

2N4401 & 2N4403

General Purpose Switching Transistors

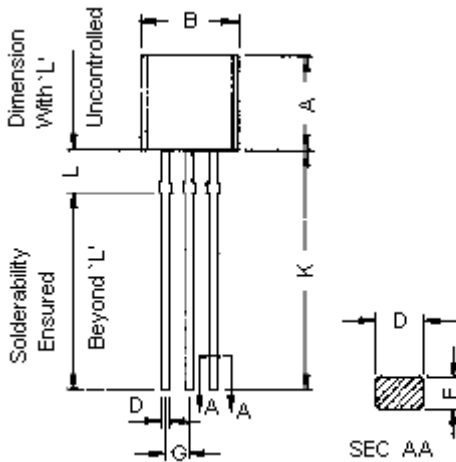


Features:

- NPN/PNP Silicon Planar Epitaxial Transistors.
- General purpose Switching Applications.
- 2N 4401 Type NPN.
- 2N 4403 Type PNP.

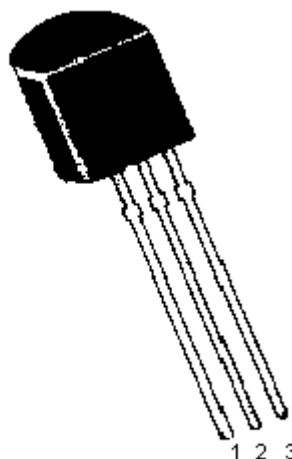
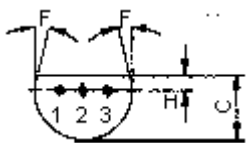
2N4401 NPN 2N4403 PNP

TO-92



Dimensions	Minimum	Maximum
A	4.32	5.33
B	4.45	5.20
C	3.18	4.19
D	0.41	0.55
E	0.35	0.50
F	5°	
G	1.14	1.40
H		1.53
K	12.70	-
L	1.982	2.082

Dimensions : Millimetres



Pin Configuration

- 1 = Emitter
- 2 = Base
- 3 = Collector



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Absolute Maximum Ratings

Parameters	Symbol	2N4401	2N4403	Unit
Collector Emitter Voltage	V_{CEO}	40	40	V
Collector Base Voltage	V_{CBO}	60		
Emitter Base Voltage	V_{EBO}	6	5	
Collector Current Continuous	I_C	600		mA
Power Dissipation at $T_a = 25^\circ\text{C}$ Derate above 25°C	P_D	625		mW
Power Dissipation at $T_C = 25^\circ\text{C}$ Derate above 25°C		5.0		mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_j, T_{stg}	-55 to +150		$^\circ\text{C}$
Thermal Resistance				
Junction to Case	$R_{th(j-c)}$	83.3		$^\circ\text{C/W}$
Junction to Ambient	$R_{th(j-a)}$	200		

Electrical Characteristics ($T_a = 25^\circ\text{C}$ unless otherwise specified)

Parameters	Symbol	Test Condition	2N4401	2N4403	Unit
Collector Emitter Voltage	BV_{CEO}^*	$I_C = 1\text{mA}, I_B = 0$	>40	>40	V
Collector Base Voltage	BV_{CBO}	$I_C = 100\mu\text{A}, I_E = 0$	>60		
Emitter Base Voltage	BV_{EBO}	$I_E = 100\mu\text{A}, I_C = 0$	>6	>5	
Base Cut off Current	I_{BEV}	$V_{CE} = 35\text{V}, V_{EB} = 0.4\text{V}$	<0.1	<0.1	μA
Collector Cut off Current	I_{CEX}	$V_{CE} = 35\text{V}, V_{EB} = 0.4\text{V}$			
Collector Emitter Saturation Voltage	$V_{CE(Sat)}^*$	$I_C = 150\text{mA}, I_B = 15\text{mA}$ $I_C = 500\text{mA}, I_B = 50\text{mA}$	<0.4 <0.75	<0.4 <0.75	V
Base Emitter Saturation Voltage	$V_{BE(Sat)}^*$	$I_C = 150\text{mA}, I_B = 15\text{mA}$ $I_C = 500\text{mA}, I_B = 50\text{mA}$	0.75 - 0.95 <1.2	0.75 - 0.95 <1.3	
DC Current Gain	h_{FE}	$I_C = 0.1\text{mA}, V_{CE} = 1\text{V}$ $I_C = 1\text{mA}, V_{CE} = 1\text{V}$ $I_C = 10\text{mA}, V_{CE} = 1\text{V}$ $I_C = 150\text{mA}, V_{CE} = 1\text{V}^*$ $I_C = 150\text{mA}, V_{CE} = 2\text{V}^*$ $I_C = 500\text{mA}, V_{CE} = 2\text{V}^*$	>20 >40 >80 100 - 300 - >40	>30 >60 >100 - 100 - 300 >20	-
Dynamic Characteristics					
Small Signal Current Gain	h_{fe}	$I_C = 1\text{mA}, V_{CE} = 10\text{V}, f = 1\text{kHz}$	40 - 500	60 - 500	-
Input Impedance	h_{ie}	$I_C = 1\text{mA}, V_{CE} = 10\text{V}, f = 1\text{kHz}$	1.0 - 15	1.5 - 15	k Ω

