



# 2N4401

## NPN GENERAL PURPOSE SWITCHING TRANSISTOR

**VOLTAGE** 40 Volts    **POWER** 625 mWatts

### FEATURES

- NPN epitaxial silicon, planar design
- Collector-emitter voltage  $V_{CE} = 40V$
- Collector current  $I_C = 600mA$
- Complimentary (PNP) device: 2N4403
- Pb free product are available :99% Sn above can meet RoHS environment substance directive request

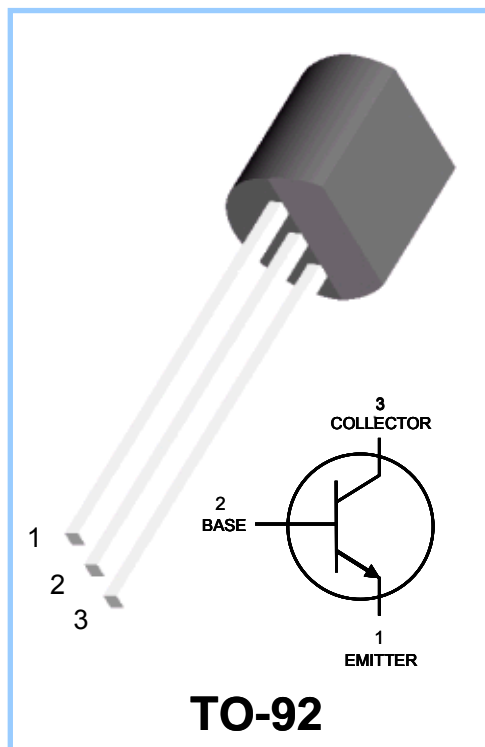
### MECHANICAL DATA

Case: TO-92

Terminals: Solderable per MIL-STD-202, Method 208

Approx Weight : 0.02grams

Marking : 4401



### ABSOLUTE MAXIMUM RATINGS

PARAMETER	Symbol	Value	Units
Collector - Emitter Voltage	$V_{CEO}$	40	V
Collector - Base Voltage	$V_{CBO}$	60	V
Emitter - Base Voltage	$V_{EBO}$	6.0	V
Collector Current - Continuous	$I_C$	600	mA

### THERMAL CHARACTERISTICS

PARAMETER	Symbol	Value	Units
Max Power Dissipation	$P_{TOT}$	625	mW
Storage Temperature	$T_{STG}$	-55 to 150	°C
Junction Temperature	$T_J$	-55 to 150	°C
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	°C/W

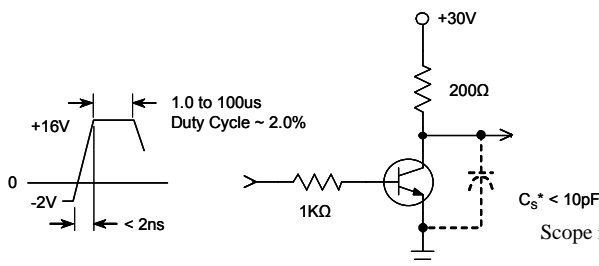


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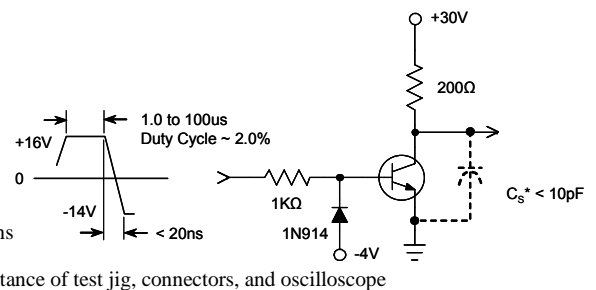
## ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise noted)

