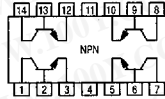


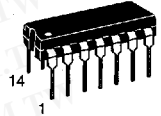
Quad General Purpose Transistors

NPN Silicon



MPQ2222
MPQ2222A*

*Motorola Preferred Device



CASE 646-06, STYLE 1
TO-116

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MAXIMUM RATINGS

Rating	Symbol	MPQ2222	MPQ2222A	Unit
Collector-Emitter Voltage	V_{CEO}	30	40	Vdc
Collector-Base Voltage	V_{CBO}	60		Vdc
Emitter-Base Voltage	V_{EBO}	5.0		Vdc
Collector Current — Continuous	I_C	500		mAdc
		Each Transistor	Total Device	
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	0.65 5.2	1.9 15.2	Watts 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	$R_{\theta JA}$	66	$^\circ\text{C}/\text{W}$

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

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ⁽¹⁾ ($I_C = 10 \text{ mAdc}, I_E = 0$)	MPQ2222 MPQ2222A	$V_{(BR)CEO}$	40 40	— —	Vdc
Collector-Base Breakdown Voltage ($I_C = 10 \mu\text{Adc}, I_E = 0$)	MPQ2222 MPQ2222A	$V_{(BR)CBO}$	60 75	— —	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10 \mu\text{Adc}, I_C = 0$)	MPQ2222 MPQ2222A	$V_{(BR)EBO}$	5.0 6.0	— —	Vdc
Collector Cutoff Current ($V_{CB} = 50 \text{ Vdc}, I_E = 0$) ($V_{CB} = 60 \text{ Vdc}, I_E = 0$)	MPQ2222 MPQ2222A	I_{CBO}	— —	50 10	nAdc
Emitter Cutoff Current ($V_{EB} = 3.0 \text{ Vdc}, I_C = 0$)		I_{EBO}	—	100	nAdc

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

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

Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS				
DC Current Gain ⁽¹⁾ (I _C = 100 μA _{dc} , V _{CE} = 10 V _{dc}) (I _C = 1.0 mA _{dc} , V _{CE} = 10 V _{dc}) (I _C = 10 mA _{dc} , V _{CE} = 10 V _{dc}) (I _C = 150 mA _{dc} , V _{CE} = 10 V _{dc}) (I _C = 300 mA _{dc} , V _{CE} = 10 V _{dc}) (I _C = 500 mA _{dc} , V _{CE} = 10 V _{dc})	h _{FE}	35 50 75 100 30 40	— — — 300 — —	—
Collector–Emitter Saturation Voltage (I _C = 150 mA _{dc} , I _B = 15 mA _{dc}) (I _C = 300 mA _{dc} , I _B = 30 mA _{dc}) (I _C = 500 mA, I _B = 50 mA)	V _{CE(sat)}	— — — —	0.4 0.3 1.6 1.0	V _{dc}
Base–Emitter Saturation Voltage (I _C = 150 mA _{dc} , I _B = 15 mA _{dc}) (I _C = 300 mA _{dc} , I _B = 30 mA _{dc}) (I _C = 500 mA, I _B = 50 mA)	V _{BE(sat)}	— 0.6 — —	1.3 1.2 2.6 2.0	V _{dc}

SMALL-SIGNAL CHARACTERISTICS				
Current–Gain — Bandwidth Product ⁽¹⁾ (I _C = 20 mA _{dc} , V _{CE} = 20 V _{dc} , f = 100 MHz)	f _T	200	—	MHz
Output Capacitance (V _{CB} = 10 V _{dc} , I _E = 0, f = 1.0 MHz)	C _{obo}	—	8.0	pF
Input Capacitance (V _{EB} = 0.5 V _{dc} , I _C = 0, f = 1.0 MHz)	C _{ibo}	—	30	pF

SWITCHING CHARACTERISTICS				
Turn–On Time (V _{CC} = 30 V _{dc} , V _{BE(off)} = –0.5 V _{dc} , I _C = 150 mA _{dc} , I _{B1} = 15 mA _{dc})	t _{on}	—	35	ns
Turn–Off Time (V _{CC} = 30 V _{dc} , I _C = 150 mA _{dc} , I _{B1} = I _{B2} = 15 mA _{dc})	t _{off}	—	285	ns

