

# ST 2N4402 / 2N4403

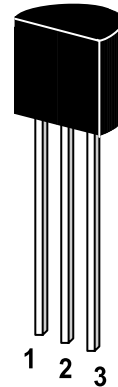
## PNP Epitaxial Silicon Transistor

General purpose transistor

Collector Emitter Voltage:  $V_{CEO} = 40\text{ V}$

Collector Dissipation:  $P_C (\text{max}) = 625\text{ mW}$

On special request, these transistors can be manufactured in different pin configurations.



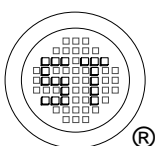
1. Emitter 2. Base 3. Collector

TO-92 Plastic Package

Weight approx. 0.19g

### Absolute Maximum Ratings ( $T_a = 25\text{ }^\circ\text{C}$ )

Parameter	Symbol	Value	Unit
Collector Base Voltage	$-V_{CBO}$	40	V
Collector Emitter Voltage	$-V_{CEO}$	40	V
Emitter Base Voltage	$-V_{EBO}$	5	V
Collector Current	$-I_C$	600	mA
Power Dissipation	$P_{tot}$	625	mW
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature Range	$T_s$	-55 to +150	$^\circ\text{C}$



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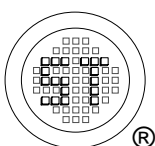


Dated : 02/12/2005

# ST 2N4402 / 2N4403

## Characteristics at $T_{amb}=25\text{ }^{\circ}\text{C}$

Parameter	Symbol	Min.	Max.	Unit
DC Current Gain				
at $-V_{CE}=1\text{V}$ , $-I_C=0.1\text{mA}$	ST 2N4403 $h_{FE}$	30	-	-
at $-V_{CE}=1\text{V}$ , $-I_C=1\text{mA}$	ST 2N4402 $h_{FE}$	30	-	-
	ST 2N4403 $h_{FE}$	60	-	-
at $-V_{CE}=1\text{V}$ , $-I_C=10\text{mA}$	ST 2N4402 $h_{FE}$	50	-	-
	ST 2N4403 $h_{FE}$	100	-	-
at $-V_{CE}=1\text{V}$ , $-I_C=150\text{mA}$	ST 2N4402 $h_{FE}$	50	150	-
	ST 2N4403 $h_{FE}$	100	300	-
at $-V_{CE}=2\text{V}$ , $-I_C=500\text{mA}$	ST 2N4403 $h_{FE}$	20	-	-
	ST 2N4403 $h_{FE}$	20	-	-
Collector Cutoff Current				
at $-V_{CB}=35\text{V}$	$-I_{CBO}$	-	100	nA
Emitter Cutoff Current				
at $-V_{EB}=5\text{V}$	$-I_{EBO}$	-	100	nA
Collector Emitter Breakdown Voltage				
at $-I_C=1\text{mA}$	$-V_{(BR)CEO}$	40	-	V
Collector Base Breakdown Voltage				
at $-I_C=100\mu\text{A}$	$-V_{(BR)CBO}$	40	-	V
Emitter Base Breakdown Voltage				
at $-I_E=100\mu\text{A}$	$-V_{(BR)EBO}$	5	-	V
Collector Saturation Voltage				
at $-I_C=150\text{mA}$ , $-I_B=15\text{mA}$	$-V_{CEsat}$	-	0.4	V
Base Saturation Voltage				
at $-I_C=150\text{mA}$ , $-I_B=15\text{mA}$	$-V_{BEsat}$	0.75	0.95	V
Gain Bandwidth Product				
at $-V_{CE}=10\text{V}$ , $-I_C=20\text{mA}$ , $f=100\text{MHz}$	ST 2N4402 $f_T$	150	-	MHz
	ST 2N4403 $f_T$	200	-	MHz
Collector Base Capacitance				
at $-V_{CB}=10\text{V}$ , $f=140\text{MHz}$	$C_{CBO}$	-	8.5	pF
Turn On Time				
at $-V_{CC}=30\text{V}$ , $-V_{BE}=2\text{V}$ , $-I_C=150\text{mA}$ , $-I_{B1}=15\text{mA}$	$t_{on}$	-	35	ns
Turn Off Time				
at $-V_{CC}=30\text{V}$ , $-I_C=150\text{mA}$ , $-I_{B1}=-I_{B2}=15\text{mA}$	$t_{off}$	-	255	ns



