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## 2N4123 & 2N4124 Silicon NPN Transistor General Purpose TO92 Type Package

### Absolute Maximum Ratings:

Collector–Emitter Voltage, $V_{CEO}$		
2N4123	.....	30V
2N4124	.....	25V
Collector–Base Voltage, $V_{CBO}$		
2N4123	.....	40V
2N4124	.....	30V
Emitter–Base Voltage, $V_{EBO}$	.....	5V
Continuous Collector Current, $I_C$	.....	200mA
Total Device Dissipation ( $T_A = +25^\circ\text{C}$ ), $P_D$	.....	350mW
Derate Above $25^\circ\text{C}$	.....	2.8mW/ $^\circ\text{C}$
Total Device Dissipation ( $T_C = +25^\circ\text{C}$ ), $P_D$	.....	1.0W
Derate Above $25^\circ\text{C}$	.....	8mW/ $^\circ\text{C}$
Operating Junction Temperature Range, $T_J$	.....	$-55^\circ$ to $+150^\circ\text{C}$
Storage Temperature Range, $T_{stg}$	.....	$-55^\circ$ to $+150^\circ\text{C}$
Thermal Resistance, Junction to Case, $R_{thJC}$	.....	83.3 $^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Ambient, $R_{thJA}$	.....	200 $^\circ\text{C}/\text{W}$

### Electrical Characteristics: ( $T_A = +25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
<b>OFF Characteristics</b>							
Collector–Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 1\text{mA}, I_E = 0$ , Note 1	30	–	–	V	
2N4123							
2N4124			25	–	–	V	
Collector–Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 10^\circ\text{A}, I_E = 0$	40	–	–	V	
2N4123							
2N4124			30	–	–	V	
Emitter–Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 10^\circ\text{A}, I_C = 0$	5	–	–	V	
Collector Cutoff Current	$I_{CBO}$	$V_{CB} = 30\text{V}, I_E = 0$	–	–	50	nA	
Base Cutoff Current	$I_{BL}$	$V_{BE} = 3\text{V}, I_C = 0$	–	–	50	nA	
<b>ON Characteristics (Note 1)</b>							
DC Current Gain	$h_{FE}$	$V_{CE} = 1\text{V}, I_C = 2\text{mA}$	50	–	150		
2N4123							
2N4124				120	–	360	
2N4123			$V_{CE} = 1\text{V}, I_C = 50\text{mA}$	25	–	–	
2N4124		60					

Note 1. Pulse Test: Pulse Width = 300 $^\circ\text{s}$ , Duty Cycle = 2%.

**Electrical Characteristics (Cont'd):** ( $T_A = +25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>ON Characteristics (Cont'd)</b> (Note 1)						
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 50\text{mA}, I_B = 5\text{mA}$	–	–	0.3	V
Base–Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 50\text{mA}, I_B = 5\text{mA}$	–	–	0.95	V
<b>Small–Signal Characteristics</b>						
Current Gain–Bandwidth Product 2N4123	$f_T$	$I_C = 10\text{mA}, V_{CE} = 20\text{V}, f = 100\text{MHz}$	250	–	–	MHz
2N4124			300	–	–	MHz
Output Capacitance	$C_{obo}$	$V_{CB} = 5\text{V}, I_E = 0, f = 100\text{MHz}$	–	–	4.0	pF
Input Capacitance	$C_{ibo}$	$V_{BE} = 0.5\text{V}, I_C = 0, f = 100\text{kHz}$	–	–	8.0	pF
Collector–Base Capacitance	$C_{cb}$	$I_E = 0, V_{CB} = 5\text{V}, f = 100\text{kHz}$	–	–	4.0	pF
Small–Signal Current Gain 2N4123	$h_{fe}$	$I_C = 2\text{mA}, V_{CE} = 10\text{V}, f = 1\text{kHz}$	50	–	200	
2N4124			120	–	480	
Current Gain – High Frequency 2N4123	$ h_{fe} $	$I_C = 10\text{mA}, V_{CE} = 20\text{V}, f = 100\text{Hz}$	2.5	–	–	–
2N4124			3.0	–	–	–
2N4123		$I_C = 2\text{mA}, V_{CE} = 10\text{V}, f = 1\text{kHz}$	50	–	200	–
2N4124			120	–	480	–
Noise Figure 2N4123	NF	$I_C = 100^\circ\text{A}, V_{CE} = 5\text{V}, R_S = 1\text{k}\Omega,$ Noise Bandwidth = 10Hz to 15.7kHz	–	–	6.0	db
2N4124			–	–	5.0	db

Note 1. Pulse Test: Pulse Width  $\leq 300^\circ\text{s}$ , Duty Cycle  $\leq 2\%$ .

