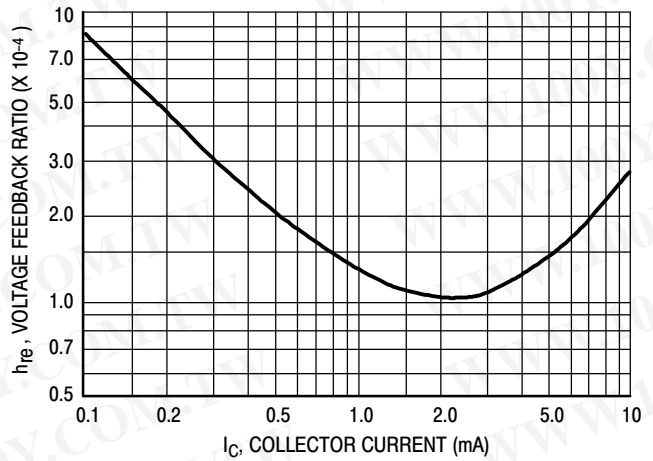


Figure 8. Voltage Feedback Ratio

STATIC CHARACTERISTICS

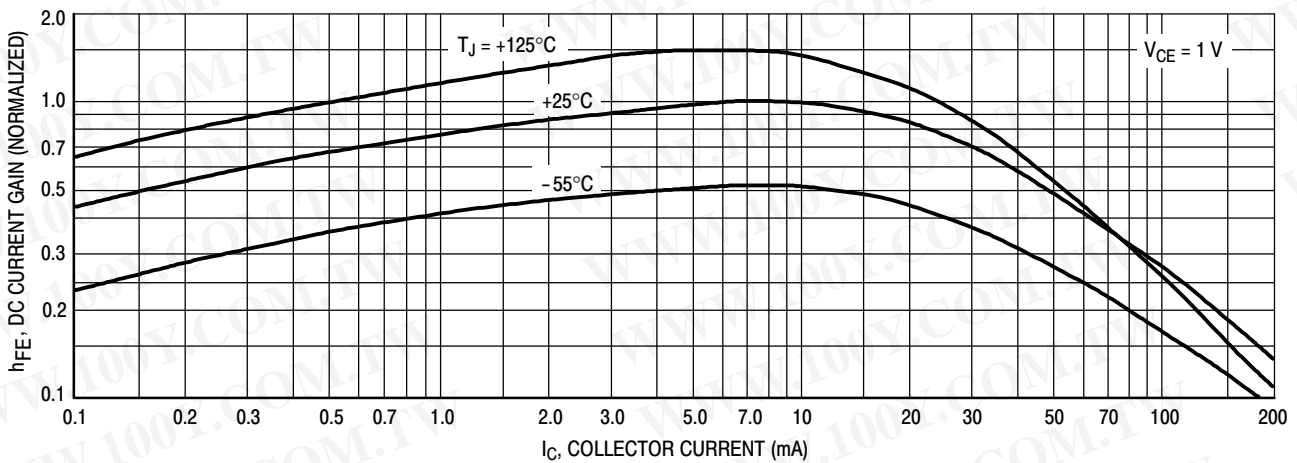


Figure 9. DC Current Gain

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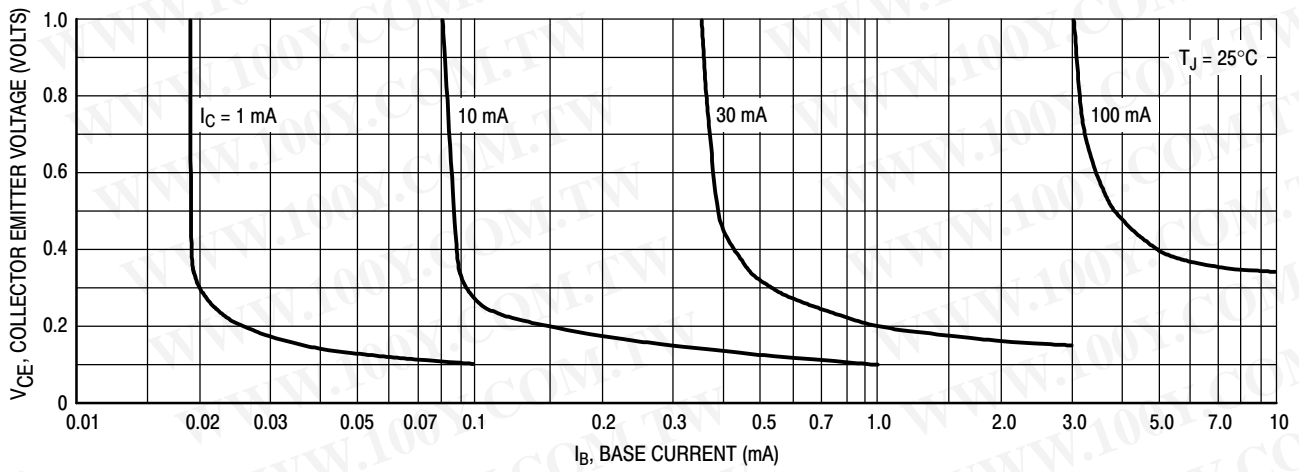