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## TRANSIENT CHARACTERISTICS

— 25°C    - - - 100°C

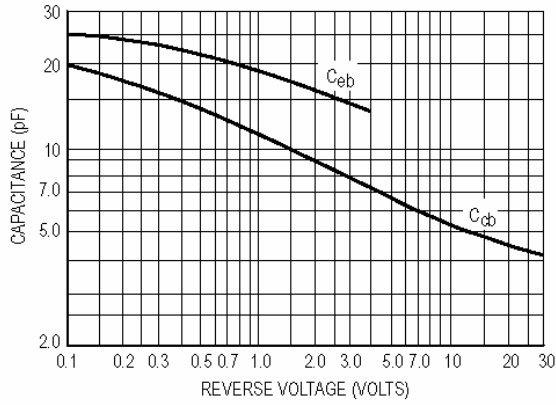


Figure 3. Capacitances

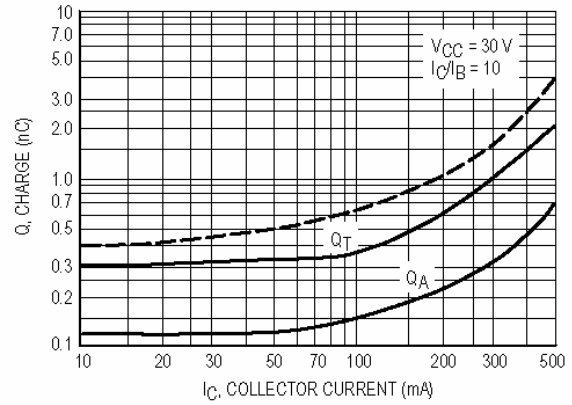


Figure 4. Charge Data

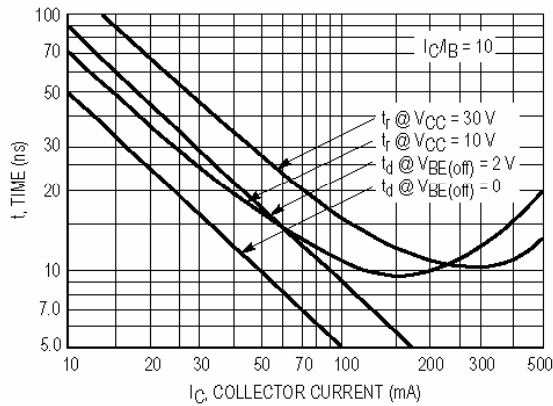


Figure 5. Turn-On Time

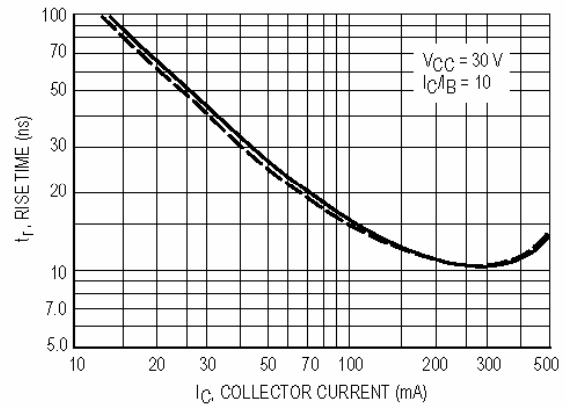


Figure 6. Rise Time

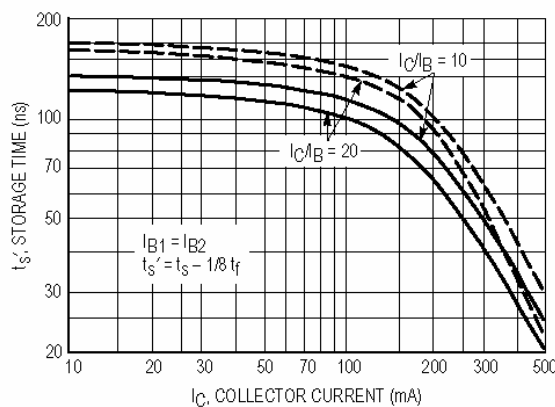
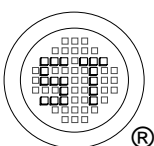


Figure 7. Storage Time



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**SMALL-SIGNAL CHARACTERISTICS**  
**NOISE FIGURE**

$V_{CE} = -10 \text{ Vdc}$ ,  $T_A = 25^\circ\text{C}$   
