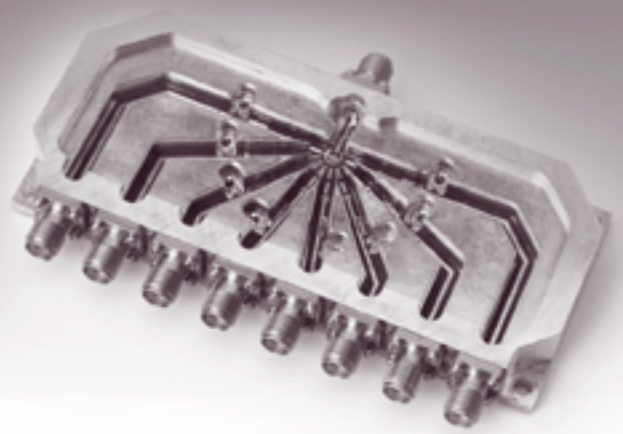
# Microwave Switches



- **SPST To SP16T Switches**
  **High Frequency Switches**
  **Low-Frequency Switches**
- **Drop-in Switches**
- **Transfer Switches**
- **High Power Switches**

## GENERAL INFORMATION

### Insertion Loss

The difference in power, measured in dB, between input level and output level when the unit is at low loss condition and all other throws are off.

### Isolation

The  in power, measured in dB, between input level and output level when the unit is at high loss condition. Isolation of the off throws in multithrow switches is measured with another throw at low loss condition and is properly terminated.

### VSWR

The ratio between the reflected signal and the incident signal.

### Power Handling Capability

The maximum CW power to which the unit can be subjected without possible permanent damage. This rating is based on the assumption that a 50 ohm source and load are used and that the control voltages and temperature range are within the specified limits.

### Switching Time

The time required for the device to attain 90% of the final RF signal referenced to the 50% level of the command logic (see Figure 1).

### Recommended Driver Waveforms

The time required for PIN diodes to change state is a function of drive current, driving impedance and parameters of the diodes. To achieve specified switching speed (in units without a driver), current spikes are necessary (see Figure 2).

### Switching Transients

One of the consequences of fast switching are the switching transients which appear at the RF ports.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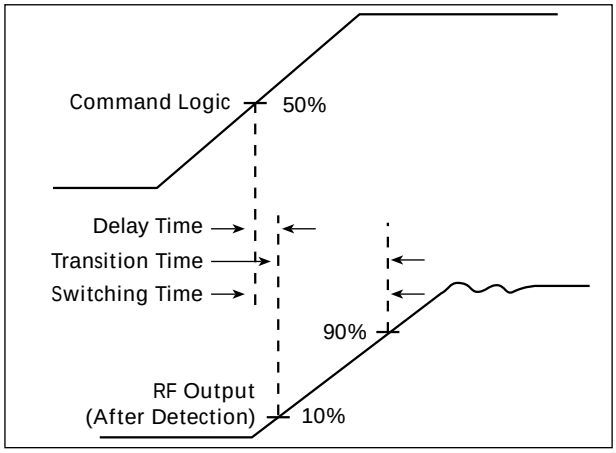


Figure 1. Switching Time Curves

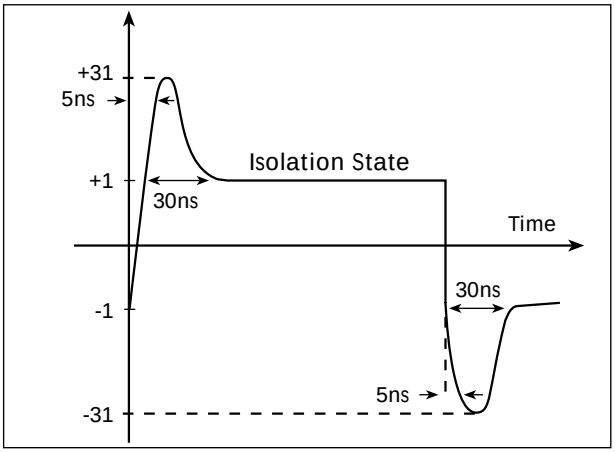


Figure 2. Recommended Driver Waveform

The transients are due to the DC shifts which occur internally in the switch during switching. Transients can cause problems because their spectral content can cause false signals to occur during switching. The problem is particularly serious when the spectral content is inside the RF band of the switch. The frequency of the transient spectral content is a function of the speed of the switch. Faster switching produces transient energy at higher frequencies. The amplitude of the transients is higher for faster switching speeds and for switches designed for lower frequencies. To decrease this effect, Elisra uses built-in, small size, low loss, high pass filters. Another way to decrease this effect is by using slower switching speed switches.

## Video Leakage Measurements

Transients are specified in several ways. One approach is to specify the maximum allowable amplitude of the transient found at each of the RF ports. Alternately, when the majority of the spectral content is outside the switch RF band, transient amplitude can be specified in-band only. This can be measured by filtering off the out-of-band transient energy. An additional method specifies the spectral content, in dBm, in the RF band of interest.

## Input Drive Requirements*

| Speed | "0" Logic | "1" Logic |
|---|---|---|
| Low speed | 0.8V max. 1.6 mA | 2.5V min. 0.04 mA |
| High speed | 0.8V max. 5.0 mA | 2.5V min. 4.0 mA |

* Provided for high speed modules.

The measuring technique is described in the following set-up schematic (see Figure 3).

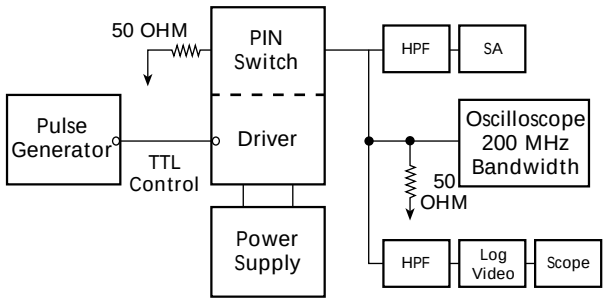


Figure 3. Video Leakage Measuring Technique

## Test Conditions

**Switching Rate:** Maximum switching rate specified

**Pulse Width:** 50% of time period

**RF Input:** None

**Power Supplies:** ON

**RF Ports:** All RF ports are 50 ohms terminated

**Definition:** The video leakage measured by the set-up is defined by the maxmum spike that occurs (mV peak to peak)

***NOTE:*** *50 ohm terminations should be connected to all RF ports.*