

MHQ2221, MHQ2222 (SILICON) MPQ2221, MPQ2222

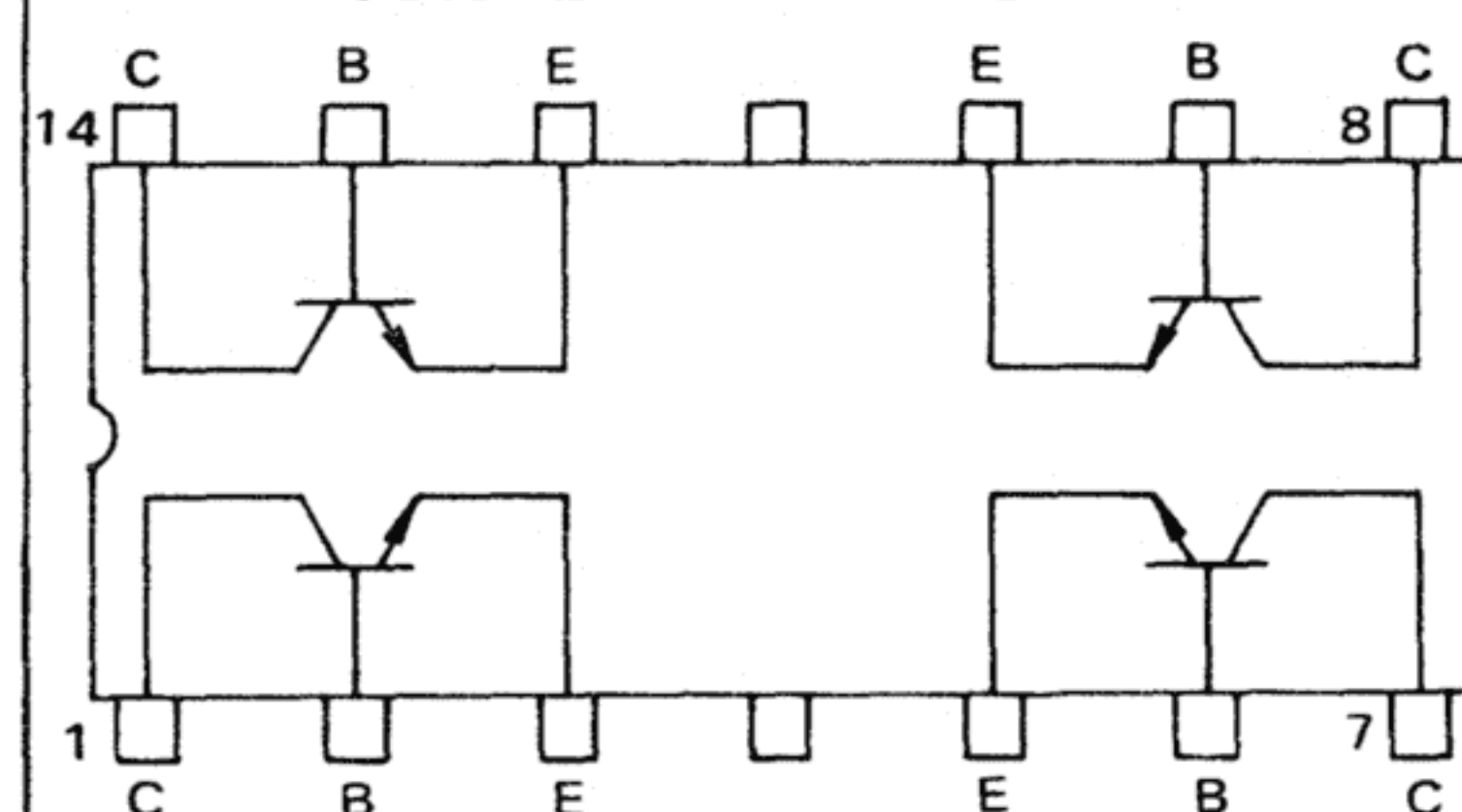
QUAD DUAL-IN-LINE NPN SILICON ANNULAR GENERAL-PURPOSE TRANSISTORS

... 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 –
 $I_{CBO} = 50 \text{ nAdc (Max) @ } V_{CB} = 50 \text{ Vdc}$
- High Collector Breakdown Voltages –
 $BV_{CEO} = 40 \text{ Vdc (Min) } BV_{CBO} = 60 \text{ Vdc (Min)}$
- Transistors Similar to 2N2218 thru 2N2222 Series
- TO-116 Packaging – Compact Size Compatible With IC Automatic Insertion Equipment
- MHQ2221 Available With $BV_{CEO} = 60 \text{ Vdc}$ on Specified Request