Bandwidth = 1.0 Hz

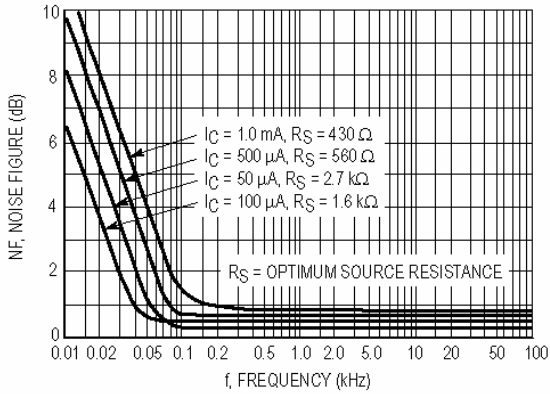


Figure 8. Frequency Effects

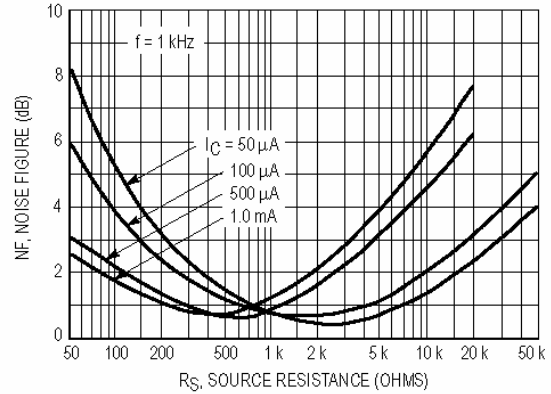


Figure 9. Source Resistance Effects

**h PARAMETERS**

$V_{CE} = -10 \text{ Vdc}$ ,  $f = 1.0 \text{ kHz}$ ,  $T_A = 25^\circ\text{C}$

This group of graphs illustrates the relationship between  $h_{fe}$  and other "h" parameters for this series of transistors. To obtain these curves, a high-gain and a low-gain unit were

selected from both the 2N4402 and 2N4403 lines, and the same units were used to develop the correspondingly-numbered curves on each graph.