Figure 10. Collector Saturation Region

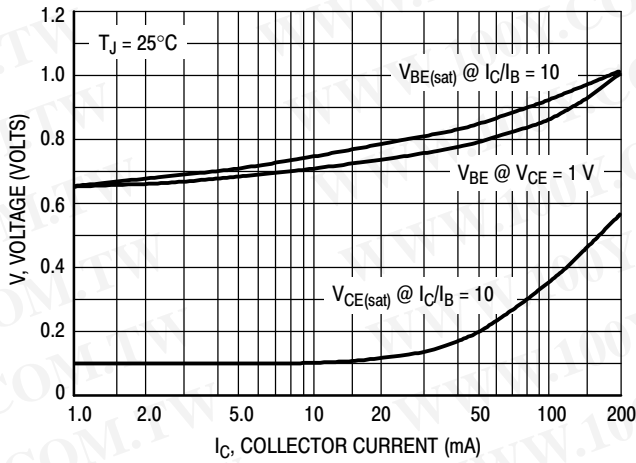


Figure 11. "On" Voltages

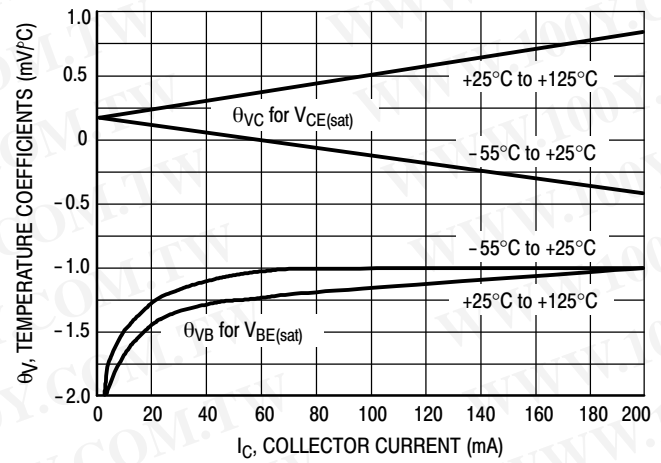


Figure 12. Temperature Coefficients

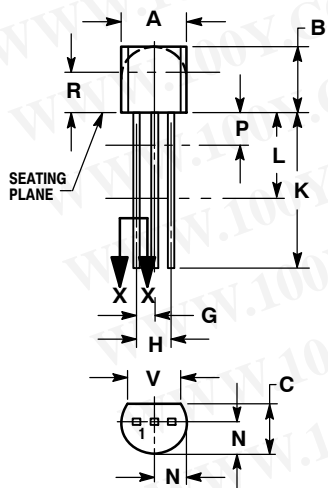
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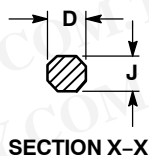
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PACKAGE DIMENSIONS

TO-92 (TO-226)
 CASE 29-11
 ISSUE AM



STRAIGHT LEAD
 BULK PACK

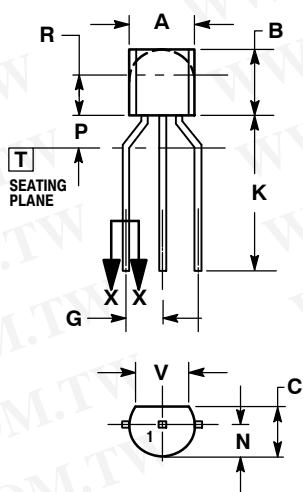


SECTION X-X

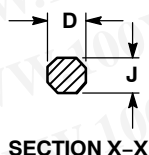
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.021	0.407	0.533
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	---	12.70	---
L	0.250	---	6.35	---
N	0.080	0.105	2.04	2.66
P	---	0.100	---	2.54
R	0.115	---	2.93	---
V	0.135	---	3.43	---



BENT LEAD
 TAPE & REEL
 AMMO PACK



SECTION X-X

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	MILLIMETERS	
	MIN	MAX
A	4.45	5.20
B	4.32	5.33
C	3.18	4.19
D	0.40	0.54
G	2.40	2.80
J	0.39	0.50
K	12.70	---
N	2.04	2.66
P	1.50	4.00
R	2.93	---
V	3.43	---

STYLE 1:

1. PIN 1. EMITTER
2. BASE
3. COLLECTOR

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