

MODULATORS, BI-PHASE

SERIES MP

GENERAL INFORMATION: Bi-Phase modulators shift the phase of an RF signal by 180° upon application of a TTL logic signal. Logic 0 produces a reference (0°) phase and logic 1 changes the phase by 180°. Bi phase modulators can be used in carrier suppression systems. If an RF signal at a frequency f_a is applied to the RF terminal, and a square wave modulating signal, f_m , is applied to the bias terminal many frequencies are generated at the RF output. They are f_a , $f_a \pm f_m$, $f_a \pm 2f_m$ — $f_a \pm n f_m$. The carrier, f_a is suppressed a minimum of 20 dB on all models. Typical suppression on most models is 30dB. The first order sidebands are each down approximately 4dB., plus insertion loss. The even sidebands are down 25dB, and the odd sidebands are as follows:

3rd order sidebands—10 dB

5th order sidebands—14 dB

7th order sidebands—18 dB, etc.

FREQUENCY COVERAGE: 0.20 to 18.0 GHz.

RF IMPEDANCE: 50 OHMS.

D.C. REQUIREMENTS: For modulators with drivers, +5 Volts at +80 mA and -5 Volts at -80 mA. (Logic 0, reference. Logic 1, 180°.

For modulators without drivers, the bias for reference phase is from -1 Volt to -15 Volts, at '0' current. For 180° phase, the bias is +40 mA to +80 mA at approx. +1 volt.

RF POWER: 5 watts average, 100 watts peak.

Bi-Phase modulators can be built to handle 60 watts average and 8 kW peak on request.

TEMPERATURE INFORMATION: Operating temperature from -55°C to +85°C.

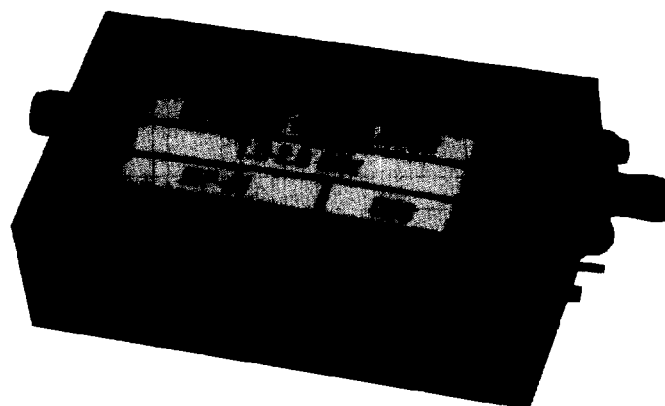
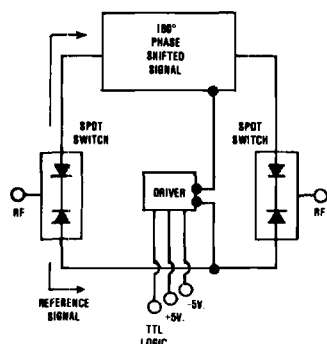
SWITCHING SPEED: Standard switching speed for all models is 500 nanosec. (750 nanosec. including storage and delay time). Any model can be switched in 10 nanoseconds (including storage and delay time) if required. However, the insertion loss will increase by 15%. For example, the MP-72 can be supplied with 10 nanoseconds switching speed, but the Min./Max. insertion loss will be 1.15 and 1.73 dB instead of 1.0 and 1.5 dB. If 10 nanoseconds is required add—1 to the model number when ordering.

ENVIRONMENT: MIL-E-5400, MIL-STD-202, MIL-E-16400, MIL-STD-883 (Special request only).

CONNECTORS: SMA standard, others on request.

NOTES:

1. If a driver is not required add—A to the model number. The thickness is reduced from 0.75 to 0.38 inches.
2. Other values of phase shift may be supplied in place of 180° on request. All other specifications remain unchanged.
3. Units covering frequency ranges other than those listed can be quoted on request. Multi-octave units are available.
4. If a narrow frequency bandwidth is required, Triangle Microwave 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.