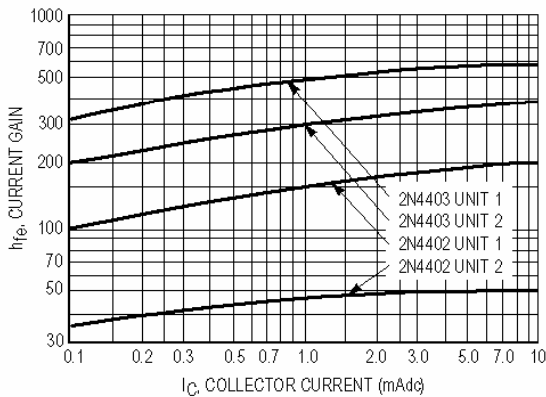


Figure 10. Current Gain

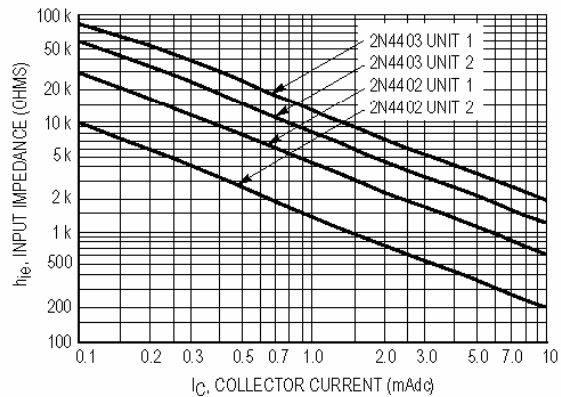


Figure 11. Input Impedance

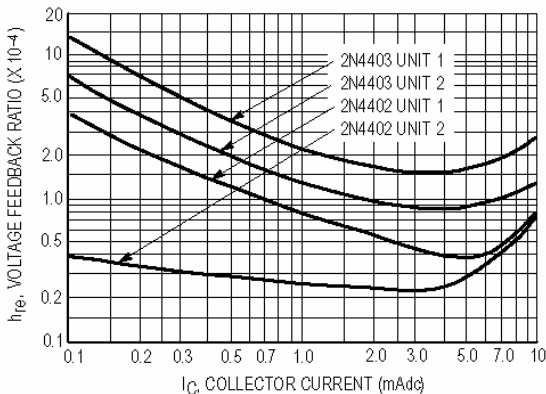


Figure 12. Voltage Feedback Ratio

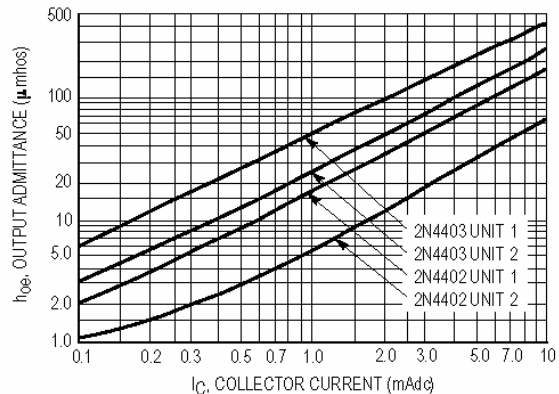
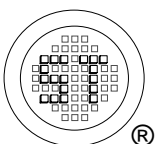


