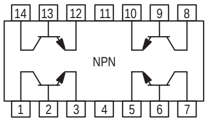
MOTOROLA
SEMICONDUCTOR TECHNICAL DATA

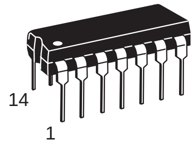
Quad General Purpose Transistors

NPN Silicon



MPQ2222
MPQ2222A*

*Motorola Preferred Device



CASE 646–06, STYLE 1
TO–116

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°C Derate above 25°C	P_D	0.65 5.2	1.9 15.2	Watts 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	$R_{\theta JA}$	66	°C/W

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage[1] (I_C = 10 mAdc, I_B = 0)	 MPQ2222 MPQ2222A	$V_{(BR)CEO}$	 40 40	 — —	Vdc
Collector–Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)	 MPQ2222 MPQ2222A	$V_{(BR)CBO}$	 60 75	 — —	Vdc
Emitter–Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)	 MPQ2222 MPQ2222A	$V_{(BR)EBO}$	 5.0 6.0	 — —	Vdc
Collector Cutoff Current (V_{CB} = 50 Vdc, I_E = 0) (V_{CB} = 60 Vdc, I_E = 0)	 MPQ2222 MPQ2222A	I_{CBO}	 — —	 50 10	nAdc
Emitter Cutoff Current (V_{EB} = 3.0 Vdc, I_C = 0)		I_{EBO}	—	100	nAdc

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

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

(Replaces MPQ2221/D)

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

Characteristic		Symbol	Min	Max	Unit
ON CHARACTERISTICS					
DC Current Gain(1)		h_{FE}			—
(I_C = 100 μAdc, V_{CE} = 10 Vdc)	MPQ2222A		35	—	
(I_C = 1.0 mAdc, V_{CE} = 10 Vdc)	MPQ2222A		50	—	
(I_C = 10 mAdc, V_{CE} = 10 Vdc)	MPQ2222,A		75	—	
(I_C = 150 mAdc, V_{CE} = 10 Vdc)	MPQ2222,A		100	300	
(I_C = 300 mAdc, V_{CE} = 10 Vdc)	MPQ2222		30	—	
(I_C = 500 mAdc, V_{CE} = 10 Vdc)	MPQ2222A		40	—	
Collector–Emitter Saturation Voltage		$V_{CE(sat)}$			Vdc
(I_C = 150 mAdc, I_B = 15 mAdc)	MPQ2222		—	0.4	
	MPQ2222A		—	0.3	
(I_C = 300 mAdc, I_B = 30 mAdc)	MPQ2222		—	1.6	
(I_C = 500 mA, I_B = 50 mA)	MPQ2222A		—	1.0	
Base–Emitter Saturation Voltage		$V_{BE(sat)}$			Vdc
(I_C = 150 mAdc, I_B = 15 mAdc)	MPQ2222		—	1.3	
	MPQ2222A		0.6	1.2	
(I_C = 300 mAdc, I_B = 30 mAdc)	MPQ2222		—	2.6	
(I_C = 500 mA, I_B = 50 mA)	MPQ2222A		—	2.0	
SMALL–SIGNAL CHARACTERISTICS					
Current–Gain — Bandwidth Product(1) (I_C = 20 mAdc, V_{CE} = 20 Vdc, f = 100 MHz)		f_T	200	—	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 1.0 MHz)		C_{obo}	—	8.0	pF
Input Capacitance (V_{EB} = 0.5 Vdc, I_C = 0, f = 1.0 MHz)		C_{ibo}	—	30	pF
SWITCHING CHARACTERISTICS					
Turn–On Time (V_{CC} = 30 Vdc, $V_{BE(off)}$ = –0.5 Vdc, I_C = 150 mAdc, I_{B1} = 15 mAdc)	MPQ2222A	t_{on}	—	35	ns
Turn–Off Time (V_{CC} = 30 Vdc, I_C = 150 mAdc, I_{B1} = I_{B2} = 15 mAdc)	MPQ2222A	t_{off}	—	285	ns