ELECTRICAL PERFORMANCE

| Model No. | Frequency Range GHz | Phase Accuracy ± Deg. Max. | VSWR Max. | Insertion Loss Min./Max. dB | Outline |
|-----------|---------------------|----------------------------|-----------|-----------------------------|---------|
| MP-24 | 0.2-0.4 | 5.0 | 1.40 | 0.6/0.9 | 2 |
| MP-25 | 0.25-0.5 | 5.0 | 1.40 | 0.6/0.9 | 2 |
| MP-29 | 0.5-1.0 | 7.0 | 1.40 | 0.6/0.9 | 2 |
| MP-34 | 0.7-0.8 | 3.0 | 1.30 | 0.6/0.9 | 2 |
| MP-36 | 0.95-1.25 | 3.0 | 1.30 | 0.6/0.9 | 2 |
| MP-41 | 1.0-2.0 | 7.0 | 1.50 | 0.6/1.1 | 2 |
| MP-44 | 1.2-1.4 | 3.0 | 1.30 | 0.6/0.9 | 2 |
| MP-49 | 2.0-4.0 | 6.0 | 1.50 | 0.7/1.2 | 5 |
| MP-53 | 3.3-3.7 | 4.0 | 1.30 | 0.7/1.0 | 3 |
| MP-57 | 4.0-8.0 | 7.0 | 1.50 | 1.0/1.5 | 3 |
| MP-58 | 4.4-5.0 | 3.0 | 1.50 | 1.0/1.3 | 3 |
| MP-62 | 7.0-12.4 | 7.0 | 1.75 | 1.2/2.0 | 4 |
| MP-64 | 8.0-16.0 | 15.0 | 1.80 | 1.5/2.5 | 4 |
| MP-67 | 8.0-18.0 | 20.0 | 2.2 | 1.5/2.8 | 4 |
| MP-72 | 9.0-9.2 | 2.0 | 1.50 | 1.0/1.3 | 1 |
| MP-75 | 12.0-18.0 | 8.0 | 2.0 | 1.6/2.8 | 4 |
| MP-88 | 16.0-18.0 | 6.0 | 2.0 | 1.6/2.8 | 4 |

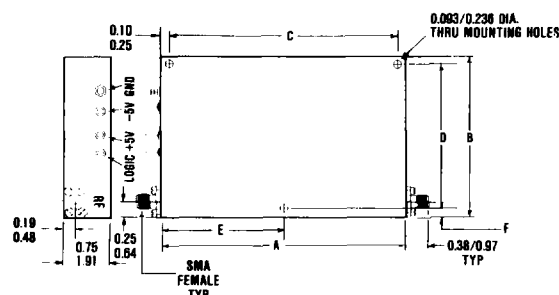
MULTI-OCTAVE BANDS

| | | | | | |
|-------|----------|------|------|---------|---|
| MP-90 | 0.2-0.5 | 10.0 | 1.50 | 2.4/3.0 | 8 |
| MP-92 | 0.5-2.0 | 8.0 | 1.70 | 2.6/3.2 | 7 |
| MP-94 | 2.0-8.0 | 7.0 | 2.00 | 3.0/4.3 | 5 |
| MP-98 | 6.0-18.0 | 12.0 | 2.25 | 5.0/7.0 | 6 |

MECHANICAL OUTLINES

| Out-line | A In./cm. | B In./cm. | C In./cm. | D In./cm. | E In./cm. | F In./cm. |
|----------|------------|-----------|-------------|-------------|----------------|-----------|
| 1 | 1.00/2.54 | 1.50/3.81 | 0.800/2.030 | 1.300/3.300 | 0.50/1.27 | 0.10/0.25 |
| 2 | 2.00/5.08 | 1.25/3.18 | 1.800/4.570 | 1.000/2.540 | 1.00/2.54 | 0.12/0.31 |
| 3 | 1.60/4.06 | 1.25/3.18 | 1.400/3.560 | 1.000/2.540 | 0.80/2.03 | 0.12/0.31 |
| 4 | 1.30/3.30 | 1.38/3.51 | 1.100/2.790 | 1.130/2.870 | N/A 4 HOLES | 0.12/0.31 |
| 5 | 3.00/7.62 | 1.25/3.18 | 2.800/7.110 | 1.000/2.540 | 1.50/3.81 | 0.12/0.31 |
| 6 | 2.50/6.35 | 1.00/2.54 | 2.300/5.842 | 0.800/2.032 | 1.25/3.18 | 0.10/0.25 |
| 7 | 4.00/10.16 | 2.00/5.08 | 3.800/9.652 | 1.800/4.572 | 2.00/5.08 | 0.10/0.25 |
| 8 | 4.00/10.16 | 3.00/7.62 | 3.800/9.652 | 2.800/7.112 | 2.00/5.08 | 0.10/0.25 |

Inches / Centimeters XX±.03XXX±.010 / XX±.08 XXX±.025



**KDI/triangle
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