

# MMPQ2222A

Preferred Device

## Quad General Purpose Transistor

NPN Silicon



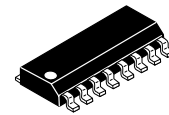
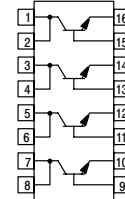
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### MAXIMUM RATINGS

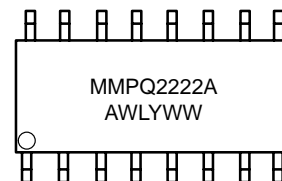
Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CEO}$	40	Vdc
Collector–Base Voltage	$V_{CB}$	75	Vdc
Emitter–Base Voltage	$V_{EB}$	5.0	Vdc
Collector Current – Continuous	$I_C$	500	mAdc
		<b>Four Transistors Equal Power</b>	
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.0 8.0	Watts mW/ $^\circ\text{C}$
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	2.4 19.2	Watts mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.



SO-16  
CASE 751B  
STYLE 4

### MARKING DIAGRAM



MMPQ2222A = Specific Device Code  
A = Assembly Location  
WL = Wafer Lot  
Y = Year  
WW = Work Week

### ORDERING INFORMATION

Device	Package	Shipping
MMPQ2222A	SO-16	48 Units/Rail

Preferred devices are recommended choices for future use and best overall value.

# MMPQ2222A

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage (Note 1) (I <sub>C</sub> = 10 mAdc, I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	40	–	–	Vdc
Collector–Base Breakdown Voltage (I <sub>C</sub> = 10 μAdc, I <sub>E</sub> = 0)	V <sub>(BR)CBO</sub>	75	–	–	Vdc
Emitter–Base Breakdown Voltage (I <sub>B</sub> = 10 μAdc, I <sub>C</sub> = 0)	V <sub>(BR)EBO</sub>	5.0 –	– –	– –	Vdc
Collector Cutoff Current (V <sub>CB</sub> = 50 Vdc, I <sub>E</sub> = 0) (V <sub>CB</sub> = 60 Vdc, I <sub>E</sub> = 0)	I <sub>CBO</sub>	– –	– –	50 10	nAdc
Emitter Cutoff Current (V <sub>EB</sub> = 3.0 Vdc, I <sub>C</sub> = 0)	I <sub>EBO</sub>	–	–	100	nAdc

### ON CHARACTERISTICS

DC Current Gain (Note 1) (I <sub>C</sub> = 100 μA, V <sub>CE</sub> = 10 V) (I <sub>C</sub> = 1.0 mA, V <sub>CE</sub> = 10 V) (I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 10 V) (I <sub>C</sub> = 150 mA, V <sub>CE</sub> = 10 V) (I <sub>C</sub> = 500 mA, V <sub>CE</sub> = 10 V) (I <sub>C</sub> = 150 mA, V <sub>CE</sub> = 1.0 V)	h <sub>FE</sub>	35 50 75 100 40 50	– – – – – –	– – – 300 – –	–
Collector–Emitter Saturation Voltage (Note 1) (I <sub>C</sub> = 150 mAdc, I <sub>B</sub> = 15 mAdc) (I <sub>C</sub> = 500 mAdc, I <sub>B</sub> = 50 mAdc)	V <sub>CE(sat)</sub>	– –	– –	0.3 1.0	Vdc
Base–Emitter Saturation Voltage (Note 1) (I <sub>C</sub> = 150 mAdc, I <sub>B</sub> = 15 mAdc) (I <sub>C</sub> = 500 mAdc, I <sub>B</sub> = 50 mAdc)	V <sub>BE(sat)</sub>	– –	– –	1.2 2.0	Vdc

### DYNAMIC CHARACTERISTICS

Current–Gain – Bandwidth Product (Note 1) (I <sub>C</sub> = 20 mAdc, V <sub>CE</sub> = 20 Vdc, f = 100 MHz)	f <sub>T</sub>	200	350	–	MHz
Output Capacitance (V <sub>CB</sub> = 10 Vdc, I <sub>E</sub> = 0, f = 1.0 MHz)	C <sub>ob</sub>	–	4.5	–	pF
Input Capacitance (V <sub>EB</sub> = 0.5 Vdc, I <sub>C</sub> = 0, f = 1.0 MHz)	C <sub>ib</sub>	–	17	–	pF