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

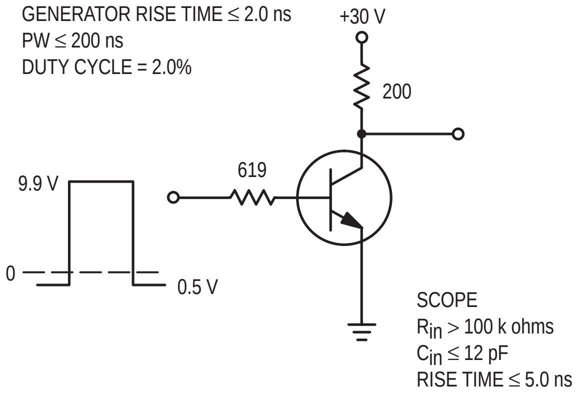


Figure 1. Delay and Rise Time Equivalent Test Circuit

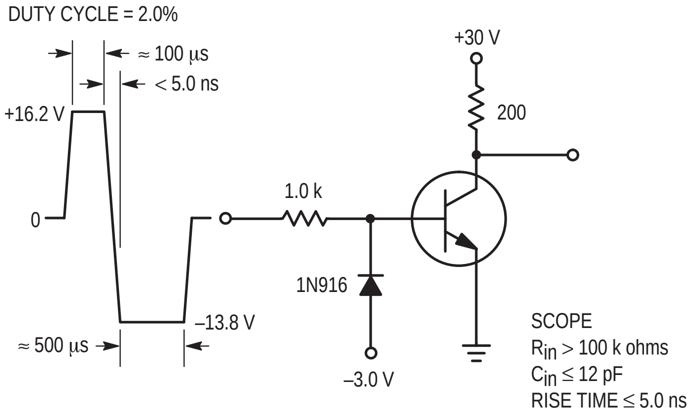


Figure 2. Storage Time and Fall Time Equivalent Test Circuit

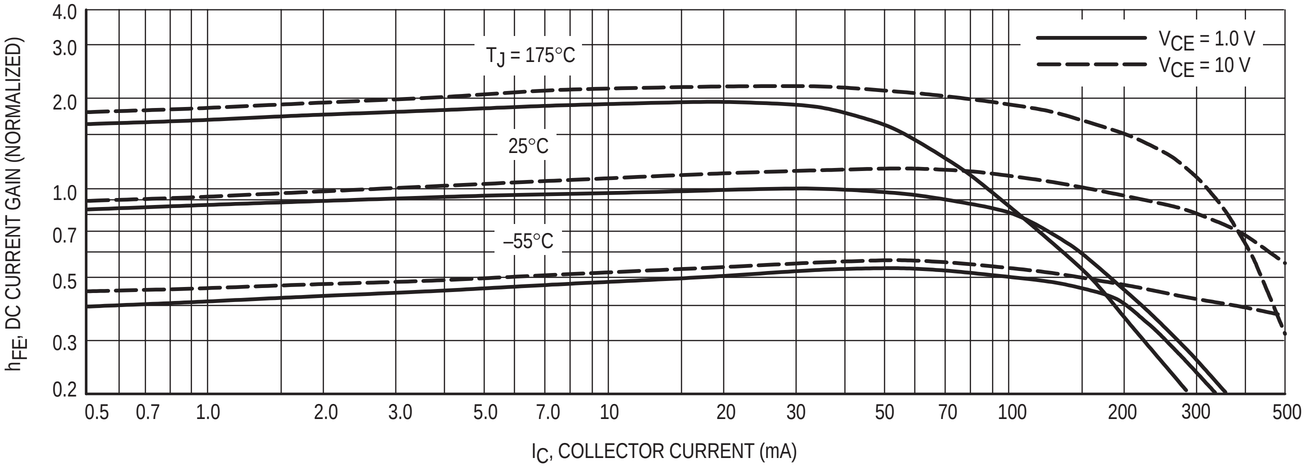


Figure 3. Normalized DC Current Gain

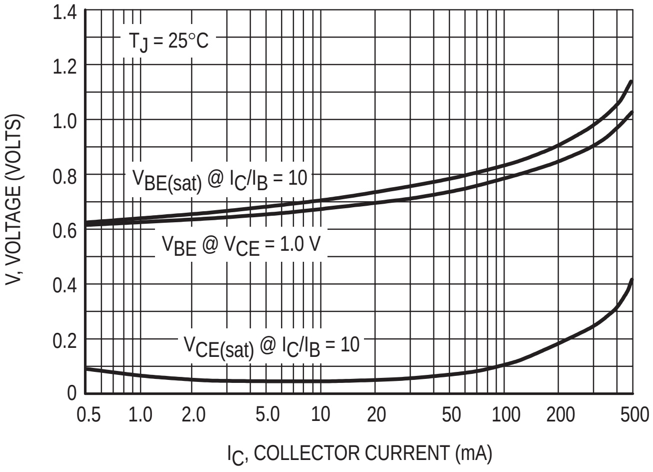


Figure 4. "ON" Voltages

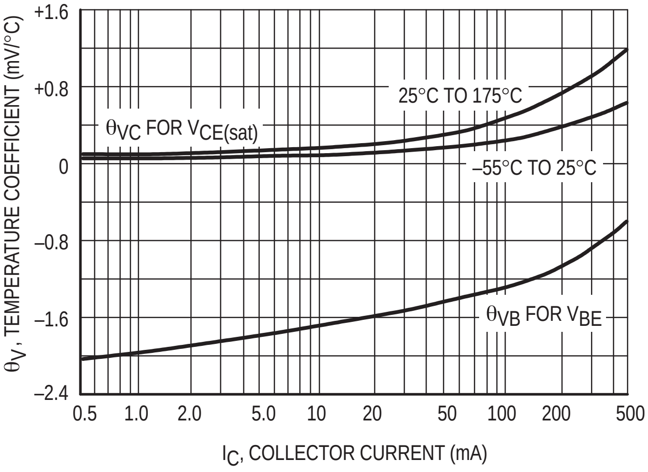


Figure 5. Temperature Coefficients

NOISE FIGURE

(V_{CE} = 10 Vdc, T_A = 25°C)