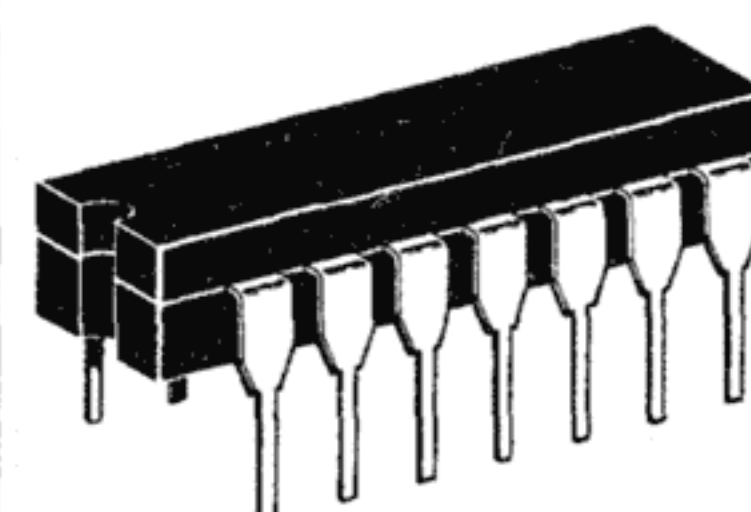
QUAD DUAL-IN-LINE NPN SILICON GENERAL-PURPOSE TRANSISTORS

CONNECTION DIAGRAM

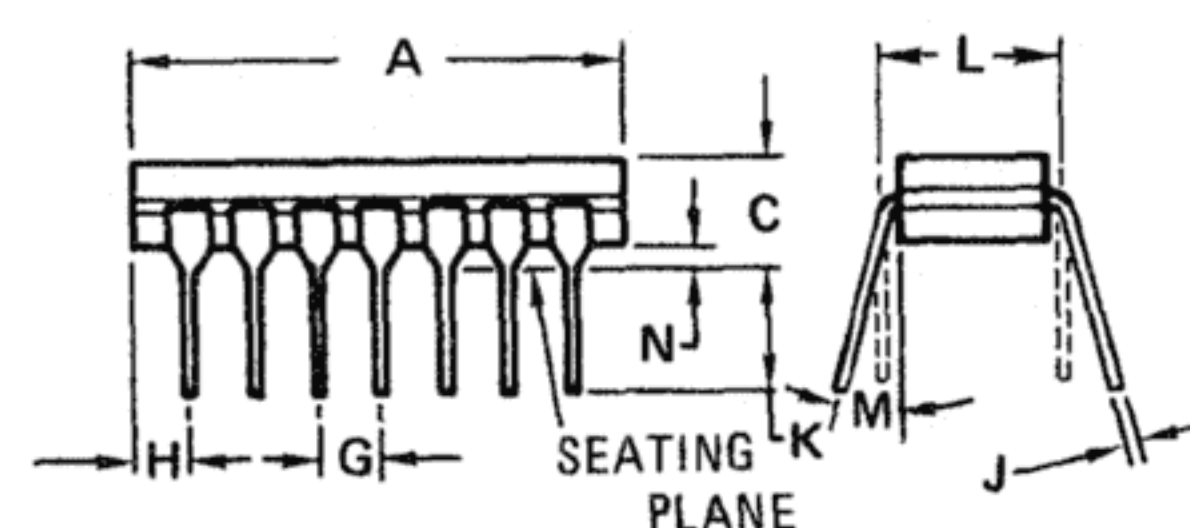
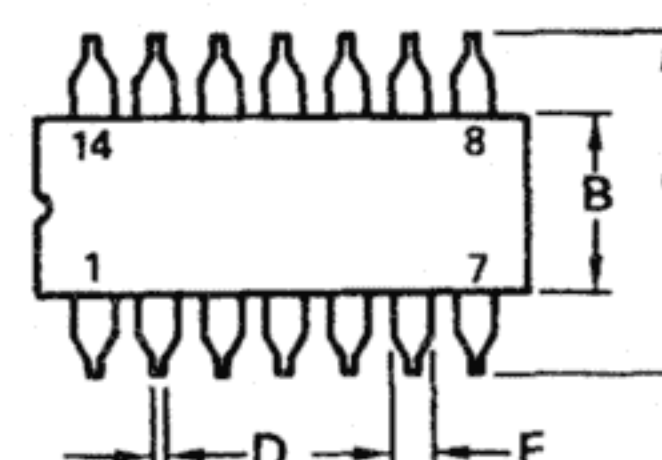


