MINIATURE ANALOG DIODE

PHASE SHIFTERS

SERIES MQ

GENERAL INFORMATION: The MQ Series are miniature analog phase shifters that continuously change the phase of a microwave signal by varying a D.C. voltage. Since the D.C. voltage applied to the diode is a reverse bias, the current drain is negligible (typically less than 10 microamperes). A balanced stripline configuration keeps the VSWR and amplitude ripple to a minimum for all values of phase shift.

FREQUENCY COVERAGE: 0.1 to 8.0 GHz

RF IMPEDANCE: 50 OHMS

D.C. VOLTAGE: 0 volts to +28 volts (standard) or 0 volts to −28 volts (optional) will vary the phase of any of the models over the minimum phase shift listed. Positive voltage is standard.

RF POWER: 10 mW peak or CW, operating. Destruct level is 1 W, CW, 100 W peak. Phase shifters can be built for operational levels to 1 watt CW or peak on request.

TEMPERATURE INFORMATION: The units can be used over a -55° C to +85° C temperature range. However, the phase will change either +5° or +5%, whichever is greater.

SWITCHING SPEED: Series MQ phase shifters can be driven from any phase value to any other value in 10 nanoseconds.

ENVIRONMENT: MIL-E-5400

CONNECTORS: The series MQ phase shifters are available with either SMA connectors (FIG. 1), stripline tabs (FIG. 2) or with a pin which mates with a removable SMA connector (FIG. 3.)

The Fig. 3 configuration allows the customer to test to the unit with the connectors. The connector may be removed by removing the four connector screws from the flange. A pin as shown in Fig. 3 will remain.

When ordering, please specify type of connector desired by adding "-A" for stripline tab or "-B" for pin to the model number. e.g., if the MQ-36 is required with stripline tabs it is ordered as MQ-36-A. If removable connectors are required the unit is ordered as MQ-36-B. If an SMA connector is required it is ordered as an MQ-36.

NOTES:

1. A) Any value of phase shift or frequency range not shown can be quoted on request.

2. A connector, (SMA FEMALE) is available in place of the bias pin at no extra charge. This will be placed at the center of the surface marked F on the drawing. This is the 0.38× A surface. If a (SMA Female) is desired, add suffix C to the model number (e.g., MQ-23C).

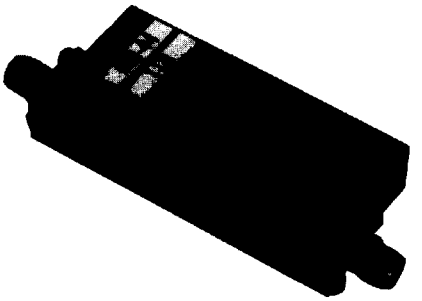
3. If a narrow frequency bandwidth is required, KDI/Triangle can supply a unit that is electrically optimized for that bandwidth. Mechanical dimensions will remain the same as the standard unit, and the price will generally be lower. Specify the frequency range when ordering a narrow bandwidth model, and a special part number will be assigned.

4. If a control voltage of −0.5 to +28V is used instead of 0 to +28V, the min. phase shift listed is increased by a factor of approx. 1.4. e.g., the MQ-45 will have a min. phase shift of approx. 504°. Caution: If −0.5V is exceeded, damage to the diodes may result. The use of current limiting resistors is highly recommended.

5. The number of mounting holes will depend upon the overall dimensions of the unit and not upon the type of connectors used. For example if an MQ-17 is ordered it will have 4 mounting holes. Fig. 1 shows the mounting hole dimensions. Refer to the mechanical outline chart to determine the number of mounting holes on each model.

6. Check appropriate figure for dimensions only. However, each model is available in any of the 3 configurations (Fig. 1, 2, or 3).

