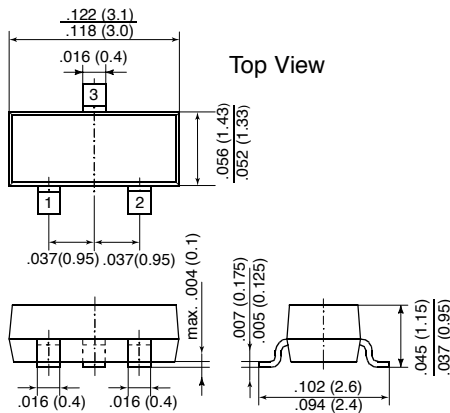


# MMBT4403

## 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	$R_{\theta JA}$	FR-5 Board	556
		Alumina Substrate	417
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.

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## 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 <sup>(1)</sup> 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 <sup>(1)</sup> at $-I_C = 150 \text{ mA}$ , $-I_B = 15 \text{ mA}$ at $-I_C = 500 \text{ mA}$ , $-I_B = 50 \text{ mA}$	$-V_{CEsat}$ $-V_{CEsat}$	– –	0.40 0.75	Volts Volts
Base-Emitter Saturation Voltage <sup>(1)</sup> at $-I_C = 150 \text{ mA}$ , $-I_B = 15 \text{ mA}$ at $-I_C = 500 \text{ mA}$ , $-I_B = 50 \text{ mA}$	$-V_{BEsat}$ $-V_{BEsat}$	0.75 –	0.95 1.30	Volts 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 $-V_{CE} = 1 \text{ V}$ , $-I_C = 0.1 \text{ mA}$ at $-V_{CE} = 1 \text{ V}$ , $-I_C = 1 \text{ mA}$ at $-V_{CE} = 1 \text{ V}$ , $-I_C = 10 \text{ mA}$ at $-V_{CE} = 2 \text{ V}$ , $-I_C = 150 \text{ mA}$ at $-V_{CE} = 2 \text{ V}$ , $-I_C = 500 \text{ mA}$	$h_{FE}$ $h_{FE}$ $h_{FE}$ $h_{FE}$ $h_{FE}$	30 60 100 100 20	– – – 300 –	– – – – –
Input Impedance at $-V_{CE} = 10 \text{ V}$ , $-I_C = 1 \text{ mA}$ , $f = 1 \text{ kHz}$	$h_{ie}$	1.5	15	k $\Omega$
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	$\mu\text{S}$
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

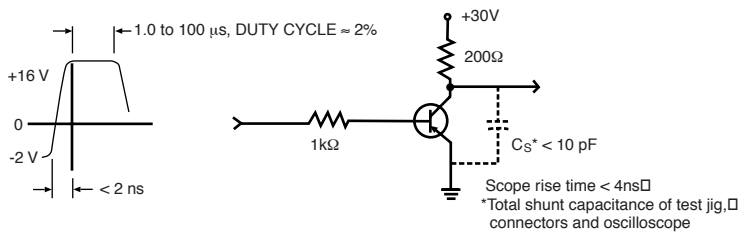


FIGURE 2 - TURN-OFF TIME

