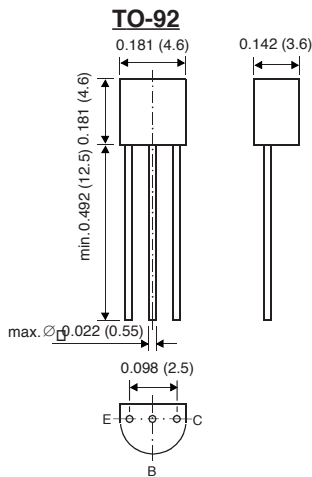


# MPS2222A

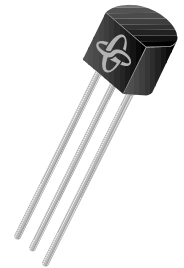
## SMALL SIGNAL TRANSISTORS (NPN)



Dimensions in inches and (millimeters)

### FEATURES

- ◆ NPN Silicon Epitaxial Planar Transistor for switching and amplifier applications.
- ◆ 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 MMBT2222A



### 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	$V_{CB0}$	75	Volts
Collector-Emitter Voltage	$V_{CE0}$	40	Volts
Emitter-Base Voltage	$V_{EB0}$	6.0	Volts
Collector Current-Continuous	$I_C$	600	mA
Power Dissipation at $T_A=25^\circ\text{C}$ Derate above 25°C	$P_{tot}$	625 5.0	mW mW/°C
Power Dissipation at $T_C=25^\circ\text{C}$ 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

# MPS2222A

## ELECTRICAL CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified

	SYMBOL	MIN.	MAX.	UNIT
Collector-Base Breakdown Voltage at $I_C = 10 \mu\text{A}$ , $I_E = 0$	$V_{(BR)CBO}$	75	–	Volts
Collector-Emitter Breakdown Voltage <sup>(1)</sup> at $I_C = 10 \text{ mA}$ , $I_B = 0$	$V_{(BR)CEO}$	40	–	Volts
Emitter-Base Breakdown Voltage at $I_E = 10 \mu\text{A}$ , $I_C = 0$	$V_{(BR)EBO}$	6.0	–	Volts
Collector-Emitter Saturation Voltage <sup>(1)</sup> at $I_C = 150 \text{ mA}$ , $I_B = 15 \text{ mA}$ at $I_C = 500 \text{ mA}$ , $I_B = 50 \text{ mA}$	$V_{CEsat}$ $V_{CEsat}$	0.6 –	0.3 1.0	Volts Volts
Base-Emitter Saturation Voltage <sup>(1)</sup> at $I_C = 150 \text{ mA}$ , $I_B = 15 \text{ mA}$ at $I_C = 500 \text{ mA}$ , $I_B = 50 \text{ mA}$	$V_{BEsat}$ $V_{BEsat}$	– –	1.2 2.0	Volts Volts
Collector Cutoff Current at $V_{EB} = 3 \text{ V}$ , $V_{CE} = 60 \text{ V}$	$I_{CEX}$	–	10	nA
Collector Cutoff Current at $V_{CB} = 60 \text{ V}$ , $I_E = 0$ at $V_{CB} = 50 \text{ V}$ , $I_E = 0$ , $T_A = 125^\circ\text{C}$	$I_{CBO}$	–	0.01 10	$\mu\text{A}$
Emitter Cutoff Current at $V_{EB} = 3 \text{ V}$ , $I_C = 0$	$I_{EBO}$	–	100	nA
Base Cutoff Current at $V_{CE} = 60 \text{ V}$ , $V_{EB} = 3.0 \text{ V}$	$I_{BL}$	–	20	nA
DC Current Gain at $V_{CE} = 10 \text{ V}$ , $I_C = 0.1 \text{ mA}$ at $V_{CE} = 10 \text{ V}$ , $I_C = 1 \text{ mA}$ at $V_{CE} = 10 \text{ V}$ , $I_C = 10 \text{ mA}$ at $V_{CE} = 10 \text{ V}$ , $I_C = 10 \text{ mA}$ , $T_A = -55^\circ\text{C}$ at $V_{CE} = 10 \text{ V}$ , $I_C = 150 \text{ mA}^{(1)}$ at $V_{CE} = 1.0 \text{ V}$ , $I_C = 150 \text{ mA}^{(1)}$ at $V_{CE} = 10 \text{ V}$ , $I_C = 500 \text{ mA}^{(1)}$	$h_{FE}$ $h_{FE}$ $h_{FE}$ $h_{FE}$ $h_{FE}$ $h_{FE}$ $h_{FE}$	35 50 75 35 100 50 40	– – – – 300 – –	– – – – – – –
Input Impedance at $V_{CE} = 10 \text{ V}$ , $I_C = 1 \text{ mA}$ , $f = 1 \text{ kHz}$ at $V_{CE} = 10 \text{ V}$ , $I_C = 10 \text{ mA}$ , $f = 1 \text{ kHz}$	$h_{ie}$	2.0 0.25	8.0 1.25	$k\Omega$
Voltage Feedback Ratio at $V_{CE} = 10 \text{ V}$ , $I_C = 1 \text{ mA}$ , $f = 1 \text{ kHz}$ at $V_{CE} = 10 \text{ V}$ , $I_C = 10 \text{ mA}$ , $f = 1 \text{ kHz}$	$h_{re}$	–	$8 \cdot 10^{-4}$ $4 \cdot 10^{-4}$	–
Current Gain-Bandwidth Product at $V_{CE} = 20 \text{ V}$ , $I_C = 20 \text{ mA}$ , $f = 100 \text{ MHz}$	$f_T$	300	–	MHz
Output Capacitance at $V_{CB} = 10 \text{ V}$ , $f = 1 \text{ kHz}$ , $I_E = 0$	$C_{OBO}$	–	8.0	pF
Input Capacitance at $V_{EB} = 0.5 \text{ V}$ , $f = 1 \text{ kHz}$ , $I_C = 0$	$C_{IBO}$	–	25	pF

