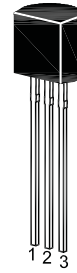


# ST 2N4402 / 2N4403

## PNP Epitaxial Silicon Transistor

General purpose transistor

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

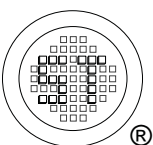


1. Emitter 2. Base 3. Collector  
TO-92 Plastic Package

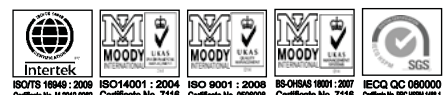
### Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

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

SEMTECH



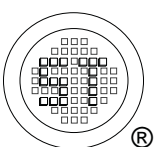
**SEMTECH ELECTRONICS LTD.**  
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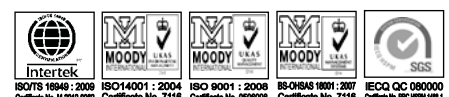
# ST 2N4402 / 2N4403

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

Parameter	Symbol	Min.	Max.	Unit
DC Current Gain				
at $-V_{CE} = 1\text{ V}$ , $-I_C = 0.1\text{ mA}$	2N4403 $h_{FE}$	30	-	-
at $-V_{CE} = 1\text{ V}$ , $-I_C = 1\text{ mA}$	2N4402 $h_{FE}$	30	-	-
	2N4403 $h_{FE}$	60	-	-
at $-V_{CE} = 1\text{ V}$ , $-I_C = 10\text{ mA}$	2N4402 $h_{FE}$	50	-	-
	2N4403 $h_{FE}$	100	-	-
at $-V_{CE} = 1\text{ V}$ , $-I_C = 150\text{ mA}$	2N4402 $h_{FE}$	50	150	-
	2N4403 $h_{FE}$	100	300	-
at $-V_{CE} = 2\text{ V}$ , $-I_C = 500\text{ mA}$	$h_{FE}$	20	-	-
Collector Base Cutoff Current at $-V_{CB} = 35\text{ V}$	$-I_{CBO}$	-	100	nA
Emitter Base Cutoff Current at $-V_{EB} = 5\text{ V}$	$-I_{EBO}$	-	100	nA
Collector Base Breakdown Voltage at $-I_C = 100\text{ }\mu\text{A}$	$-V_{(BR)CBO}$	40	-	V
Collector Emitter Breakdown Voltage at $-I_C = 1\text{ mA}$	$-V_{(BR)CEO}$	40	-	V
Emitter Base Breakdown Voltage at $-I_E = 100\text{ }\mu\text{A}$	$-V_{(BR)EBO}$	5	-	V
Collector Emitter Saturation Voltage at $-I_C = 150\text{ mA}$ , $-I_B = 15\text{ mA}$ at $-I_C = 500\text{ mA}$ , $-I_B = 50\text{ mA}$	$-V_{CE(sat)}$	-	0.4 0.75	V
Base Emitter Saturation Voltage at $-I_C = 150\text{ mA}$ , $-I_B = 15\text{ mA}$ at $-I_C = 500\text{ mA}$ , $-I_B = 50\text{ mA}$	$-V_{BE(sat)}$	0.75 -	0.95 1.3	V
Gain Bandwidth Product at $-V_{CE} = 10\text{ V}$ , $-I_C = 20\text{ mA}$ , $f = 100\text{ MHz}$	2N4402 $f_T$	150	-	MHz
	2N4403 $f_T$	200	-	
Collector Output Capacitance at $-V_{CB} = 10\text{ V}$ , $f = 140\text{ MHz}$	$C_{ob}$	-	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

