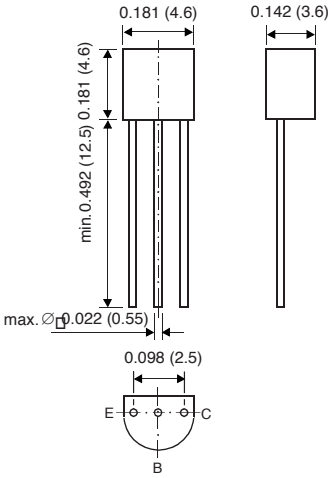
2N4403

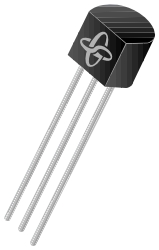
SMALL SIGNAL TRANSISTORS (PNP)

TO-92



Dimensions in inches and (millimeters)

FEATURES



- PNP Silicon Epitaxial Planar Transistor for switching and amplifier applications.
- As complementary type, the NPN transistor 2N4401 is recommended.
- On special request, this transistor is also manufactured in the pin configuration TO-18.
- This transistor is also available in the SOT-23 case with the type designation MMBT4403.

MECHANICAL DATA

Case: TO-92 Plastic Package
Weight: approx. 0.18g

MAXIMUM RATINGS AND THERMAL CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified

	SYMBOL	VALUE	UNIT
Collector-Base Voltage	$-V_{CBO}$	40	Volts
Collector-Emitter Voltage	$-V_{CEO}$	40	Volts
Emitter-Base Voltage	$-V_{EBO}$	5.0	Volts
Collector Current - Continuous	$-I_C$	600	mA
Power Dissipation at T_A = 25°C Derate above 25°C	P_{tot}	625 5.0	mW mW/°C
Power Dissipation at T_C = 25°C Derate above 25°C	P_{tot}	1.5 12	W mW/°C
Thermal Resistance Junction to Ambient Air	$R_{\Theta JA}$	200	°C/W
Thermal Resistance Junction to Case	$R_{\Theta JC}$	83.3	°C/W
Junction Temperature	T_j	150	°C
Storage Temperature Range	T_S	– 55 to +150	°C

2N4403

ELECTRICAL CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified

	SYMBOL	MIN.	.MAX.	UNIT
Collector-Base Breakdown Voltage at $-I_C$ = 0.1 mA, I_E = 0	$-V_{(BR)CBO}$	40	–	Volts
Collector-Emitter Breakdown Voltage(1) at $-I_C$ = 1 mA, I_B = 0	$-V_{(BR)CEO}$	40	–	Volts
Emitter-Base Breakdown Voltage at $-I_E$ = 0.1 mA, I_C = 0	$-V_{(BR)EBO}$	5.0	–	Volts
Collector-Emitter Saturation Voltage(1) at $-I_C$ = 150 mA, $-I_B$ = 15 mA at $-I_C$ = 500 mA, $-I_B$ = 50 mA	 $-V_{CEsat}$ $-V_{CEsat}$	 – –	 0.40 0.75	 Volts Volts
Base-Emitter Saturation Voltage(1) at $-I_C$ = 150 mA, $-I_B$ = 15 mA at $-I_C$ = 500 mA, $-I_B$ = 50 mA	 $-V_{BEsat}$ $-V_{BEsat}$	 0.75 –	 0.95 1.30	 Volts Volts
Collector Cutoff Current at $-V_{EB}$ = 0.4 V, $-V_{CE}$ = 35 V	$-I_{CEX}$	–	100	nA
Base Cutoff Current at $-V_{EB}$ = 0.4 V, $-V_{CE}$ = 35 V	$-I_{BEV}$	–	100	nA
DC Current Gain at $-V_{CE}$ = 1 V, $-I_C$ = 0.1 mA at $-V_{CE}$ = 1 V, $-I_C$ = 1 mA at $-V_{CE}$ = 1 V, $-I_C$ = 10 mA at $-V_{CE}$ = 2 V, $-I_C$ = 150 mA(1) at $-V_{CE}$ = 2 V, $-I_C$ = 500 mA(1)	 h_{FE} h_{FE} h_{FE} h_{FE} h_{FE}	 30 60 100 100 20	 – – – 300 –	 – – – – –
Input Impedance at $-V_{CE}$ = 10 V, $-I_C$ = 1 mA, f = 1 kHz	h_{ie}	1.5	15	kΩ
Voltage Feedback Ratio at $-V_{CE}$ = 10 V, $-I_C$ = 1 mA, f = 1 kHz	h_{re}	$0.1 \cdot 10^{-4}$	$8 \cdot 10^{-4}$	–
Current Gain-Bandwidth Product at $-V_{CE}$ = 10 V, $-I_C$ = 20 mA, f = 100 MHz	f_T	200	–	MHz
Collector-Base Capacitance at $-V_{CB}$ = 10 V, I_E=0, f = 1.0 MHz	C_{CB}	–	8.5	pF
Emitter-Base Capacitance at $-V_{EB}$ = 0.5 V, I_C=0, f = 1.0 MHz	C_{EB}	–	30	pF

NOTES
(1) Pulse test: Pulse width ≤ 300μs - Duty cycle ≤ 2%

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ELECTRICAL CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified

	SYMBOL	MIN.	MAX.	UNIT
Small Signal Current Gain at $-V_{CE}$ = 10 V, $-I_C$ = 1 mA, f = 1 kHz	h_{fe}	60	500	–
Output Admittance at $-V_{CE}$ = 10 V, $-I_C$ = 1 mA, f = 1 kHz	h_{oe}	1.0	100	μS
Delay Time (see Fig. 1) at $-I_{B1}$ = 15 mA, $-I_C$ = 150 mA, $-V_{CC}$ = 30V, $-V_{EB}$ = 2V	t_d	–	15	ns
Rise Time (see Fig. 1) at $-I_{B1}$ = 15 mA, $-I_C$ = 150 mA, $-V_{CC}$ = 30V, $-V_{EB}$ = 2V	t_r	–	20	ns
Storage Time (see Fig. 2) at $I_{B1} = -I_{B2}$ = 15 mA, $-I_C$ = 150 mA, $-V_{CC}$ = 30V	t_s	–	225	ns
Fall Time (see Fig. 2) at $I_{B1} = -I_{B2}$ = 15 mA, $-I_C$ = 150 mA, $-V_{CC}$ = 30V,	t_f	–	30	ns

SWITCHING TIME EQUIVALENT TEST CIRCUIT

FIGURE 1 - TURN-ON TIME

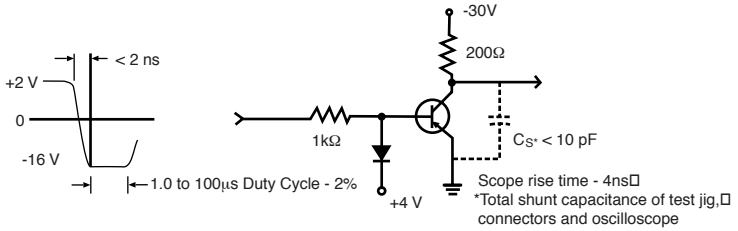

FIGURE 2 - TURN-OFF TIME