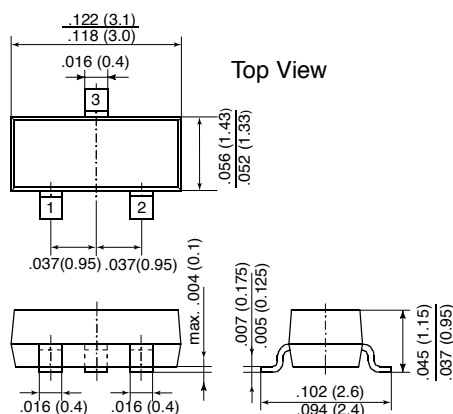


MMBT4403

SMALL SIGNAL TRANSISTORS (PNP)

SOT-23



Dimensions in inches and (millimeters)

Pin configuration

1 = Base, 2 = Emitter, 3 = Collector.

FEATURES

- ◆ PNP Silicon Epitaxial Planar Transistor for switching and amplifier applications.
- ◆ As complementary type, the NPN transistor MMBT4401 is recommended.
- ◆ This transistor is also available in the TO-92 case with the type designation 2N4403.



MECHANICAL DATA

Case: SOT-23 Plastic Package

Weight: approx. 0.008g

Marking code: 2T

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	$-I_C$	600	mA
Power Dissipation FR-5 Board,* $T_A=25^\circ\text{C}$ Derate above 25°C	P_{tot}	225 1.8	mW mW/°C
Power Dissipation Alumina Substrate,** $T_A=25^\circ\text{C}$ Derate above 25°C	P_{tot}	300 2.4	mW mW/°C
Thermal Resistance, Junction to Ambient FR-5 Board Alumina Substrate	$R_{\theta JA}$	556 417	°C/W
Junction Temperature	T_j	150	°C
Storage Temperature Range	T_s	-55 to +150	°C

*FR-5 = 1.0 x 0.75 x 0.062 in.

**Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

MMBT4403

ELECTRICAL CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified

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

NOTES:

(1) Pulse test: pulse width $\leq 300\mu$ duty cycle $\leq 2\%$

MMBT4403

ELECTRICAL CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified

	SYMBOL	MIN.	MAX.	UNIT
Voltage Feedback Ratio at $-V_{CE} = 10\text{ V}$, $-I_C = 1\text{ mA}$, $f = 1\text{ kHz}$	h_{re}	$0.1 \cdot 10^{-4}$	$8 \cdot 10^{-4}$	—
Small Signal Current Gain at $-V_{CE} = 10\text{ V}$, $-I_C = 1\text{ mA}$, $f = 1\text{ kHz}$	h_{fe}	60	500	—
Output Admittance at $-V_{CE} = 1\text{ V}$, $-I_C = 1\text{ mA}$, $f = 1\text{ kHz}$	h_{oe}	1.0	100	μS
Delay Time at $-I_{B1} = 15\text{ mA}$, $-I_C = 150\text{ mA}$, $-V_{CC} = 30\text{ V}$, $-V_{EB} = 2\text{ V}$	t_d	—	15	ns
Rise Time at $-I_{B1} = 15\text{ mA}$, $-I_C = 150\text{ mA}$, $-V_{CC} = 30\text{ V}$, $-V_{EB} = 2\text{ V}$	t_r	—	20	ns
Storage Time at $I_{B1} = -I_{B2} = 15\text{ mA}$, $-I_C = 150\text{ mA}$, $-V_{CC} = 30\text{ V}$	t_s	—	225	ns
Fall Time at $I_{B1} = -I_{B2} = 15\text{ mA}$, $-I_C = 150\text{ mA}$, $-V_{CC} = 30\text{ V}$	t_f	—	30	ns

SWITCHING TIME EQUIVALENT TEST CIRCUIT

FIGURE 1 - TURN-ON TIME

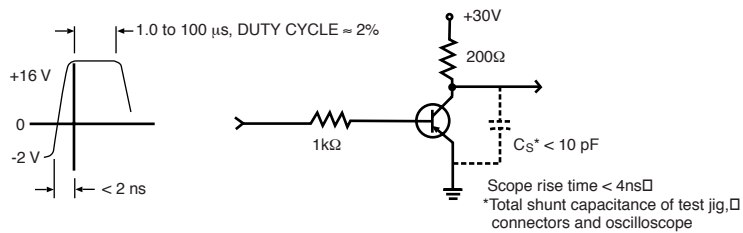


FIGURE 2 - TURN-OFF TIME