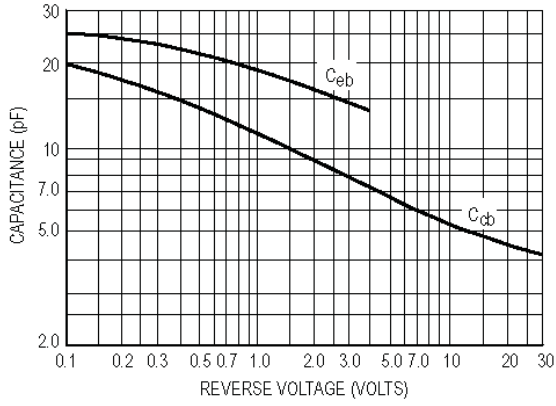


Figure 1. Capacitances

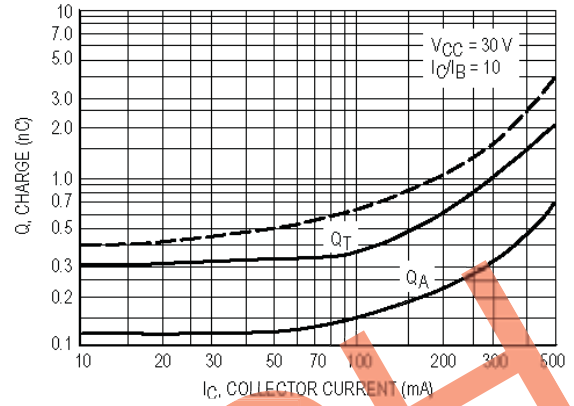


Figure 2. Charge Data

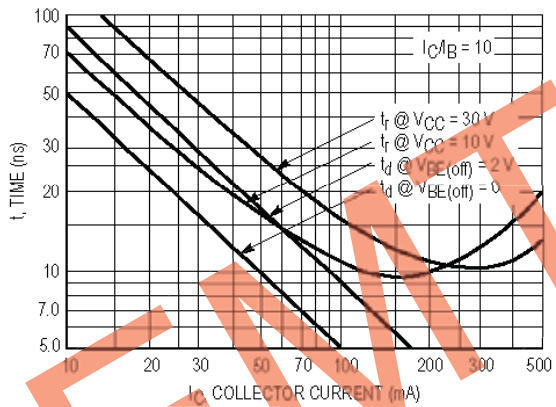


Figure 3. Turn-On Time

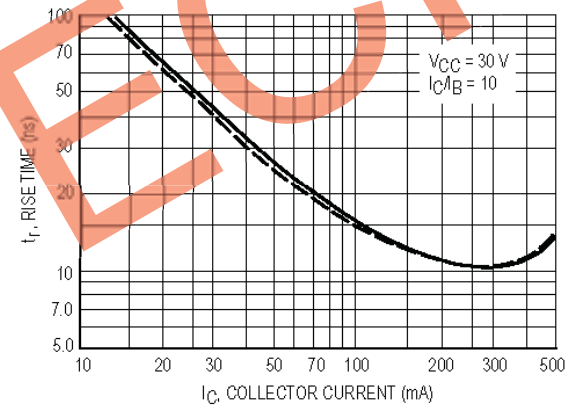


Figure 4. Rise Time

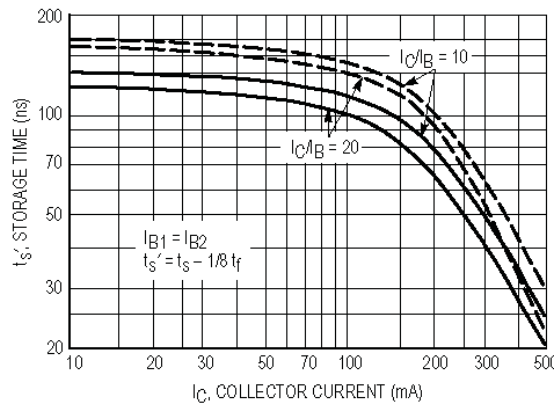
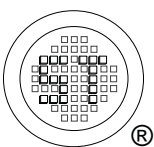
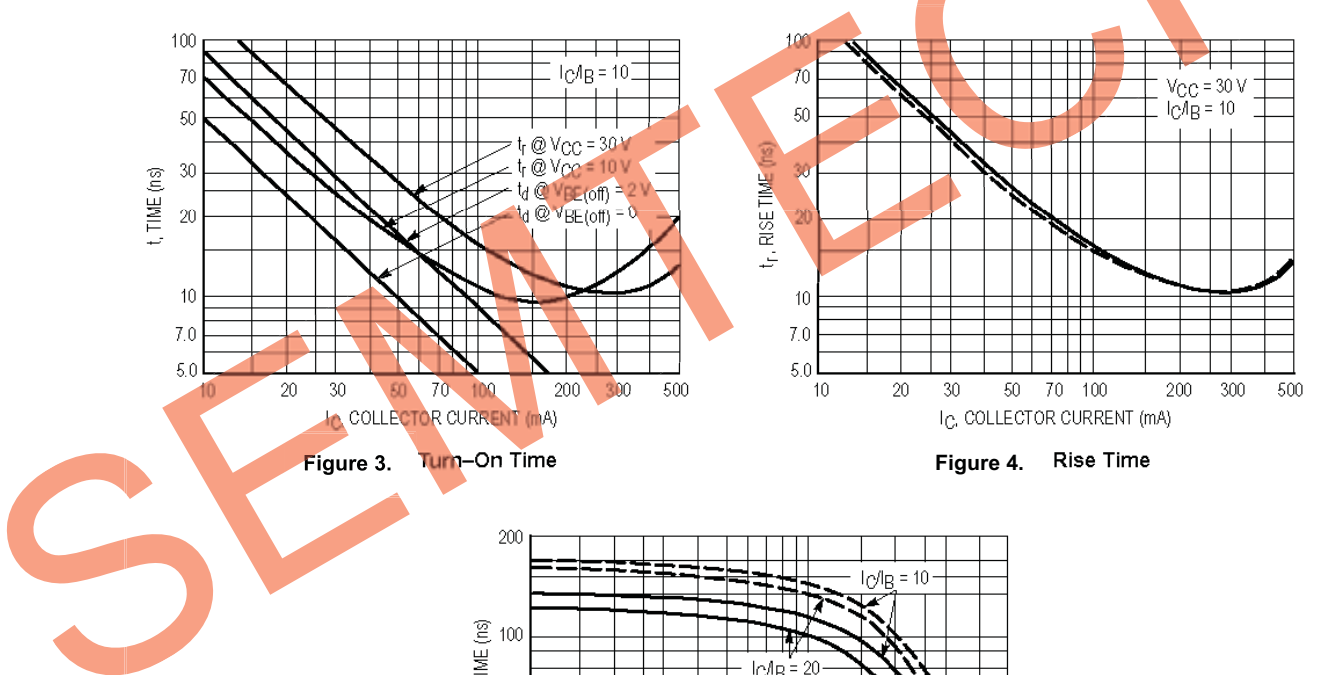