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

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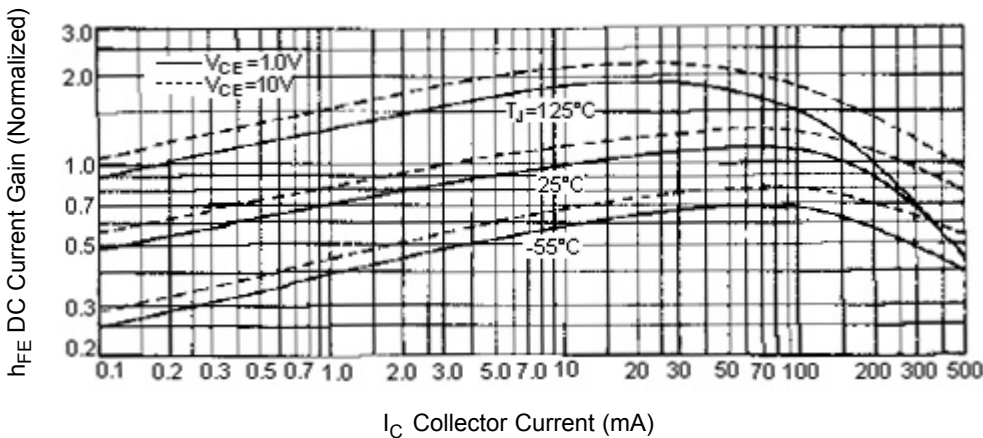
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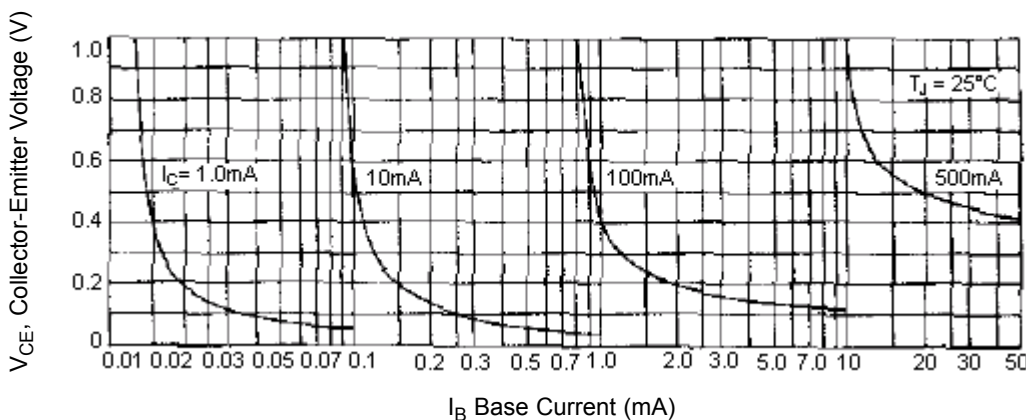
Electrical Characteristics ($T_a = 25^\circ\text{C}$ unless otherwise specified)