### SWITCHING CHARACTERISTICS

Turn–On Time (V <sub>CC</sub> = 30 Vdc, V <sub>BE(off)</sub> = –0.5 Vdc, I <sub>C</sub> = 150 mAdc, I <sub>B1</sub> = 15 mAdc)	t <sub>on</sub>	–	25	–	ns
Turn–Off Time (V <sub>CC</sub> = 30 Vdc, I <sub>C</sub> = 150 mAdc, I <sub>B1</sub> = I <sub>B2</sub> = 15 mAdc)	t <sub>off</sub>	–	250	–	ns

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

# MMPQ2222A

## SWITCHING TIME EQUIVALENT TEST CIRCUITS

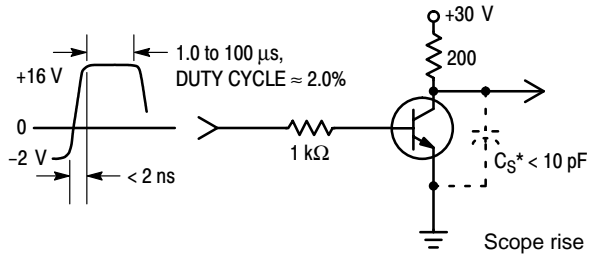


Figure 1. Turn-On Time

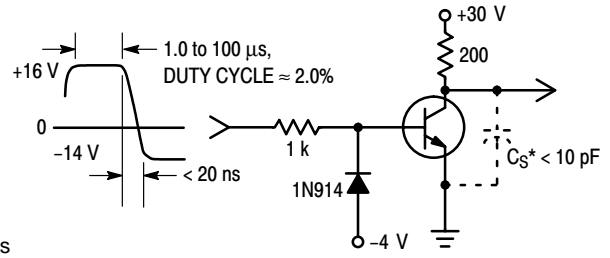


Figure 2. Turn-Off Time

Scope rise time < 4 ns  
\*Total shunt capacitance of test jig, connectors, and oscilloscope.