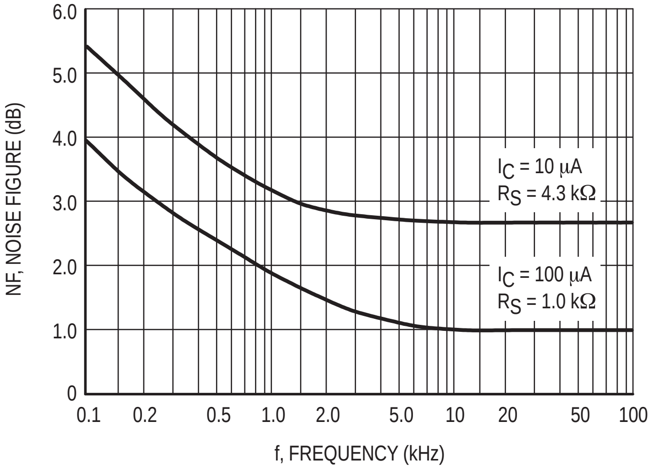


Figure 6. Frequency Effects

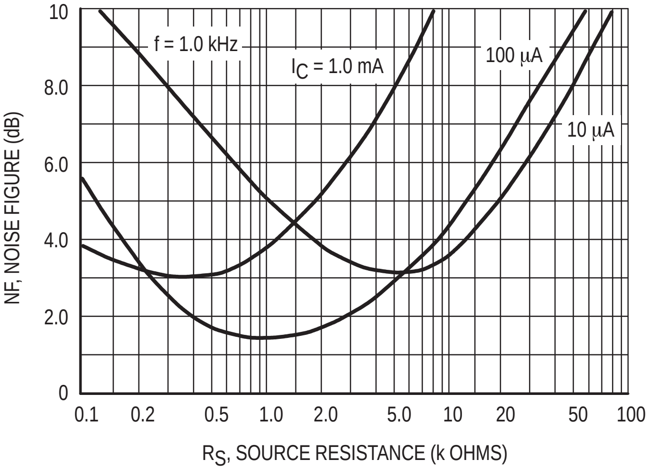


Figure 7. Source Resistance Effects

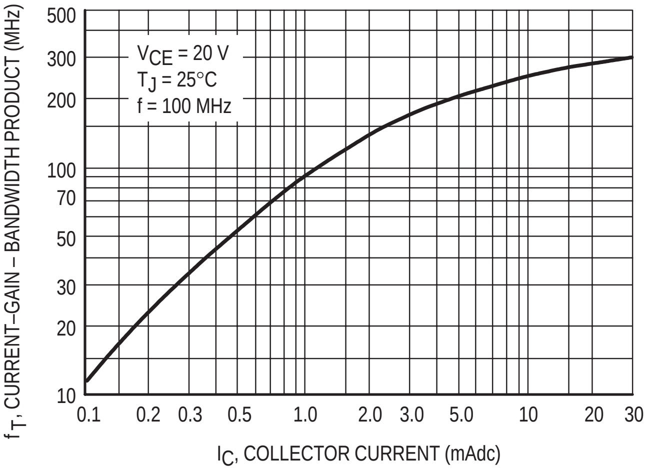


Figure 8. Current–Gain — Bandwidth Product

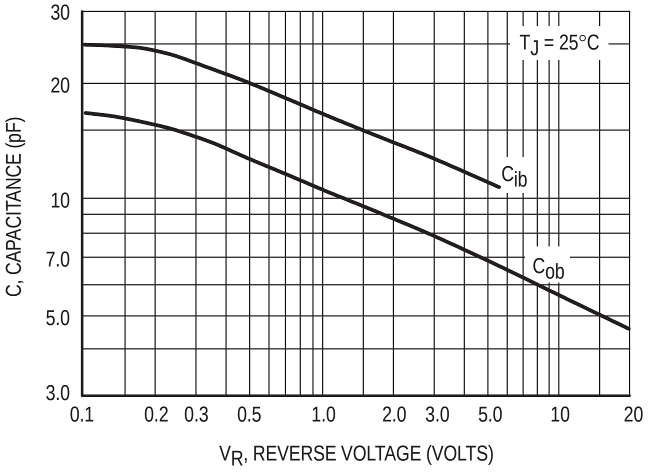