Figure 5. Storage Time



SMALL-SIGNAL CHARACTERISTICS

NOISE FIGURE

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

Bandwidth = 1.0 Hz

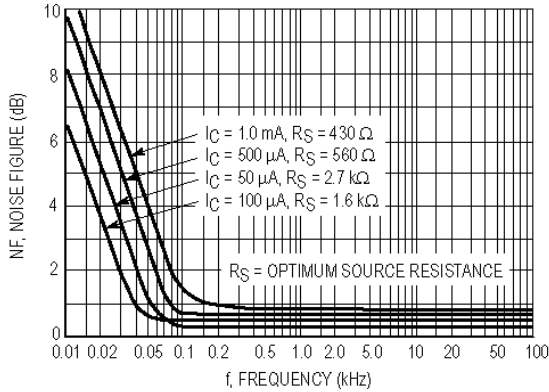


Figure 6. Frequency Effects

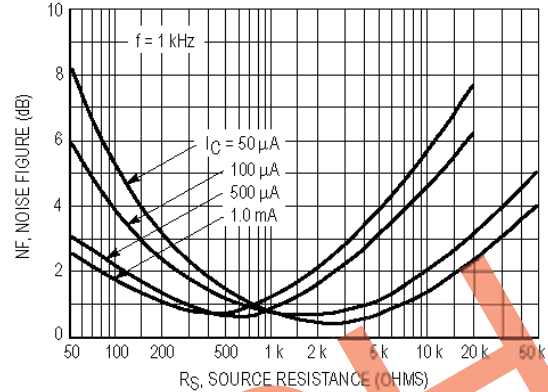


Figure 7. Source Resistance Effects

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.