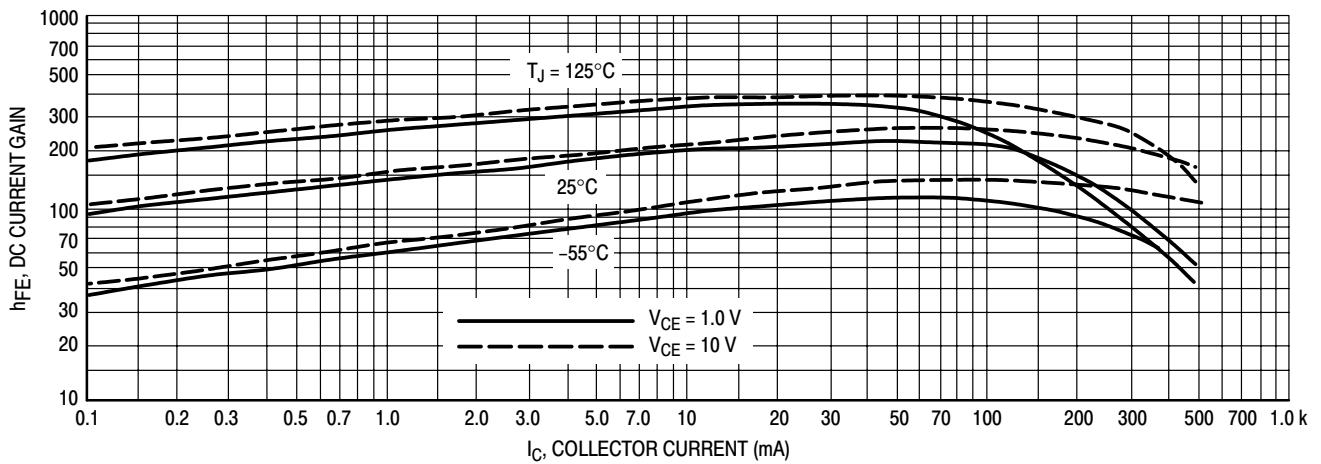


Figure 3. DC Current Gain

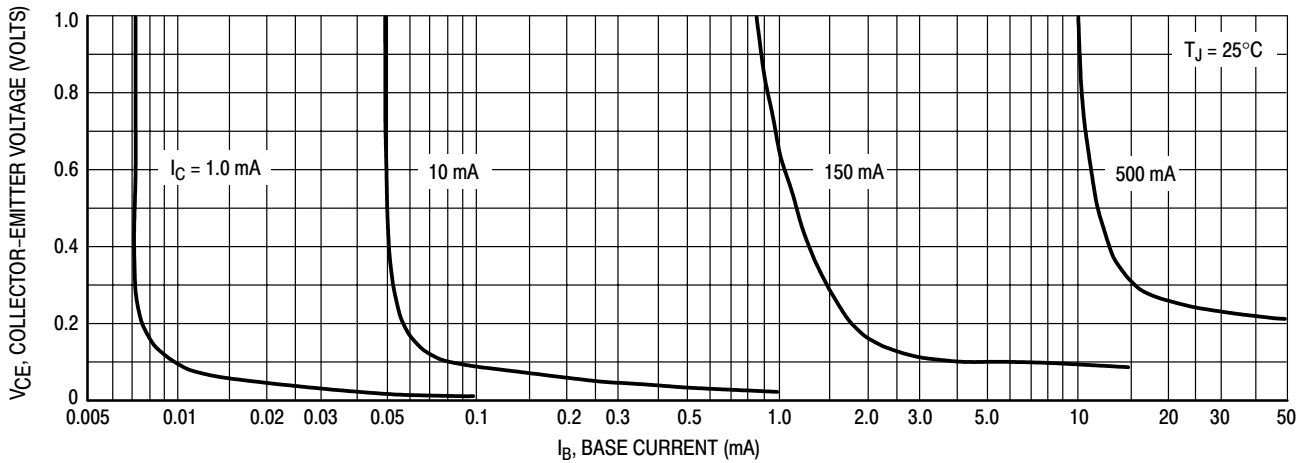


Figure 4. Collector Saturation Region

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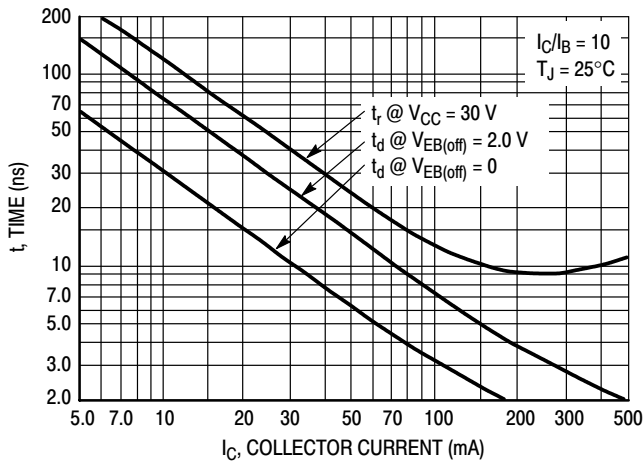