Figure 9. Capacitances

SWITCHING TIME CHARACTERISTICS

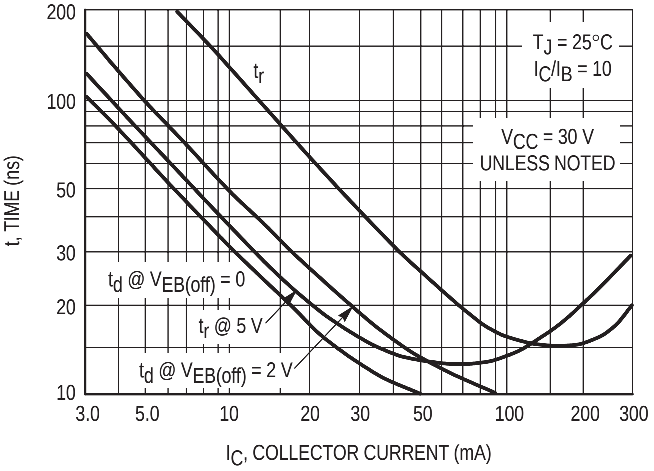


Figure 10. Turn–On Time

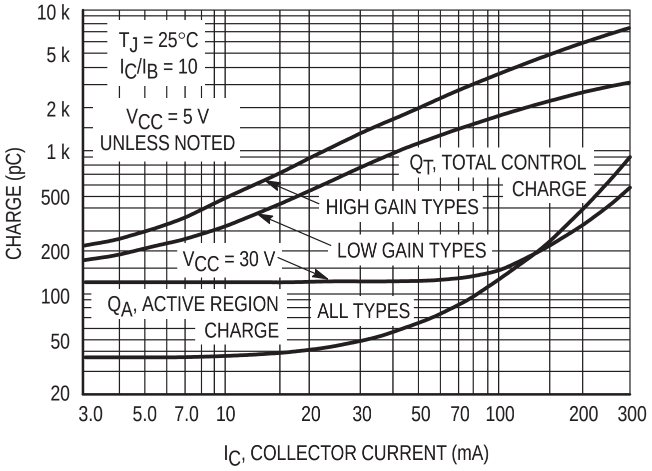


Figure 11. Charge Data

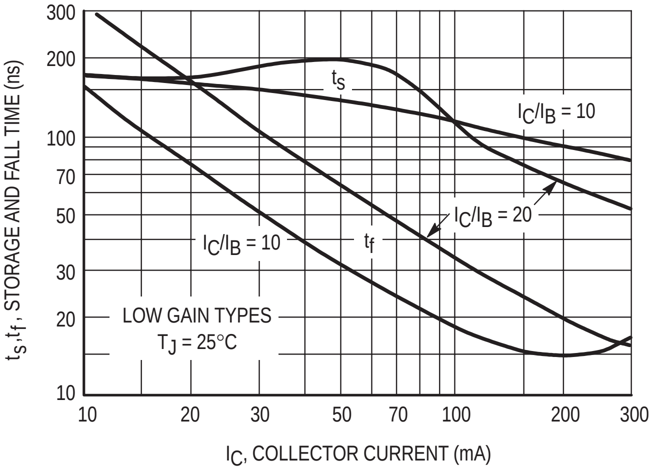


Figure 12. Turn–Off Behavior