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

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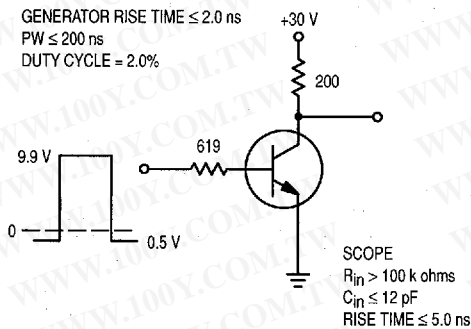


Figure 1. Delay and Rise Time Equivalent Test Circuit

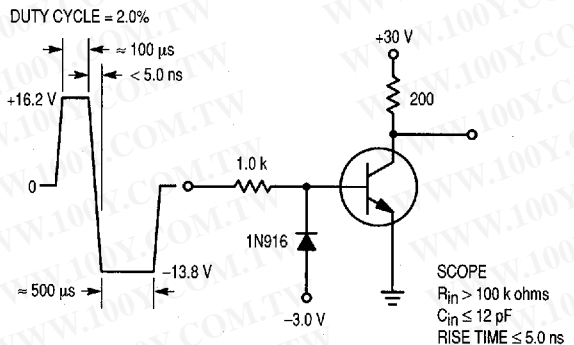


Figure 2. Storage Time and Fall Time Equivalent Test Circuit

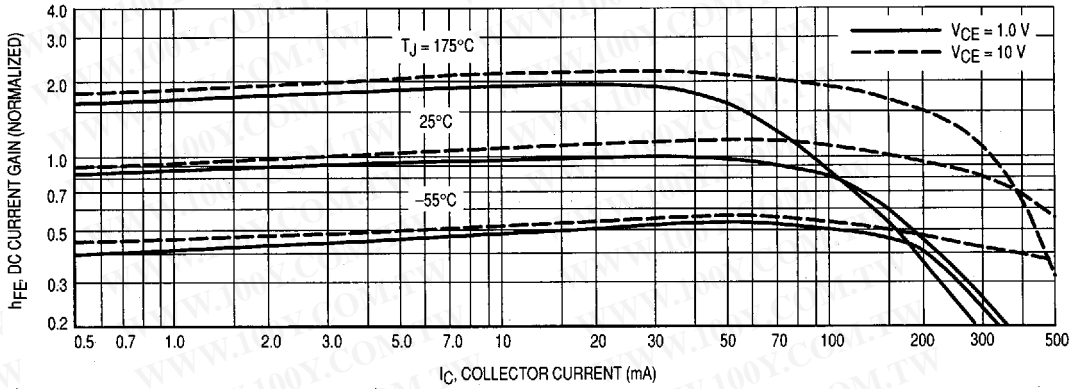


Figure 3. Normalized DC Current Gain

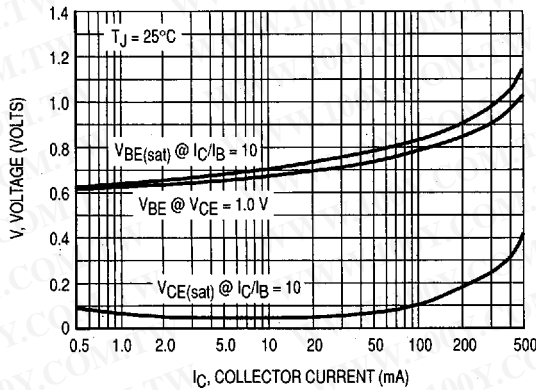


Figure 4. "ON" Voltages

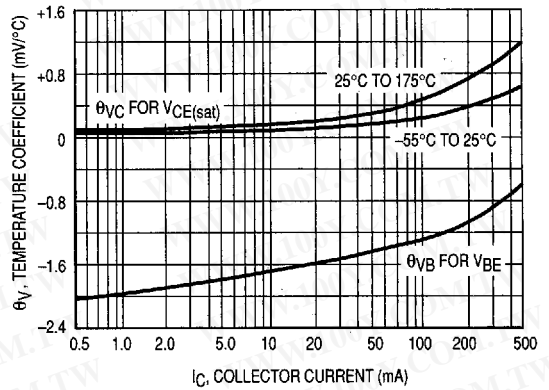


Figure 5. Temperature Coefficients

NOISE FIGURE
($V_{CE} = 10 \text{ Vdc}$, $T_A = 25^\circ\text{C}$)

