



# Model F1938 Bi-Phase Modulator

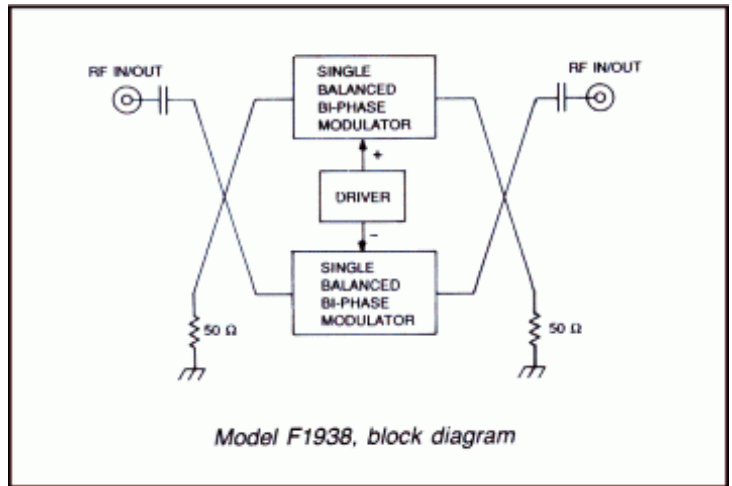
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Application Notes for [Microwave Phase Shifter](#)

- Frequency range: 6-18 GHz
- Different phase shift:  $180^\circ \pm 10^\circ$
- High speed: 5 nsec (10-90% RF)
- Low VSWR and insertion loss
- Small size, light weight

The Model F1938 is a high-speed  $0^\circ$  or  $180^\circ$  phase shifter that operates over the 6 to 18 GHz frequency range. It features a double-balanced design that provides excellent phase accuracy over its entire frequency range.

The rf design is shown below. The currents required to switch the unit between states are provided by the integrated driver, which is controlled by an external logic signal.



## PERFORMANCE CHARACTERISTICS

Frequency Range .....	6 to 18 GHz
Differential Phase Shift <sup>(1)</sup> .....	$180^\circ \pm 10^\circ$
<b>Switching Characteristics<sup>(2)</sup></b>	
ON Time.....	20 nsec. Max.
OFF Time .....	20 nsec. Max.
Rise Time .....	5 nsec. Max.
Fall Time .....	5 nsec. Max.
Insertion Loss <sup>(1)</sup> .....	>6 to 16 GHz, 3 dB max. >16 to 18 GHz, 3.5 dB max.
VSWR <sup>(1)</sup> .....	2.0 max.
<b>Change of Insertion Loss</b>	
<b>With Phase Shift</b> .....	1.0 dB max.
<b>Carrier Suppression</b> .....	20 dB min.
<b>Modulation Rate</b> .....	10 MHz max.
<b>Power Handling Capability</b>	
Without Performance Degradation .....	1W cw or peak 2W average, 25W peak (1 $\mu$ sec max. pulse width)
Survival Power .....	
<b>Power Supply Requirements</b> .....	+5V $\pm 5\%$ , 65 mA -12V to -15V, 20 mA

## Control Characteristics

Control Input Impedance .....	Schottky TTL, two-unit load. (A unit load is 2 mA sink current and 50 µA source current.)
Control Logic .....	Alternate applications of logic "0" (-0.3 to +0.8V) and logic "1" (+2.0 to +5.0V) switches phases by 180°

**NOTES:**

(1) With option 85, within Frequency Band of 16 to 18 GHz will be:

- a. Insertion Loss: 4 dB max
- b. Differential Phase Shift: 180° ±15°
- c. VSWR: 2.2:1 max.

(2) As measured with a phase bridge.

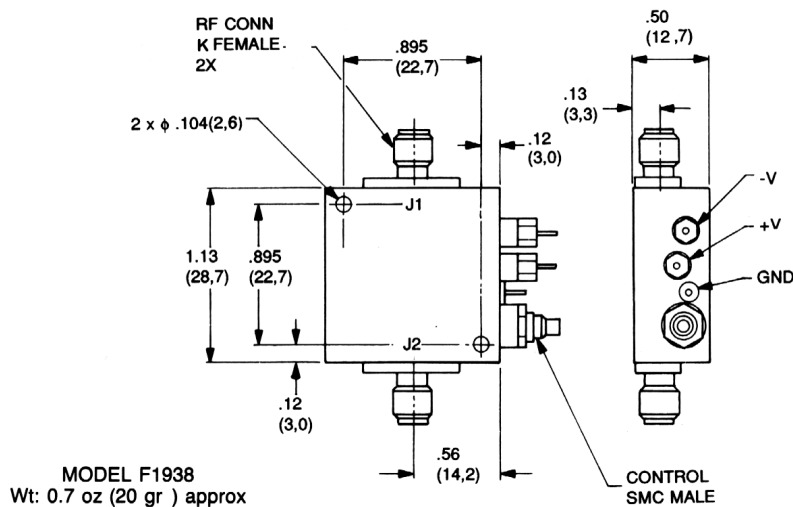
## ENVIRONMENTAL RATINGS

Operating Temperature Range .....	-65°C to + 110°C
Non-Operating Temperature Range .....	-65°C to + 125°C
Humidity .....	MIL-STD-202F, Method 103B, Cond. B (96 hrs. at 95%)
Shock .....	MIL-STD-202F, Method 213B, Cond. B (75G, 6 msec)
Vibration .....	MIL-STD-202F, Method 204D, Cond. B (.06" double amplitude or 15G, whichever is less)
Altitude .....	MIL-STD-202F, Method 105C, Cond. B (50,000 ft.)
Temp. Cycling .....	MIL-STD-202F, Method 107D, Cond. A, 5 cycles

## AVAILABLE OPTIONS

Option No.	Description
<b>3</b>	SMA female control connector
<b>7</b>	Two K male RF connectors
<b>10</b>	One K (J1) male and one K female (J2) RF connector
<b>33</b>	EMI filter solder-type control terminal
<b>85</b>	SMA RF connectors (see note (1) above for specification change with this option).

## DIMENSIONS AND WEIGHT



Dimensional Tolerances, unless otherwise indicated: .XX ±.02; .XXX ±.005



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