7. Monotonicity guaranteed for all models.



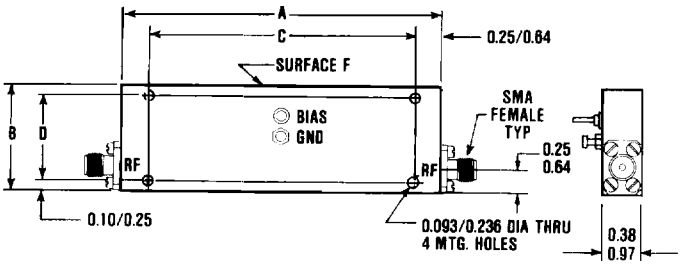


FIG. 1

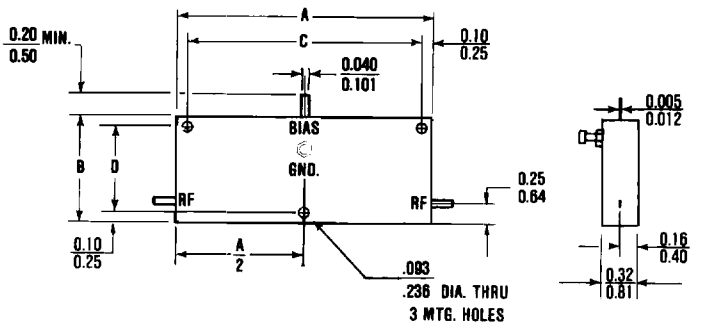


FIG. 2

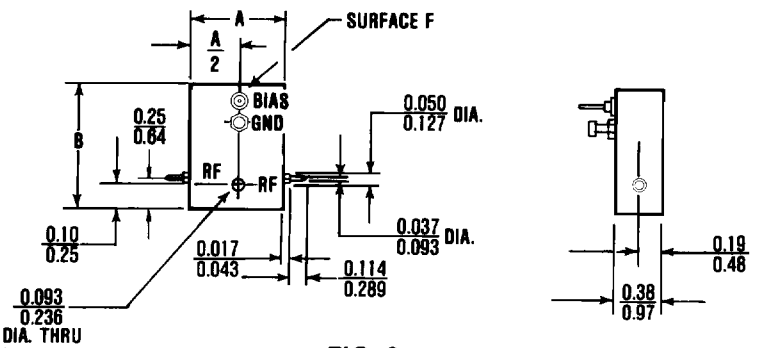


FIG. 3

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ELECTRICAL PERFORMANCE

MECHANICAL OUTLINES

Model No.	Frequency Range (GHz)	Phase Shift Min. (Degrees)	Insertion Loss Max. (dB)	Amplitude Ripple Max. (±dB)	VSWR Max.	Figure See Note 6	No. of Mtg. Holes	A in. cm.	B in. cm.	C in. cm.	D in. cm.
MQ-12	0.1-0.2	60	0.75	0.25	1.50	2	3	1.90 4.83	1.90 4.83	1.700 4.320	1.700 4.320
MQ-13	0.1-0.2	360	5.0	1.25	2.5	1	4	6.00 15.24	3.00 7.62	5.500 13.970	2.800 7.110
MQ-14	0.2-0.4	60	0.75	0.25	1.50	2	3	1.20 3.05	1.50 3.81	1.000 2.540	1.300 3.300
MQ-16	0.25-0.5	60	0.75	0.25	1.50	2	3	1.20 3.05	1.50 3.81	1.000 2.540	1.300 3.300
MQ-17	0.25-0-.5	360	5.0	1.25	2.0	1	4	6.00 15.24	1.50 3.81	5.500 13.970	1.300 3.300
MQ-22	0.45-0.5	75	0.7	0.25	1.50	2	3	1.20 3.05	1.50 3.81	1.000 2.540	1.300 3.300
MQ-23	0.45-0.5	140	1.25	0.30	1.60	2	3	2.40 6.10	1.50 3.81	2.200 5.590	1.300 3.300
MQ-26	0.5-1.0	60	0.80	0.25	1.50	2	3	1.00 2.54	1.10 2.79	0.800 2.030	0.900 2.290
MQ-27	0.5-1.0	180	4.0	0.7	1.75	2	3	2.80 7.11	1.10 2.79	2.600 6.600	0.900 2.290
MQ-28	0.5-1.0	360	6.0	1.25	2.0	1	4	4.50 11.43	1.10 2.79	4.000 10.160	0.900 2.290
MQ-29	0.7-0.9	60	0.70	0.15	1.50	2	3	1.00 2.54	1.10 2.79	0.800 2.030	0.900 2.290
MQ-31	0.95-1.25	180	3.0	0.5	1.75	2	3	2.80 7.11	1.10 2.79	2.600 6.600	0.900 2.290
MQ-33	1.0-2.0	60	0.8	0.25	1.7	2	3	0.80 2.03	1.20 3.05	.600 1.520	1.000 2.540
MQ-34	1.0-2.0	360	6.5	1.5	2.25	1	4	3.80 9.65	1.20 3.05	3.300 8.380	1.000 2.540
MQ-36	1.20-1.40	60	0.7	0.20	1.5	2	3	0.80 2.03	1.20 3.05	.600 1.520	1.000 2.540
MQ-39	1.7-2.4	15	0.7	0.15	1.5	2	3	0.80 2.03	1.20 3.05	.600 1.520	1.000 2.540
MQ-42	1.9-2.1	60	0.9	0.25	1.5	2	3	0.80 2.03	1.20 3.05	.600 1.520	1.000 2.540
MQ-44	2.0-4.0	180	4.0	0.75	2.0	2	3	2.40 6.10	1.00 2.54	2.200 5.590	0.800 2.030
MQ-45	2.0-4.0	360	7.0	1.75	2.25	1	4	3.50 8.89	1.00 2.54	3.000 7.620	0.800 2.030
MQ-47	2.2-2.3	60	1.0	0.25	1.5	3	1	0.75 1.91	1.00 2.54	— —	— —
MQ-49	2.2-2.3	180	3.0	0.6	1.75	2	3	2.25 5.72	1.00 2.54	2.050 5.210	0.800 2.030
MQ-52	2.9-3.1	180	3.0	0.6	1.75	2	3	2.25 5.72	1.00 2.54	2.050 5.210	0.800 2.030
MQ-54	3.3-3.7	60	1.2	0.3	1.7	3	1	0.75 1.91	1.00 2.54	— —	— —
MQ-59	4.0-8.0	40	1.4	0.25	2.0	3	1	0.60 1.52	1.00 2.54	— —	— —
MQ-60	4.0-8.0	360	8.5	2.0	2.5	1	4	3.00 7.62	1.00 2.54	2.500 6.350	0.800 2.030
MQ-63	4.4-5.0	15	1.0	0.15	1.5	3	1	0.60 1.52	1.00 2.54	— —	— —
MQ-64	4.4-5.0	60	1.2	0.25	1.65	3	1	0.60 1.52	1.00 2.54	— —	— —

INCHES / CENTIMETERS XX ±.03 XXX ±.010 / XX ±.08 XXX ±.025

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