Figure 13. Output Admittance



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## STATIC CHARACTERISTICS

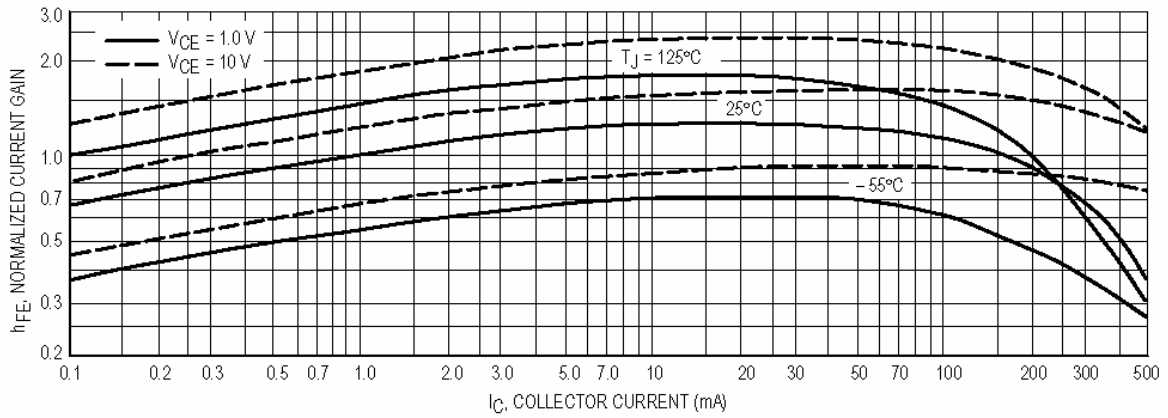


Figure 14. DC Current Gain

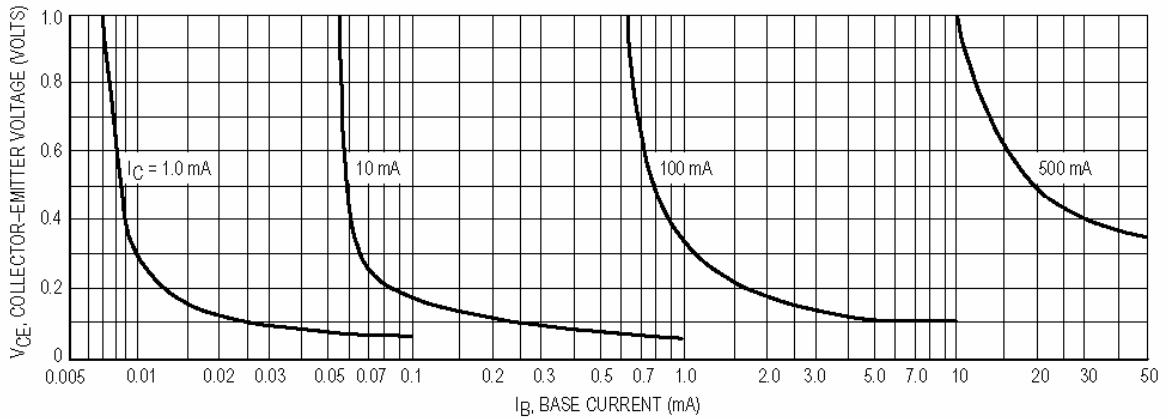


Figure 15. Collector Saturation Region

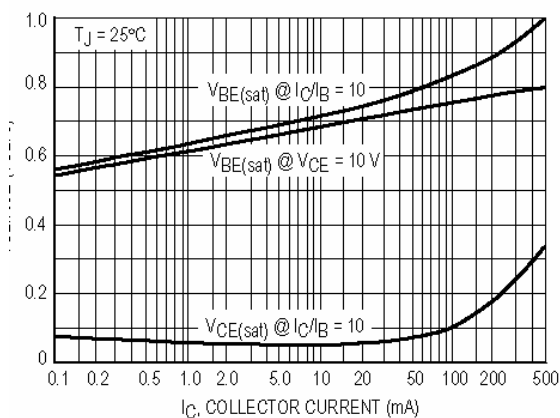


Figure 16. "On" Voltages

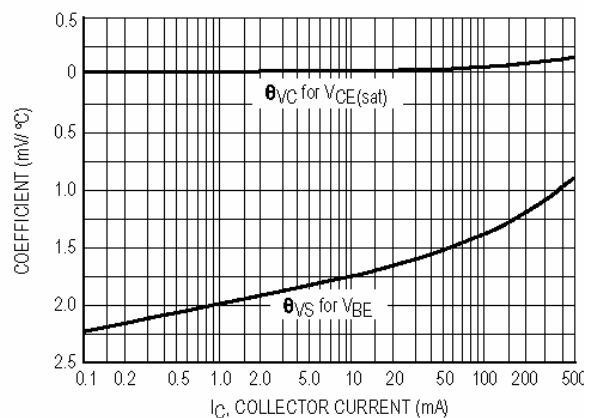
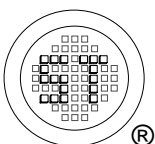


Figure 17. Temperature Coefficients



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