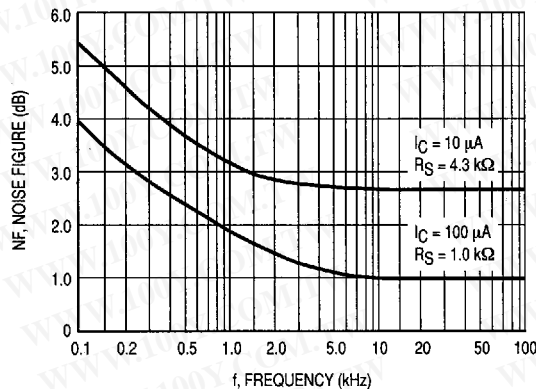


Figure 6. Frequency Effects

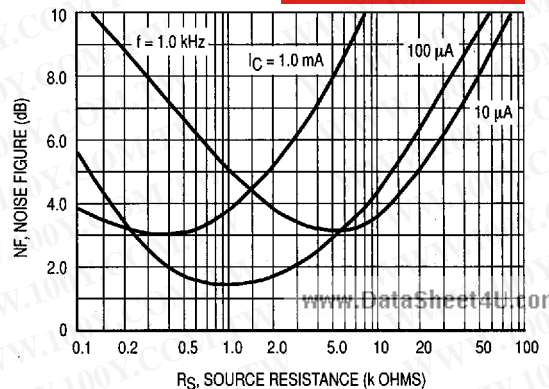


Figure 7. Source Resistance Effects

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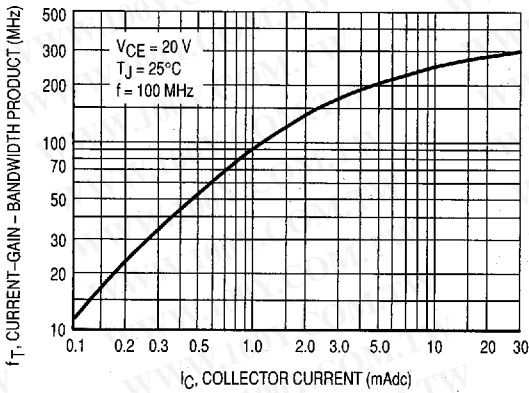