MAXIMUM RATINGS

Rating	Symbol	Value	Unit		
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		
		Each Transistor	Total Device		
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	P_D	0.65	1.9	Watts	
Derate above 25°C		MHQ2221, MHQ2222 MPQ2221, MPQ2222	3.72 5.2	10.88 15.2	mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	MHQ2221,22 MPQ2221,22	-65 to +200 -55 to +150	$^\circ\text{C}$	



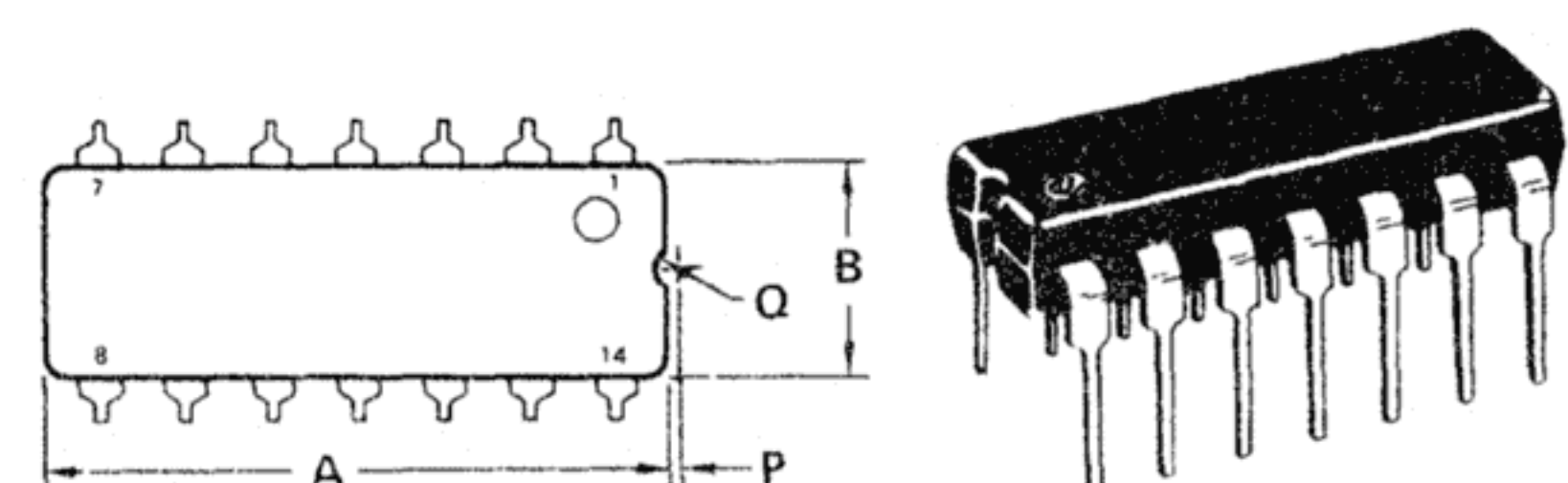
MHQ2221, MHQ2222
CERAMIC
CASE 632-02
TO-116



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	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	0.584	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 $^\circ$	—	15 $^\circ$
N	0.51	0.76	0.020	0.030
P	—	8.25	—	0.325

