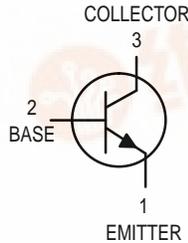


# Switching Transistors

## NPN Silicon



### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CEO}$	15	Vdc
Collector–Emitter Voltage	$V_{CES}$	40	Vdc
Collector–Base Voltage	$V_{CBO}$	40	Vdc
Emitter–Base Voltage	$V_{EBO}$	4.5	Vdc
Collector Current — Continuous	$I_C$	200	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	625 5.0	mW mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	$^\circ\text{C}/\text{W}$

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage <sup>(1)</sup> ( $I_C = 10 \text{ mAdc}, I_E = 0$ )	MPS2369A	$V_{(BR)CEO}$	15	—	—	Vdc
Collector–Emitter Breakdown Voltage ( $I_C = 10 \mu\text{Adc}, V_{BE} = 0$ )	MPS2369,A	$V_{(BR)CES}$	40	—	—	Vdc
Collector–Base Breakdown Voltage ( $I_C = 10 \mu\text{Adc}, I_E = 0$ )	MPS2369,A	$V_{(BR)CBO}$	40	—	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 10 \mu\text{Adc}, I_C = 0$ )	MPS2369,A	$V_{(BR)EBO}$	4.5	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 20 \text{ Vdc}, I_E = 0$ ) ( $V_{CB} = 20 \text{ Vdc}, I_E = 0, T_A = 125^\circ\text{C}$ )	MPS2369,A	$I_{CBO}$	— —	— —	0.4 30	$\mu\text{Adc}$
Collector Cutoff Current ( $V_{CE} = 20 \text{ Vdc}, V_{BE} = 0$ )	MPS2369,A	$I_{CES}$	—	—	0.4	$\mu\text{Adc}$

1. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

## MPS2369 MPS2369A

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>ON CHARACTERISTICS</b>					
DC Current Gain <sup>(1)</sup> ( $I_C = 10\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ ) ( $I_C = 10\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ , $T_A = -55^\circ\text{C}$ ) ( $I_C = 10\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ ) ( $I_C = 10\text{ mAdc}$ , $V_{CE} = 0.35\text{ Vdc}$ ) ( $I_C = 10\text{ mAdc}$ , $V_{CE} = 0.35\text{ Vdc}$ , $T_A = -55^\circ\text{C}$ ) ( $I_C = 30\text{ mAdc}$ , $V_{CE} = 0.4\text{ Vdc}$ ) ( $I_C = 100\text{ mAdc}$ , $V_{CE} = 2.0\text{ Vdc}$ ) ( $I_C = 100\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ )	$h_{FE}$	— 20 40 40 20 30 20 20	— — — — — — — —	120 — 120 — — — — —	—
Collector–Emitter Saturation Voltage <sup>(1)</sup> ( $I_C = 10\text{ mAdc}$ , $I_B = 1.0\text{ mAdc}$ ) ( $I_C = 10\text{ mAdc}$ , $I_B = 1.0\text{ mAdc}$ ) ( $I_C = 10\text{ mAdc}$ , $I_B = 1.0\text{ mAdc}$ , $T_A = +125^\circ\text{C}$ ) ( $I_C = 30\text{ mAdc}$ , $I_B = 3.0\text{ mAdc}$ ) ( $I_C = 100\text{ mAdc}$ , $I_B = 10\text{ mAdc}$ )	$V_{CE(sat)}$	— — — — —	— — — — —	0.25 0.20 0.30 0.25 0.50	Vdc
Base–Emitter Saturation Voltage <sup>(1)</sup> ( $I_C = 10\text{ mAdc}$ , $I_B = 1.0\text{ mAdc}$ ) ( $I_C = 10\text{ mAdc}$ , $I_B = 1.0\text{ mAdc}$ , $T_A = +125^\circ\text{C}$ ) ( $I_C = 10\text{ mAdc}$ , $I_B = 1.0\text{ mAdc}$ , $T_A = -55^\circ\text{C}$ ) ( $I_C = 30\text{ mAdc}$ , $I_B = 3.0\text{ mAdc}$ ) ( $I_C = 100\text{ mAdc}$ , $I_B = 10\text{ mAdc}$ )	$V_{BE(sat)}$	0.7 0.5 — — —	— — — — —	0.85 — 1.02 1.15 1.60	Vdc
<b>SMALL–SIGNAL CHARACTERISTICS</b>					
Output Capacitance ( $V_{CB} = 5.0\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{obo}$	—	—	4.0	pF
Small–Signal Current Gain ( $I_C = 10\text{ mAdc}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$h_{fe}$	5.0	—	—	—
<b>SWITCHING CHARACTERISTICS</b>					
Storage Time ( $I_{B1} = I_{B2} = I_C = 10\text{ mAdc}$ ) (Figure 3)	$t_s$	—	5.0	13	ns
Turn–On Time ( $V_{CC} = 3.0\text{ Vdc}$ , $I_C = 10\text{ mAdc}$ , $I_{B1} = 3.0\text{ mAdc}$ ) (Figure 1)	$t_{on}$	—	8.0	12	ns
Turn–Off Time ( $V_{CC} = 3.0\text{ Vdc}$ , $I_C = 10\text{ mAdc}$ , $I_{B1} = 3.0\text{ mAdc}$ , $I_{B2} = 1.5\text{ mAdc}$ ) (Figure 2)	$t_{off}$	—	10	18	ns

1. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

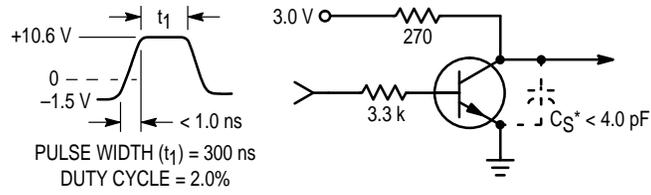


Figure 1.  $t_{on}$  Circuit

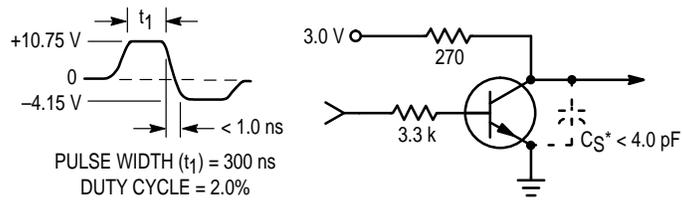


Figure 2.  $t_{off}$  Circuit

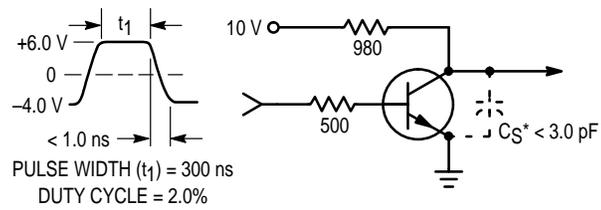
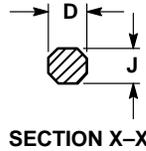
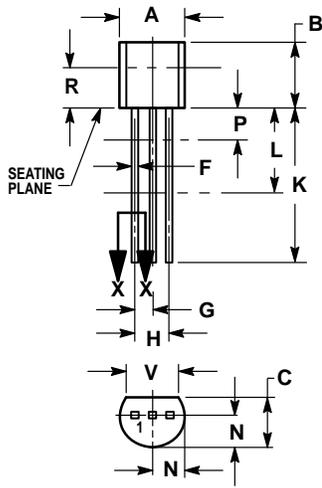


Figure 3. Storage Test Circuit

\* Total shunt capacitance of test jig and connectors.

**MPS2369 MPS2369A**

**PACKAGE DIMENSIONS**



**CASE 029-04  
(TO-226AA)  
ISSUE AD**

**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K MINIMUM. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.022	0.41	0.55
F	0.016	0.019	0.41	0.48
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	—	12.70	—
L	0.250	—	6.35	—
N	0.080	0.105	2.04	2.66
P	—	0.100	—	2.54
R	0.115	—	2.93	—
V	0.135	—	3.43	—

**STYLE 1:**

- PIN 1. EMITTER
2. BASE
3. COLLECTOR

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