PARAMETER	Symbol	Test Condition	MIN.	TYP.	MAX.	Units
Collector - Emitter Breakdown Voltage	V <sub>(BR)CEO</sub>	I <sub>C</sub> =1.0mA, I <sub>E</sub> =0	40	-	-	V
Collector - Base Breakdown Voltage	V <sub>(BR)CBO</sub>	I <sub>C</sub> =100uA, I <sub>E</sub> =0	60	-	-	V
Emitter - Base Breakdown Voltage	V <sub>(BR)EBO</sub>	I <sub>E</sub> =100uA, I <sub>C</sub> =0	6.0	-	-	V
Base Cutoff Current	I <sub>BEV</sub>	V <sub>CE</sub> =35V, V <sub>EB</sub> =0.4V	-	-	100	nA
Collector Cutoff Current	I <sub>CEX</sub>	V <sub>CE</sub> =35V, V <sub>EB</sub> =0.4V	-	-	100	nA
DC Current Gain	h <sub>FE</sub>	I <sub>C</sub> =0.1mA, V <sub>CE</sub> =1.0V	20	-	-	-
		I <sub>C</sub> =1.0mA, V <sub>CE</sub> =1.0V	40	-	-	
		I <sub>C</sub> =10mA, V <sub>CE</sub> =1.0V	80	-	-	
		I <sub>C</sub> =150mA, V <sub>CE</sub> =1.0V	100	-	300	
		I <sub>C</sub> =500mA, V <sub>CE</sub> =2.0V	40	-	-	
Collector - Emitter Saturation Voltage	V <sub>CE(SAT)</sub>	I <sub>C</sub> =150mA, I <sub>B</sub> =15mA I <sub>C</sub> =500mA, I <sub>B</sub> =50mA	-	-	0.4 0.75	V
Base - Emitter Saturation Voltage	V <sub>BE(SAT)</sub>	I <sub>C</sub> =150mA, I <sub>B</sub> =15mA I <sub>C</sub> =500mA, I <sub>B</sub> =50mA	0.75 -	- -	0.95 1.2	V
Current-Gain - Bandwidth Product	f <sub>T</sub>	I <sub>C</sub> =200mA, V <sub>CE</sub> =10V f=100MHz	250	-	-	MHz
Collector-Base Capacitance	C <sub>CBO</sub>	V <sub>CB</sub> =5.0V, I <sub>E</sub> =0, f=1MHz	-	-	6.5	pF
Emitter - Base Capacitance	C <sub>EBO</sub>	V <sub>CB</sub> =5.0V, I <sub>E</sub> =0, f=1MHz	-	-	30	pF
Delay Time	t <sub>d</sub>	V <sub>CC</sub> =30V, V <sub>BE</sub> =2.0V, I <sub>C</sub> =150mA, I <sub>B1</sub> =15mA	-	-	15	ns
Rise Time	t <sub>r</sub>		-	-	20	ns
Storage Time	t <sub>s</sub>		-	-	225	ns
Fall Time	t <sub>f</sub>		-	-	30	ns