Parameters	Symbol	Test Condition	2N4401	2N4403	Unit
Voltage Feedback Ratio	h_{re}	$I_C = 1\text{mA}, V_{CE} = 10\text{V}, f = 1\text{kHz}$	0.1 - 8.0		$\times 10^{-4}$
Output Impedance	h_{oe}	$I_C = 1\text{mA}, V_{CE} = 10\text{V}, f = 1\text{kHz}$	1.0 - 30	1.0 - 100	$\mu\Omega$
Collector-Base Capacitance	C_{cb}	$V_{CB} = 5\text{V}, I_E = 0, f = 100\text{kHz}$ $V_{CB} = 10\text{V}, I_E = 0, f = 140\text{kHz}$	<6.5 -	- <8.5	pF
Emitter-Base Capacitance	C_{eb}	$V_{EB} = 0.5\text{V}, I_C = 0, f = 100\text{kHz}$ $V_{EB} = 0.5\text{V}, I_C = 0, f = 140\text{kHz}$	<30 -	- <30	
Transition Frequency	f_T	$I_C = 20\text{mA}, V_{CE} = 10\text{V}, f = 100\text{MHz}$	>250	>200	MHz
Switching Characteristics					
Delay Time	t_d	$V_{CC} = 30\text{V}, V_{EB} = 2\text{V}$ $I_C = 150\text{mA}, I_{B1} = 15\text{mA}$	<15	ns	
Rise Time	t_r		<20		
Storage time	t_s	$V_{CC} = 30\text{V}, I_C = 150\text{mA}$ $I_{B1} = I_{B2} = 15\text{mA}$	<225		
Fall Time	t_f		<30		