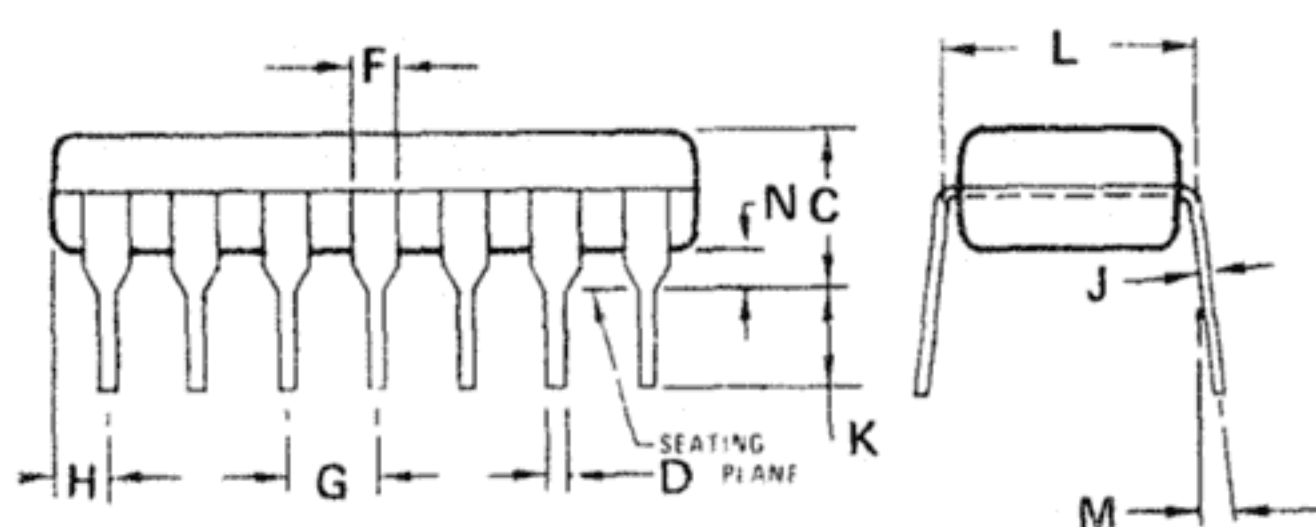
All JEDEC dimensions and notes apply.

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



MPQ2221, MPQ2222

CASE 646
PLASTIC PACKAGE



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	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 $^\circ$	—	10 $^\circ$
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.

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 mA _{dc} , I _B = 0)	BV _{CEO}	40	—	—	V _{dc}
Collector-Base Breakdown Voltage (I _C = 10 μA _{dc} , I _E = 0)	BV _{CB0}	60	—	—	V _{dc}
Emitter-Base Breakdown Voltage (I _E = 10 μA _{dc} , I _C = 0)	BV _{EBO}	5.0	—	—	V _{dc}
Collector Cutoff Current (V _{CB} = 50 V _{dc} , I _E = 0)	I _{CB0}	—	—	50	nA _{dc}
Emitter Cutoff Current (V _{BE} = 3.0 V _{dc} , I _C = 0)	I _{EBO}	—	—	50	nA _{dc}

ON CHARACTERISTICS					
DC Current Gain(1) (I _C = 10 mA _{dc} , V _{CE} = 10 V _{dc})	h _{FE}	MHQ2221, MPQ2221	35	—	—
		MHQ2222, MPQ2222	75	—	—
(I _C = 150 mA _{dc} , V _{CE} = 10 V _{dc})		MHQ2221, MPQ2221	40	—	—
		MHQ2222, MPQ2222	100	—	—
(I _C = 300 mA _{dc} , V _{CE} = 10 V _{dc})	MHQ2221, MPQ2221	20	—	—	
	MHQ2222, MPQ2222	30	—	—	
Collector-Emitter Saturation Voltage (I _C = 150 mA _{dc} , I _B = 15 mA _{dc}) (I _C = 300 mA _{dc} , I _B = 30 mA _{dc})	V _{CE(sat)}	—	—	0.4 1.6	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})	V _{BE(sat)}	—	—	1.3 2.6	V _{dc}

DYNAMIC CHARACTERISTICS					
Current-Gain-Bandwidth Product (1) (I _C = 20 mA _{dc} , V _{CE} = 20 V _{dc} , f = 100 MHz)	f _T	200	350	—	MHz
Output Capacitance (V _{CB} = 10 V _{dc} , I _E = 0, f = 100 kHz)	C _{ob}	—	4.5	8.0	pF
Input Capacitance (V _{BE} = 0.5 V _{dc} , I _C = 0, f = 100 kHz)	C _{ib}	—	17	30	pF

SWITCHING CHARACTERISTICS (Figure 1)					
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}) (Figure 1)	t _{on}	—	25	—	ns
Turn-Off Time (V _{CC} = 30 V _{dc} , I _C = 150 mA _{dc} , I _{B1} = I _{B2} = 15 mA _{dc}) (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