### SWITCHING TIME EQUIVALENT TEST CIRCUITS



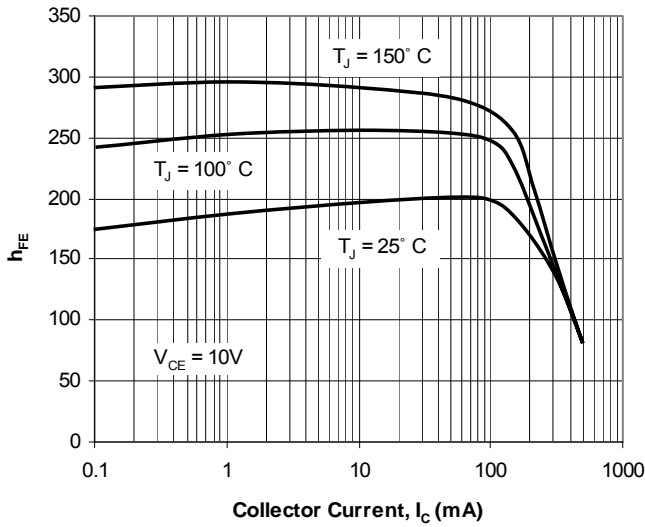
**Fig. 1. Turn-On Time**



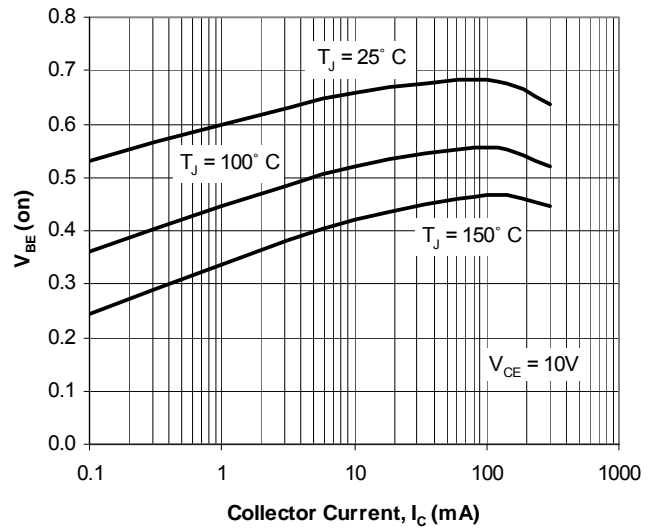
**Fig. 2. Turn-Off Time**



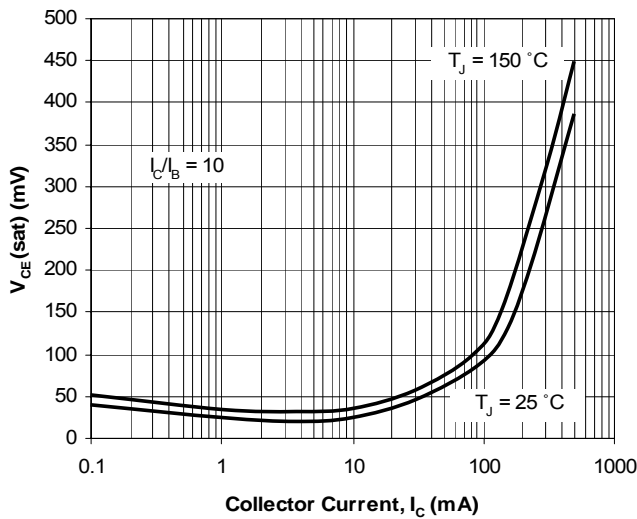
**ELECTRICAL CHARACTERISTICS CURVE**



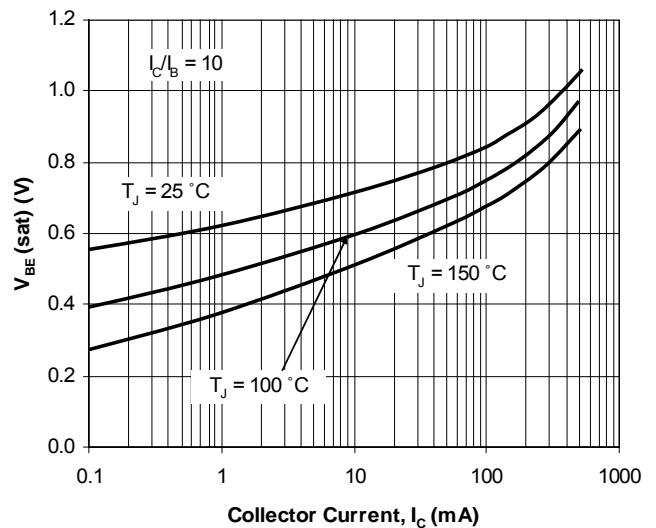
**Fig. 3. Typical  $h_{FE}$  vs Collector Current**



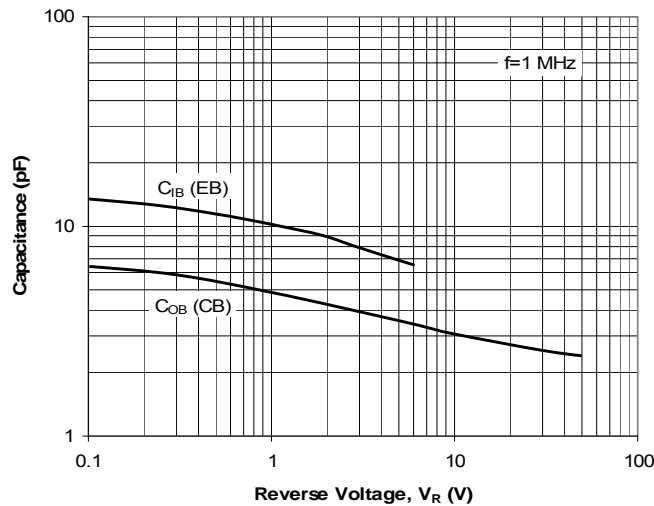
**Fig. 4. Typical  $V_{BE}$  vs Collector Current**



**Fig. 5. Typical  $V_{CE}(\text{sat})$  vs Collector Current**



**Fig. 6. Typical  $V_{BE}(\text{sat})$  vs Collector Current**



**Fig. 7. Typical Capacitances vs Reverse Voltage**

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TO-92 Case Outline