DC Current Gain



DC Current Gain

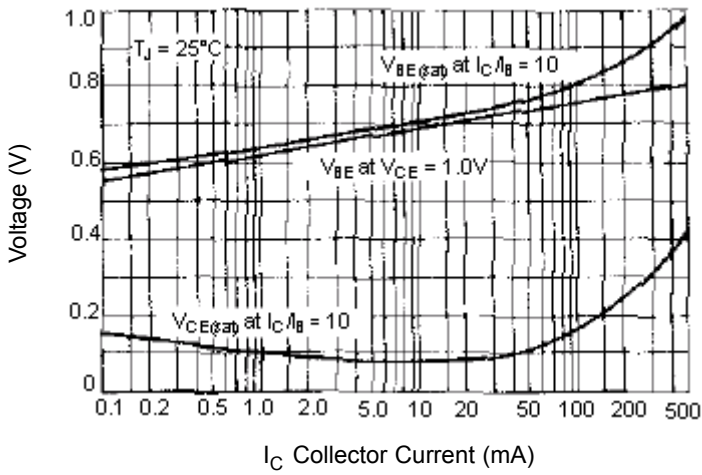


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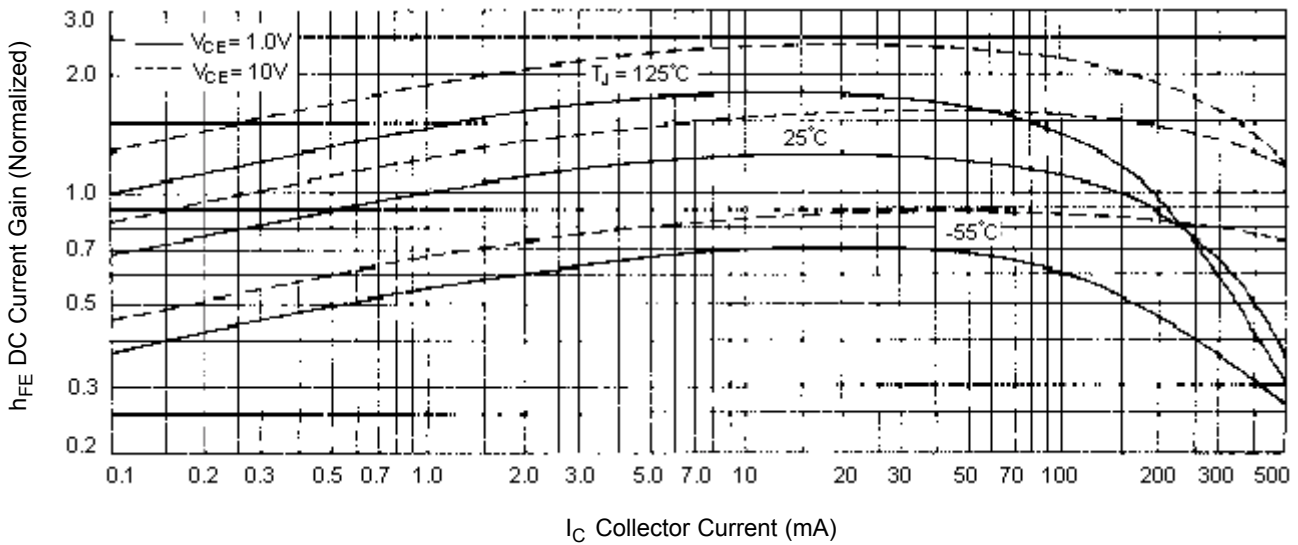
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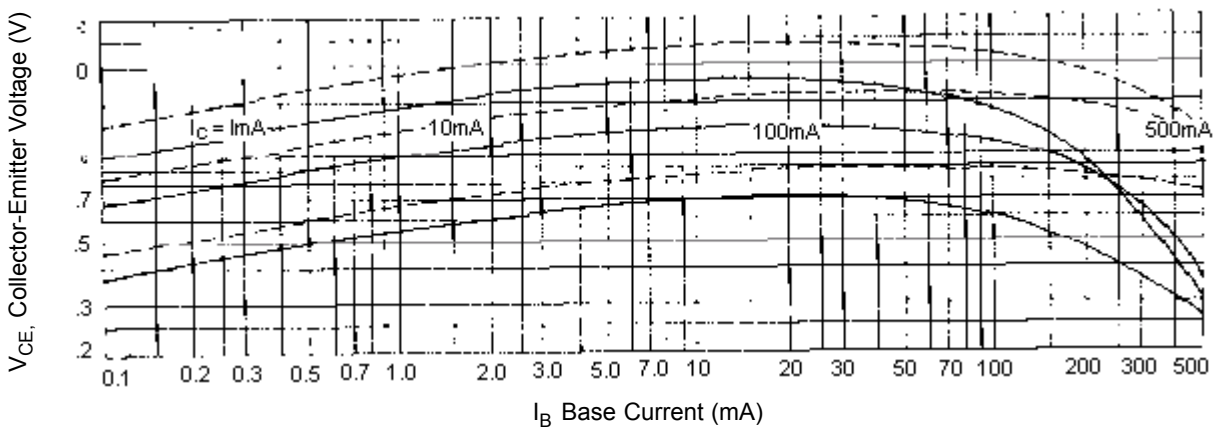
On Voltages



DC Current Gain



Collector Saturation Region

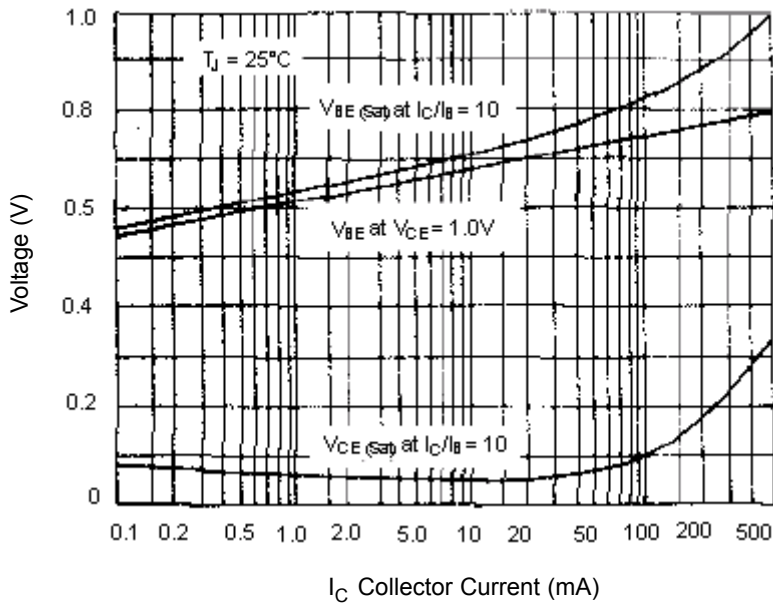


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General Purpose Switching Transistors



On Voltages



Specifications

V_{CE0} maximum (V)	V_{CBO} maximum (V)	I_C (A)	h_{FE} minimum at $I_C = 1\text{mA}$	f_T minimum (MHz)	P_{tot} (mW)	Package and Pin Out	Type	Part Number
40	40	0.6	100	250	625	TO-92	NPN	2N4401
	60			200			PNP	2N4403



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Notes:

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