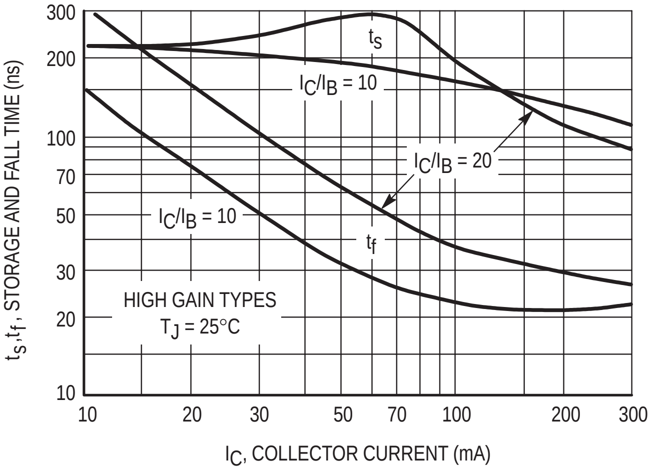


Figure 13. Turn–Off Behavior

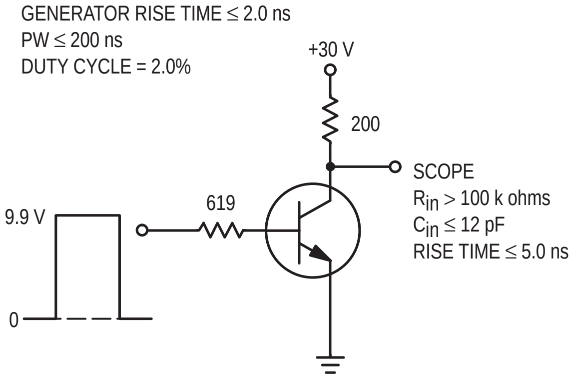


Figure 14. Delay and Rise Time Equivalent Test Circuit

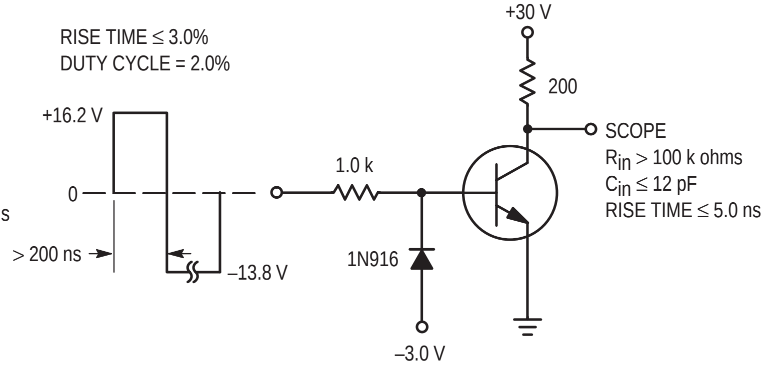


Figure 15. Storage Time and Fall Time Equivalent Test Circuit