

CAL LAB

 HEWLETT  
PACKARD

**PULSE MODULATOR**  
2 to 18 GHz

model  
11720A

TECHNICAL DATA 1 SEPT 80

**Add High Performance Pulse Modulation  
to your Microwave Sources . . .**



**Featuring . . .**

- 2 to 18 GHz RF Range
- <10 ns Rise & Fall Times
- >80 dB On/Off Ratio

3 ns/div.

# 11720A Pulse Modulator

## Description

The Hewlett-Packard Model 11720A Pulse Modulator is a high-performance, state-of-the-art microwave pulse modulator covering the 2 to 18 GHz frequency range. Because of its wide frequency coverage, the 11720A is suitable for adding pulse modulation capability to many microwave signal sources and eliminating the need for several individual narrowband modulators in many applications.

The 11720A Pulse Modulator features extremely short rise and fall times and a high ON/OFF ratio, making it suitable for testing most pulsed radar systems. For systems with wide frequency coverage, such as surveillance receivers, the superior performance and frequency coverage of the 11720A make it an ideal accessory for wideband sweepers and synthesizers.

Internally, the modulator used in the 11720A is a

series-shunt PIN diode switch. This configuration offers a superior input match over a simple shunt diode switch where the input power is reflected back to the source in the "OFF" state. In the 11720A, the series components reduce this reflection without significantly increasing the insertion loss.

The 11720A contains all the necessary modulator drive circuitry for the specified rise and fall times. This means that a standard pulse generator can supply the pulse input. No external modulator driver or shaping circuit is necessary. In fact, almost any video source that can deliver >3 V peak into 50 ohms can be used without affecting rise/fall times or ON/OFF ratio performance. In addition, a normal/complement function is provided to adapt the 11720A to positive-true or negative-true logic inputs.

## Specifications

**Frequency Range:** 2 to 18 GHz.

**ON/OFF Ratio:** >80 dB.

### Insertion Loss:

2 to 12.4 GHz: <6 dB.

2 to 18 GHz: <10 dB.

**Rise ( $T_R$ ) and Fall ( $T_F$ ) Times:** <10 ns.

**Maximum RF Input Power:** +20 dBm.

**Minimum RF Pulse Width<sup>1</sup> ( $T_{RF}$ ):** <50 ns.

**Pulse Width Compression ( $T_V - T_{RF}$ ):** <20 ns.

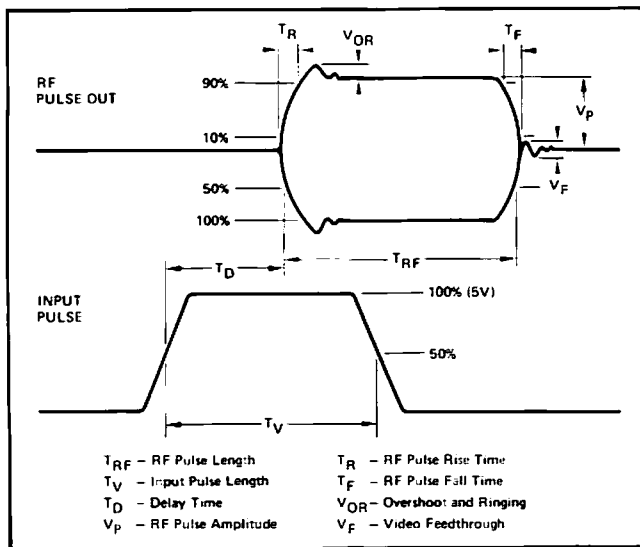
**Maximum Pulse Repetition Rate:** >5 MHz.

**Maximum Delay Time ( $T_D$ ):** <60 ns.

**Video Feedthrough ( $V_F$ ):** <60 mV peak-to-peak.

**Overshoot, Ringing<sup>2</sup> ( $V_{OR}/V_P$ ):** <0.2

### Pulse Definitions:



<sup>1</sup> Off time must be  $\geq 140$  ns.

<sup>2</sup> Overshoot and ringing may be reduced by operating at <10 dBm RF input and >+15°C ambient temperature.

<sup>3</sup> For pulse repetition rates <1 MHz.

<sup>4</sup> Operation at 360 - 440 Hz limited to  $\leq 126.5$  V.

### Pulse Input

**Normal Mode:** >3 V (on), <0.5 V (off).

**Complement Mode:** <0.5 V (on), >3 V (off).

**Impedance:** 50  $\Omega$  nominal.

### Damage Levels

**RF Input:** ac: 2 watts (+33 dBm).

dc: 40 volts.

**Pulse Input:**  $\pm 6$  V peak from  $\geq 50 \Omega$  Source.

+6 V peak, -0.5 V peak from <50  $\Omega$  Source.

### Connectors

**RF (IN and OUT):** Type N Female.

**Pulse Input:** BNC Female.

### General

**Operating Temperature:** 0°C to +55°C.

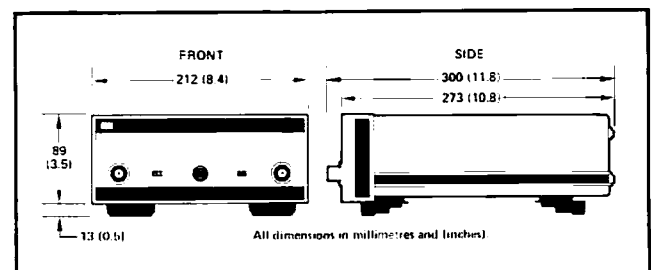
**RF Leakage<sup>3</sup>:** Meets Radiated and Conducted Limits of MIL-I-6181D.

**Power<sup>4</sup>:** 100, 120, 220, 240 V; +5%, -10%.

48-440 Hz; 25 VA max.

**Weight:** Net, 2.6 kg (5 lb, 12 oz); shipping, 3.6 kg (8 lb).

### Dimensions:



### Ordering Information

11720A Pulse Modulator

Price

\$2600

*Domestic U.S.A. Prices Only  
Prices and Data subject to change*