Figure 5. Turn-On Time

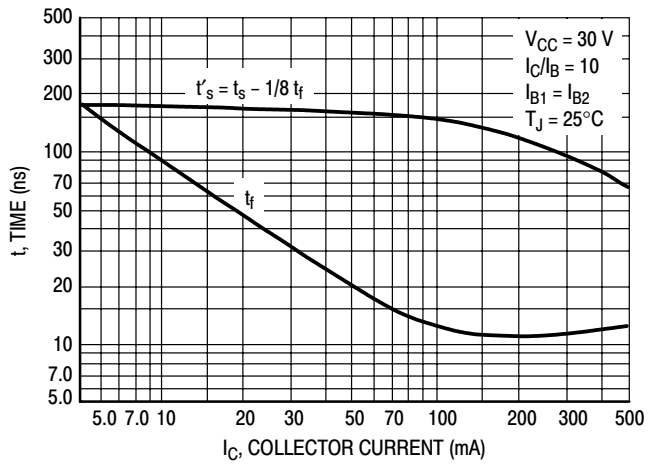


Figure 6. Turn-Off Time

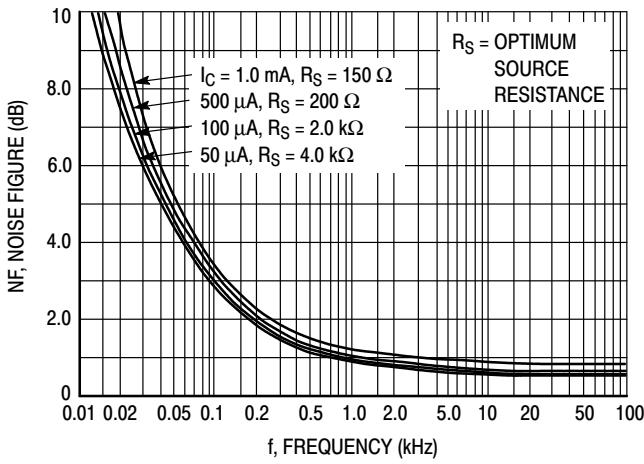


Figure 7. Frequency Effects

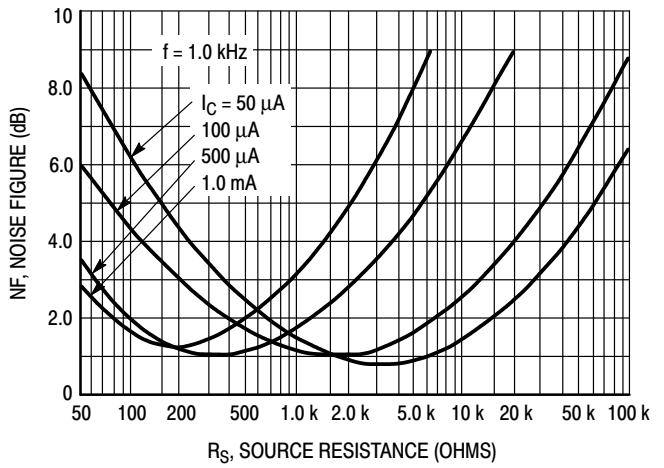


Figure 8. Source Resistance Effects

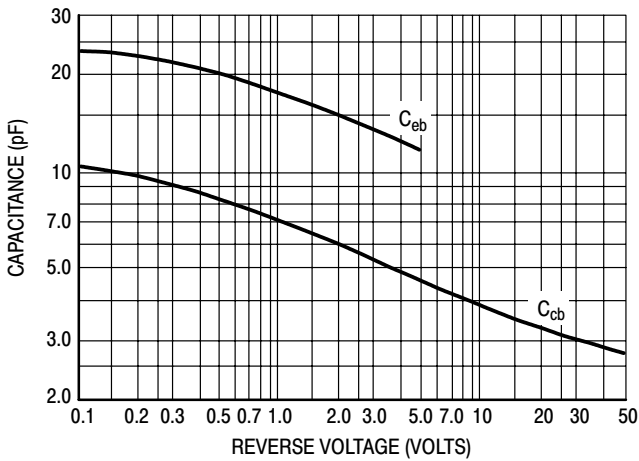


Figure 9. Capacitances

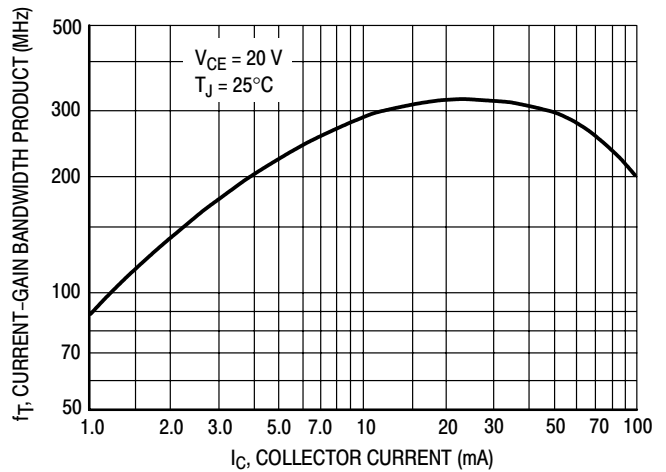


Figure 10. Current-Gain Bandwidth Product

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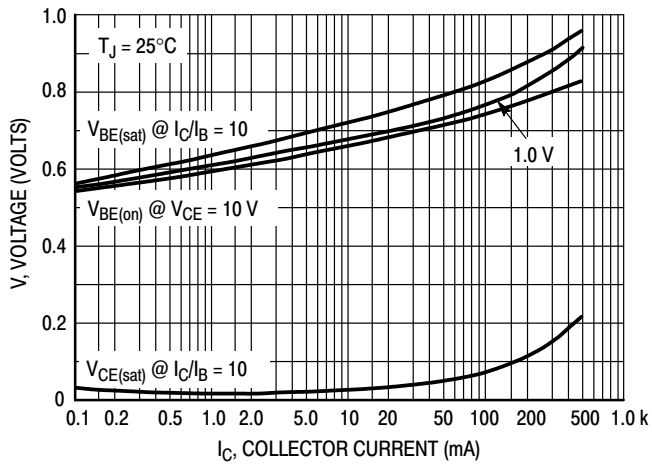