Figure 8. Current-Gain — Bandwidth Product

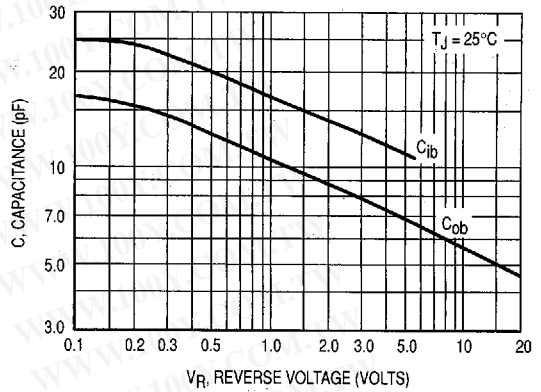


Figure 9. Capacitances

SWITCHING TIME CHARACTERISTICS

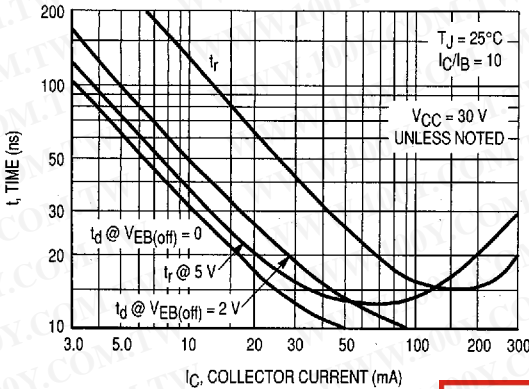


Figure 10. Turn-On Time

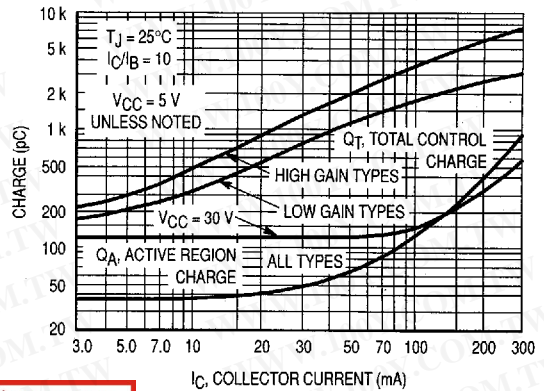


Figure 11. Charge Data

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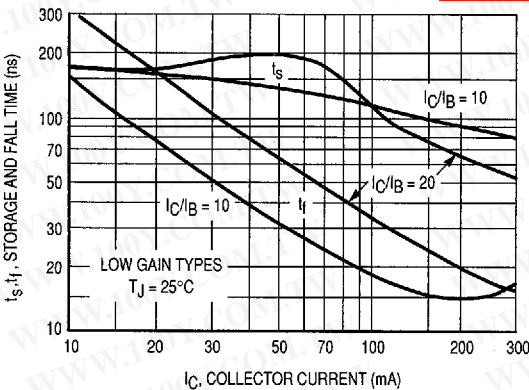


Figure 12. Turn-Off Behavior

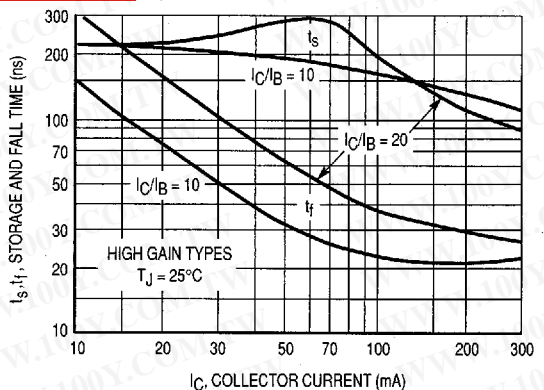


Figure 13. Turn-Off Behavior

MPQ2222 MPQ2222A

GENERATOR RISE TIME ≤ 2.0 ns

PW ≤ 200 ns

DUTY CYCLE = 2.0%

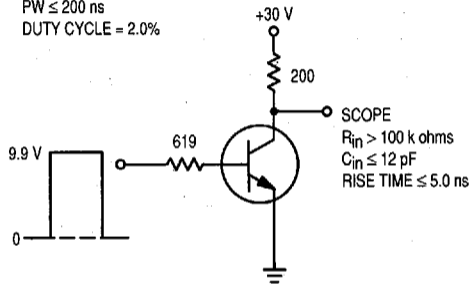


Figure 14. Delay and Rise Time Equivalent Test Circuit

RISE TIME $\leq 3.0\%$
DUTY CYCLE = 2.0%

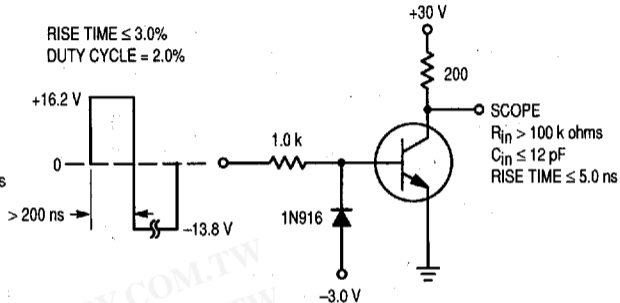


Figure 15. Storage Time and Fall Time Equivalent Test Circuit

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