### NOTES

(1) Pulse test: Pulse width  $\leq 300\mu\text{s}$  - Duty cycle  $\leq 2\%$

# MPS2222A

## ELECTRICAL CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified

	SYMBOL	MIN.	MAX.	UNIT
Small Signal Current Gain at $V_{CE} = 10\text{ V}$ , $I_C = 1\text{ mA}$ , $f = 1\text{ kHz}$ at $V_{CE} = 10\text{ V}$ , $I_C = 10\text{ mA}$ , $f = 1\text{ kHz}$	$h_{fe}$	50 75	300 375	– –
Output Admittance at $V_{CE} = 10\text{ V}$ , $I_C = 1\text{ mA}$ , $f = 1\text{ kHz}$ at $V_{CE} = 10\text{ V}$ , $I_C = 10\text{ mA}$ , $f = 1\text{ kHz}$	$h_{oe}$	5.0 25	35 200	$\mu\text{S}$
Collector Base Time Constant at $I_E = 20\text{ mA}$ , $V_{CB} = 20\text{ V}$ , $f = 31.8\text{ MHz}$	$r_b' C_C$	–	150	ps
Noise Figure at $V_{CE} = 10\text{ V}$ , $I_C = 100\text{ }\mu\text{A}$ , $R_S = 1\text{ k}\Omega$ $f = 1\text{ kHz}$	NF	–	4.0	dB
Delay Time (see fig.1) at $I_{B1} = 15\text{ mA}$ , $I_C = 150\text{ mA}$ , $V_{CC}=30\text{V}$ , $V_{BE} = -0.5\text{V}$	$t_d$	–	10	ns
Rise Time (see fig.1) at $I_{B1} = 15\text{ mA}$ , $I_C = 150\text{ mA}$ , $V_{CC}=30\text{V}$ , $V_{BE} = -0.5\text{V}$	$t_r$	–	25	ns
Storage Time (see fig. 2) at $I_{B1} = I_{B2} = 15\text{ mA}$ , $I_C = 150\text{ mA}$ , $V_{CC}=30\text{V}$	$t_s$	–	225	ns
Fall Time (see fig. 2) at $I_{B1} = I_{B2} = 15\text{ mA}$ , $I_C = 150\text{ mA}$ , $V_{CC}=30\text{V}$	$t_f$	–	60	ns

## SWITCHING TIME EQUIVALENT TEST CIRCUIT

FIGURE 1 - TURN-ON TIME

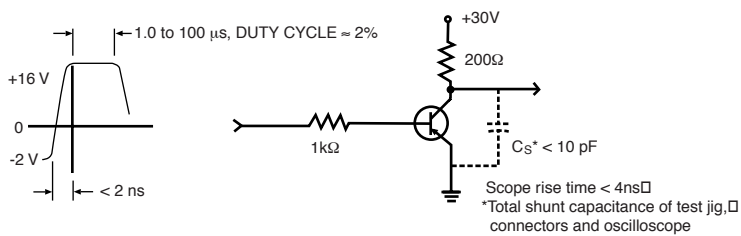


FIGURE 2 - TURN-OFF TIME