Figure 11. "On" Voltages

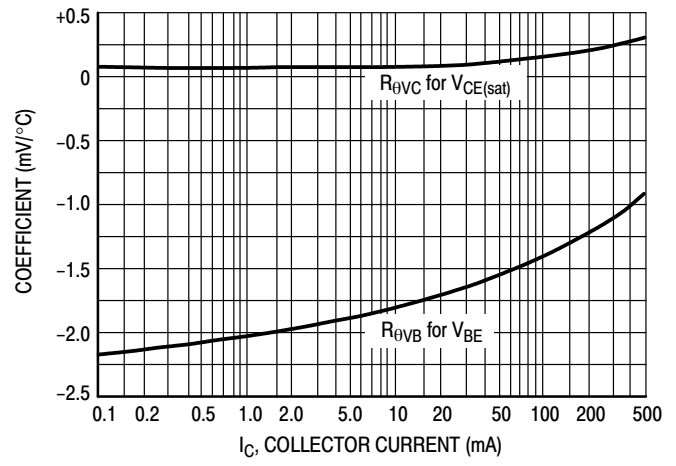
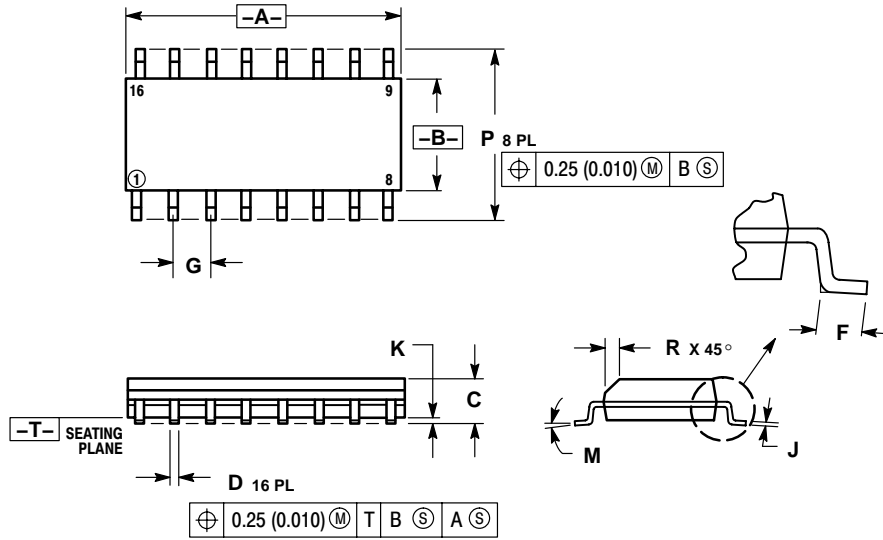


Figure 12. Temperature Coefficients

# MMPQ2222A

## PACKAGE DIMENSIONS

SO-16  
CASE 751B-05  
ISSUE J



### NOTES:

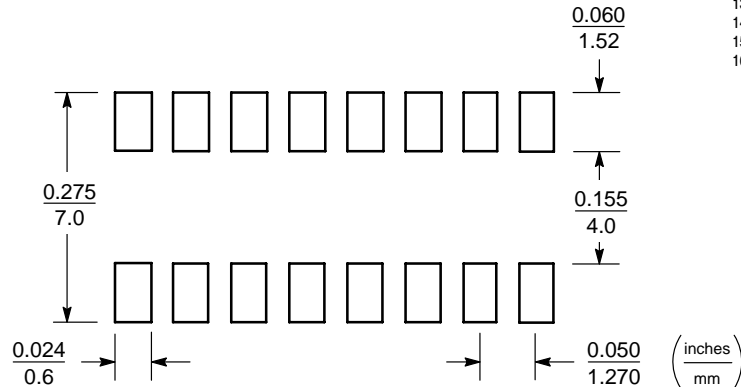
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

### STYLE 4:

- PIN 1. COLLECTOR, DYE #1
- COLLECTOR, #1
- COLLECTOR, #2
- COLLECTOR, #2
- COLLECTOR, #3
- COLLECTOR, #3
- COLLECTOR, #4
- COLLECTOR, #4
- BASE, #4
- EMITTER, #4
- BASE, #3
- EMITTER, #3
- BASE, #2
- EMITTER, #2
- BASE, #1
- EMITTER, #1

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