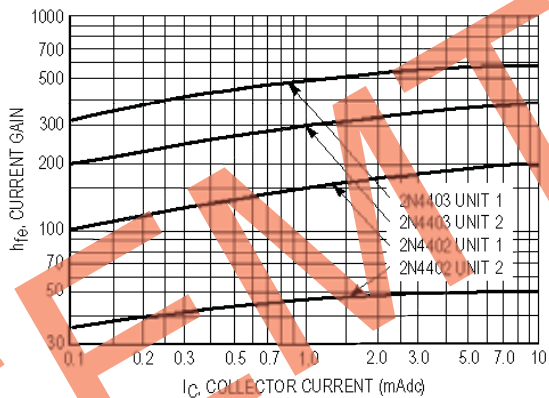


Figure 8. Current Gain

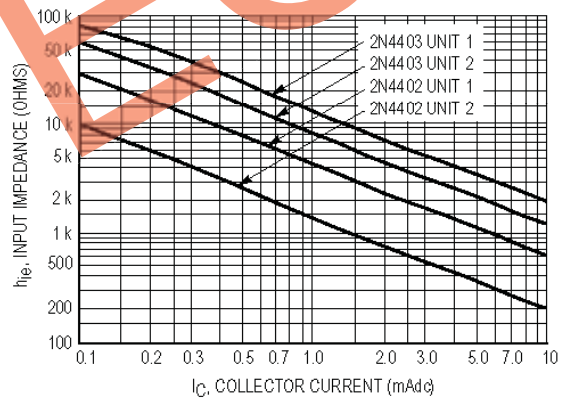


Figure 9. Input Impedance

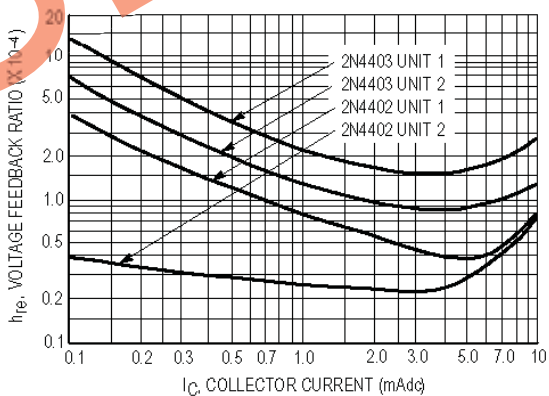


Figure 10. Voltage Feedback Ratio

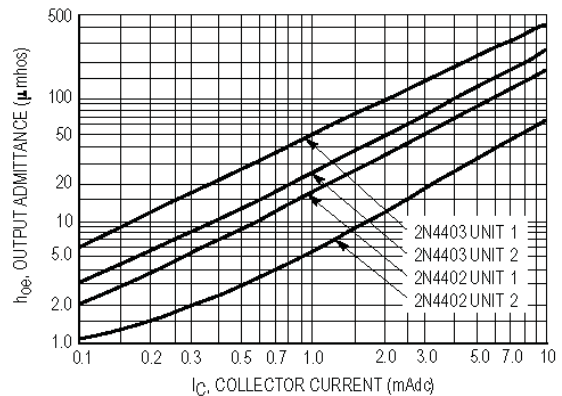
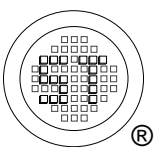


