SEMICONDUCTOR TECHNICAL DATA

Switching Transistors
NPN Silicon

COLLECTOR
3

2
BASE

1
EMITTER

MPS2369
MPS2369A*

*Motorola Preferred Device

CASE 29–04, STYLE 1
TO–92 (TO–226AA)
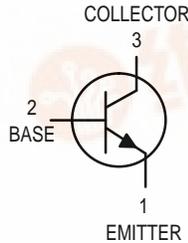
MAXIMUM RATINGS

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°C Derate above 25°C	P_D	625 5.0	mW mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−55 to +150	°C

THERMAL CHARACTERISTICS

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

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector–Emitter Breakdown Voltage[1] (I_C = 10 mAdc, I_B = 0)	MPS2369A	$V_{(BR)CEO}$	15	—	—	Vdc
Collector–Emitter Breakdown Voltage (I_C = 10 μAdc, V_{BE} = 0)	MPS2369,A	$V_{(BR)CES}$	40	—	—	Vdc
Collector–Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)	MPS2369,A	$V_{(BR)CBO}$	40	—	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)	MPS2369,A	$V_{(BR)EBO}$	4.5	—	—	Vdc

Collector Cutoff Current
    (V_{CB} = 20 Vdc, I_E = 0)
    (V_{CB} = 20 Vdc, I_E = 0, T_A = 125°C)
	MPS2369,A	I_{CBO}	—
			—
				—
				—
					0.4
					30
						μAdc

Collector Cutoff Current (V_{CE} = 20 Vdc, V_{BE} = 0)	MPS2369,A	I_{CES}	—	—	0.4	μAdc

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Continued)

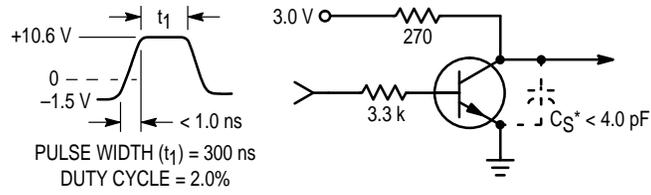| Characteristic		Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS						
DC Current Gain[1]		h_{FE}				—
(I_C = 10 mAdc, V_{CE} = 1.0 Vdc)	MPS2369A		—	—	120	
(I_C = 10 mAdc, V_{CE} = 1.0 Vdc, T_A = −55°C)	MPS2369		20	—	—	
(I_C = 10 mAdc, V_{CE} = 1.0 Vdc)	MPS2369		40	—	120	
(I_C = 10 mAdc, V_{CE} = 0.35 Vdc)	MPS2369A		40	—	—	
(I_C = 10 mAdc, V_{CE} = 0.35 Vdc, T_A = −55°C)	MPS2369A		20	—	—	
(I_C = 30 mAdc, V_{CE} = 0.4 Vdc)	MPS2369A		30	—	—	
(I_C = 100 mAdc, V_{CE} = 2.0 Vdc)	MPS2369		20	—	—	
(I_C = 100 mAdc, V_{CE} = 1.0 Vdc)	MPS2369A		20	—	—	
Collector−Emitter Saturation Voltage[1]		$V_{CE(sat)}$				Vdc
(I_C = 10 mAdc, I_B = 1.0 mAdc)	MPS2369		—	—	0.25	
(I_C = 10 mAdc, I_B = 1.0 mAdc)	MPS2369A		—	—	0.20	
(I_C = 10 mAdc, I_B = 1.0 mAdc, T_A = +125°C)	MPS2369A		—	—	0.30	
(I_C = 30 mAdc, I_B = 3.0 mAdc)	MPS2369A		—	—	0.25	
(I_C = 100 mAdc, I_B = 10 mAdc)	MPS2369A		—	—	0.50	
Base−Emitter Saturation Voltage[1]		$V_{BE(sat)}$				Vdc
(I_C = 10 mAdc, I_B = 1.0 mAdc)	MPS2369		0.7	—	0.85	
(I_C = 10 mAdc, I_B = 1.0 mAdc, T_A = +125°C)	MPS2369A		0.5	—	—	
(I_C = 10 mAdc, I_B = 1.0 mAdc, T_A = −55°C)	MPS2369A		—	—	1.02	
(I_C = 30 mAdc, I_B = 3.0 mAdc)	MPS2369A		—	—	1.15	
(I_C = 100 mAdc, I_B = 10 mAdc)	MPS2369A		—	—	1.60	
SMALL−SIGNAL CHARACTERISTICS						
Output Capacitance		C_{obo}	—	—	4.0	pF
(V_{CB} = 5.0 Vdc, I_E = 0, f = 1.0 MHz)	MPS2369,A					
Small−Signal Current Gain		h_{fe}	5.0	—	—	—
(I_C = 10 mAdc, V_{CE} = 10 Vdc, f = 100 MHz)	MPS2369,A					
SWITCHING CHARACTERISTICS						
Storage Time		t_s	—	5.0	13	ns
(I_{B1} = I_{B2} = I_C = 10 mAdc) (Figure 3)	MPS2369,A					
Turn−On Time		t_{on}	—	8.0	12	ns
(V_{CC} = 3.0 Vdc, I_C = 10 mAdc, I_{B1} = 3.0 mAdc) (Figure 1)	MPS2369,A					
Turn−Off Time		t_{off}	—	10	18	ns
(V_{CC} = 3.0 Vdc, I_C = 10 mAdc, I_{B1} = 3.0 mAdc, I_{B2} = 1.5 mAdc) (Figure 2)	MPS2369,A					

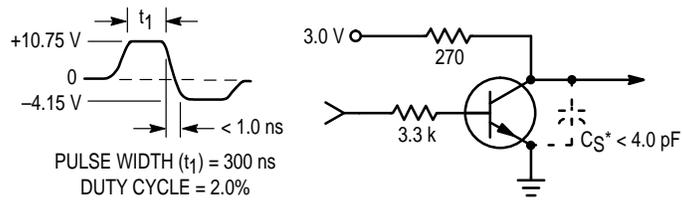1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.
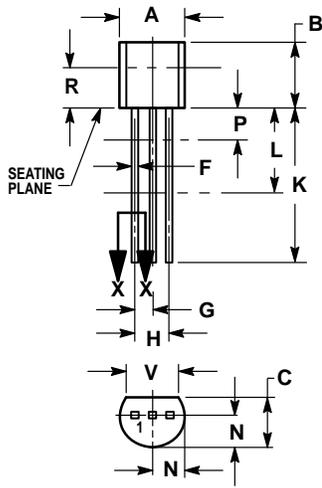
Figure 1. t$_{on}$ Circuit

Figure 2. t$_{off}$ Circuit
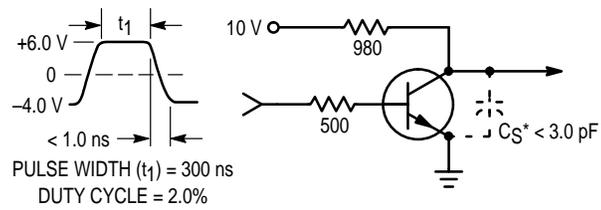
Figure 3. Storage Test Circuit

* Total shunt capacitance of test jig and connectors.

PACKAGE DIMENSIONS

SECTION X–X

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

CASE 029–04
(TO–226AA)
ISSUE AD

(M) **MOTOROLA**