MHQ2221, MHQ2222 (SILICON)
MPQ2221, MPQ2222

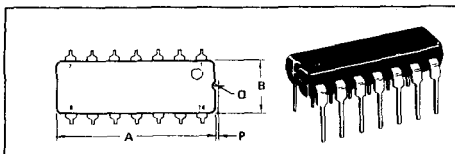
QUAD DUAL-IN-LINE NPN SILICON ANNULAR GENERAL-PURPOSE TRANSISTORS

. . . Designed for general-purpose switching circuits and DC to VHF amplifier applications.

- Choice of Ceramic or Plastic Package
- DC Current Gain Specified – 10 to 300 mAdc
- Low Collector-Cutoff Current – I_{CBO} = 50 nAdc (Max) @ V_{CB} = 50 Vdc
- High Collector Breakdown Voltages – BV_{CEO} = 40 Vdc (Min) BV_{CBO} = 60 Vdc (Min)
- Transistors Similar to 2N2218 thru 2N2222 Series
- TO-116 Packaging – Compact Size Compatible With IC Automatic Insertion Equipment
- MHQ2221 Available With BV_{CEO} = 60 Vdc on Specified Request

MAXIMUM RATINGS

Rating	Symbol	Value		Unit
		Each Transistor	Total Device	
Collector-Emitter Voltage	V_{CEO}	40		Vdc
Collector-Base Voltage	V_{CB}	60		Vdc
Emitter-Base Voltage	V_{EB}	5.0		Vdc
Collector Current – Continuous	I_C	500		mAdc
Total Power Dissipation @ T_A = 25°C	P_D	0.65	1.9	Watts
Derate above 25°C MHQ2221, MHQ2222		3.72	10.88	mW/°C
MPQ2221, MPQ2222		5.2	15.2	
Operating and Storage Junction Temperature Range MHQ2221,22	T_J,T_{stg}	-65 to +200		°C
MPQ2221,22		-55 to +150		



MPQ2221, MPQ2222

CASE 646

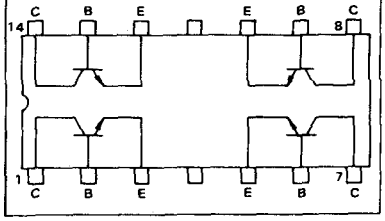
PLASTIC PACKAGE

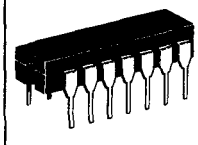
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	18.16	18.80	0.715	0.740
B	6.10	6.60	0.240	0.260
C	4.06	4.57	0.160	0.180
D	0.38	0.51	0.015	0.020
F	1.02	1.52	0.040	0.060
G	2.54 BSC		0.100 BSC	
H	1.32	1.83	0.052	0.072
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	7.37	7.87	0.290	0.310
M	–	10°	–	10°
N	0.51	1.02	0.020	0.040
P	0.13	0.38	0.005	0.015
Q	0.51	0.76	0.020	0.030

NOTES:
1. LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.
2. DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL

QUAD DUAL-IN-LINE NPN SILICON GENERAL-PURPOSE TRANSISTORS

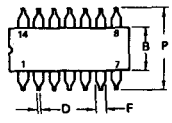
CONNECTION DIAGRAM

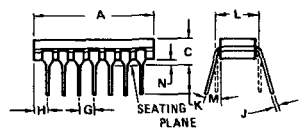




MHQ2221, MHQ2222

CERAMIC
CASE 632-02
TO-116





DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	16.8	19.9	0.660	0.785
B	5.59	7.11	0.220	0.280
C	–	5.08	–	0.200
D	0.381	0.564	0.015	0.023
F	0.77	1.77	0.030	0.070
G	2.54 BSC		0.100 BSC	
J	0.203	0.381	0.008	0.015
K	2.54	–	0.100	–
L	7.62 BSC		0.300 BSC	
M	–	15°	–	15°
N	0.51	0.76	0.020	0.030
P	–	8.25	–	0.325

All JEDEC dimensions and notes apply.

NOTE:
DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.

MHQ2221, MHQ2222, MPQ2221, MPQ2222 (continued)

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)		BV_{CEO}	40	–	–	Vdc
Collector-Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)		BV_{CBO}	60	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)		BV_{EBO}	5.0	–	–	Vdc
Collector Cutoff Current (V_{CB} = 50 Vdc, I_E = 0)		I_{CBO}	–	–	50	nAdc
Emitter Cutoff Current (V_{BE} = 3.0 Vdc, I_C = 0)		I_{EBO}	–	–	50	nAdc
ON CHARACTERISTICS						
DC Current Gain(1)		h_{FE}				–
(I_C = 10 mAdc, V_{CE} = 10 Vdc)	MHQ2221, MPQ2221		35	–	–	
	MHQ2222, MPQ2222		75	–	–	
(I_C = 150 mAdc, V_{CE} = 10 Vdc)	MHQ2221, MPQ2221		40	–	–	
	MHQ2222, MPQ2222		100	–	–	
(I_C = 300 mAdc, V_{CE} = 10 Vdc)	MHQ2221, MPQ2221		20	–	–	
	MHQ2222, MPQ2222		30	–	–	
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$				Vdc
(I_C = 150 mAdc, I_B = 15 mAdc)			–	–	0.4	
(I_C = 300 mAdc, I_B = 30 mAdc)			–	–	1.6	
Base-Emitter Saturation Voltage		$V_{BE(sat)}$				Vdc
(I_C = 150 mAdc, I_B = 15 mAdc)			–	–	1.3	
(I_C = 300 mAdc, I_B = 30 mAdc)			–	–	2.6	
DYNAMIC CHARACTERISTICS						
Current-Gain–Bandwidth Product (1) (I_C = 20 mAdc, V_{CE} = 20 Vdc, f = 100 MHz)		f_T	200	350	–	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 100 kHz)		C_{ob}	–	4.5	8.0	pF
Input Capacitance (V_{BE} = 0.5 Vdc, I_C = 0, f = 100 kHz)		C_{ib}	–	17	30	pF
SWITCHING CHARACTERISTICS (Figure 1)						
Turn-On Time (V_{CC} = 30 Vdc, $V_{BE(off)}$ = 0.5 Vdc, I_C = 150 mAdc, I_{B1} = 15 mAdc) (Figure 1)		t_{on}	–	25	–	ns
Turn-Off Time (V_{CC} = 30 Vdc, I_C = 150 mAdc, I_{B1} = I_{B2} = 15 mAdc) (Figure 2)		t_{off}	–	250	–	ns

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

FIGURE 1 – DELAY AND RISE TIME EQUIVALENT TEST CIRCUIT

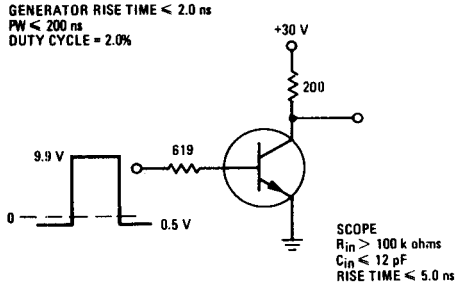


FIGURE 2 – STORAGE TIME AND FALL TIME EQUIVALENT TEST CIRCUIT