Figure 11. Output Admittance



STATIC CHARACTERISTICS

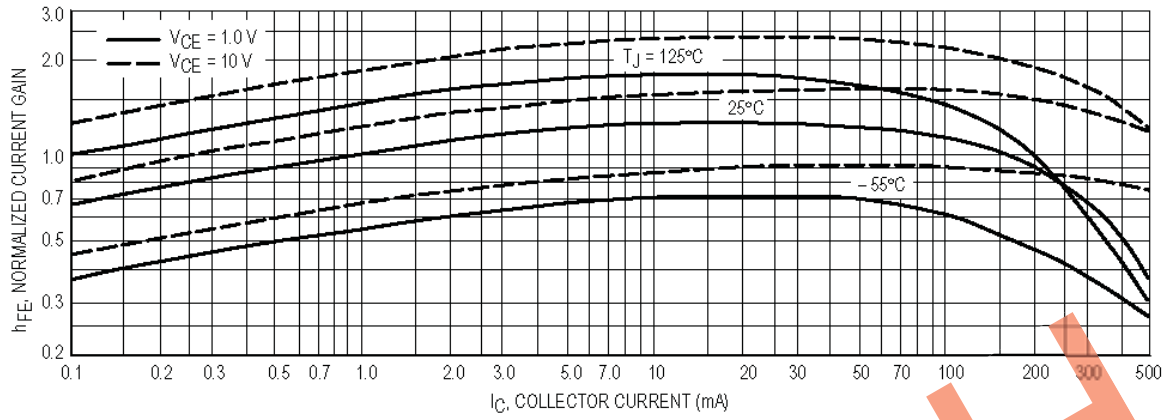


Figure 12. DC Current Gain

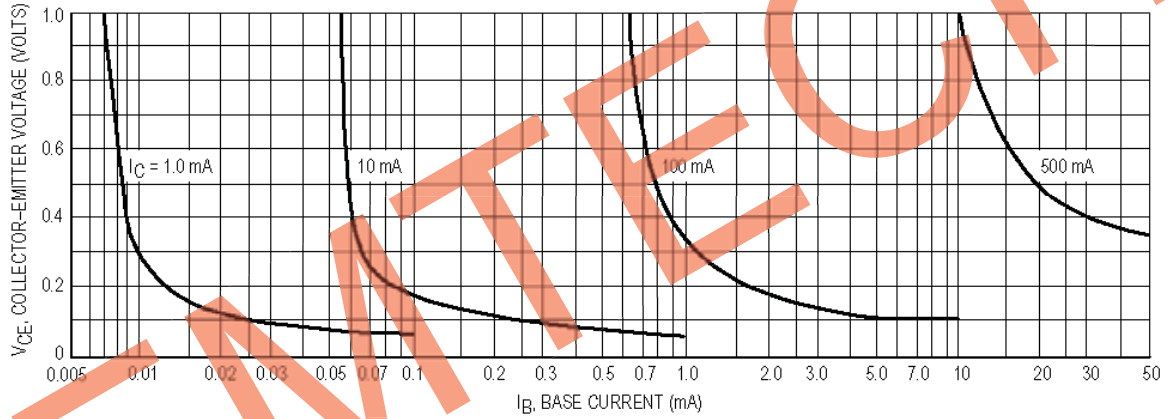


Figure 13. Collector Saturation Region

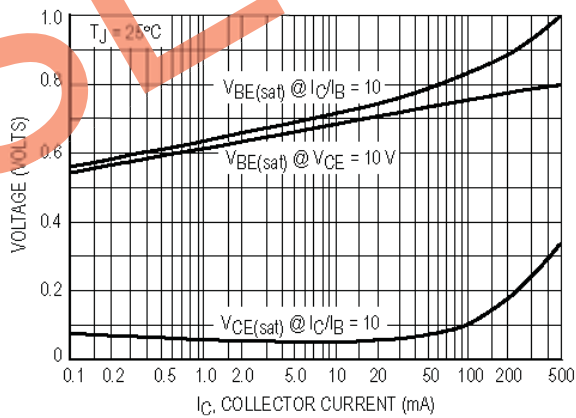


Figure 14. "On" Voltages

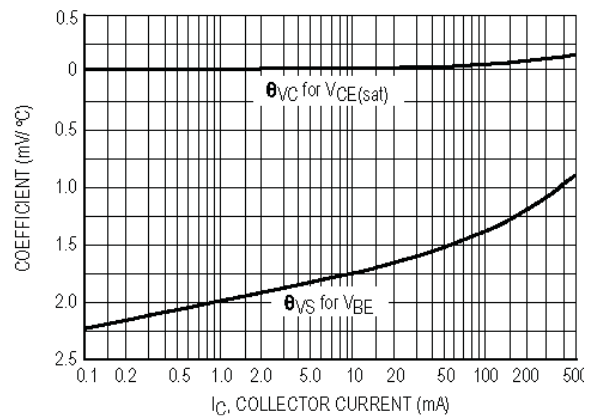


Figure 15. Temperature Coefficients

