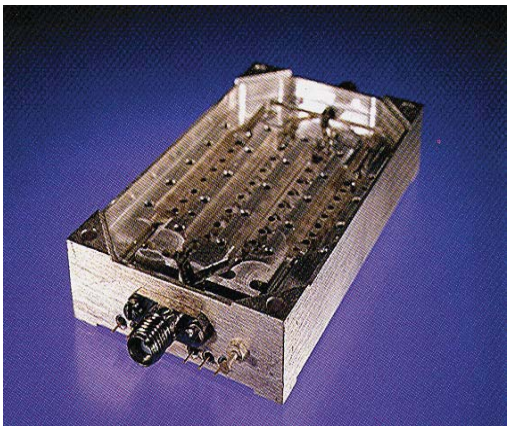
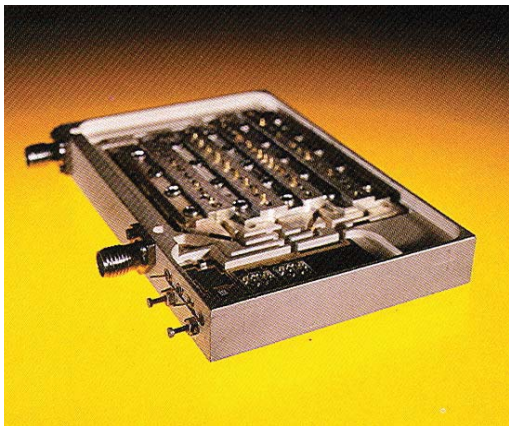
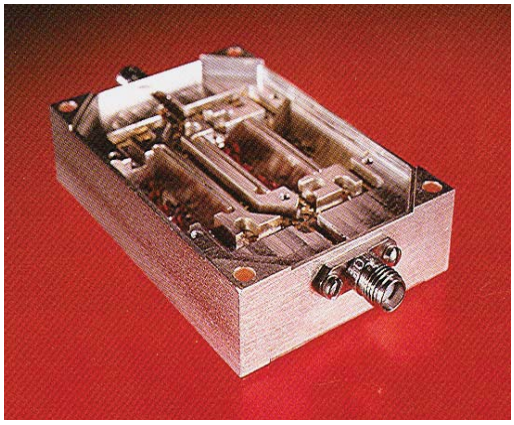
Switch Filters







DESCRIPTION The Microphase Switch Filters are custom designed assemblies of Microphase filters, solid-state switches and switch drivers optimally integrated to achieve a specific requirement. Achieving optimal performance requires a rigorous design trade off in individual filter, switch and driver designs combined with careful integration and tuning. The ability to tune and match the constituent parts in an assembly offers improved overall performance with significant size and cost benefits. Microphase presently has produced over 90 switch filter assemblies in the 10 MHz to 22 GHz frequency range.

TYPES Most switch filter assemblies feature one input port and one output port with two or more alternately selectable filter paths (thru path optional). A low loss, well-matched response is achieved for the selected filter passband with a reflective out-of-band response maintaining high isolation and rejection. Optionally, multiple input or outputs may be specified to alternately route the main signal, combine multiple signals or inject BIT signals for testing purposes.

Switched multiplexers are typically used where the slight increase in insertion loss of a solid-state switch is unacceptable. By replacing the input switch with a multiplexer, lower overall loss and reduced switching time is achieved. Since the input signal is always present at the output switch, the group delay of the filter will not add to the selected band transition time, an advantage in fast switching synthesizer applications.

FILTERS Virtually any type of Microphase filter or multiplexer can be integrated into a switch filter assembly. Lumped element lowpass, highpass or bandpass filters are typically used at lower frequencies where size is a primary consideration. At higher frequencies, Combline bandpass filters are used where their reduced height and ease of tuning offer performance advantages.

SWITCHES PIN diode and GaAs FET switches are used depending upon the specific switching requirements. Monolithic GaAs switches use 3 terminal FET transistors to achieve extremely fast switching speeds (≤ 10 nsec.) very low bias power (mW) and small size. Unfortunately they suffer from poor insertion loss and isolation that degrades rapidity with frequency. The poor isolation and increased insertion loss generally limit their use to frequencies less than 4 GHz.

These units can be designed to your specification. Please contact Microphase for your special design requirements.

Excellent Electrical Performance

High Isolation

Low Insertion Loss and Low VSWR

PIN diodes are two terminal devices with impedance that is determined by the bias current flowing through them. Forward current on the order of 10 mA will produce a series resistance less than 5 Ohms and a reverse voltage will produce a negligible leakage current and a series resistance greater than 5K Ohms with a parasitic capacitance generally less than 1 pF. A PIN diode in the low impedance state is used in series to conduct RF with low loss or used in shunt to short out RF with high isolation. Conversely, a PIN diode reverse biased to a high impedance is used in series to block RF with high isolation or used in shunt to pass RF with low loss. Frequency range 10 MHz to 26 GHz.

All series diode switches are small, multiple throw broadband, multi-octave designs with a simplified driver but suffer from slow switching speed (1µsec.), moderate power handling, and poor isolation at higher frequencies.

All shunt diode designs are larger, generally restricted to SP2T octave bands but switch fast (25 nsec.), handle high power and feature low insertion loss at high frequencies.

The most common design is a series, shunt switch to achieve a multiple throw, broadband, fast switching and good isolation with moderate insertion loss and power handling capabilities.

DRIVERS Microphase integral drivers are designed to provide the proper control element bias dependent upon input TTL control signals. +5 volts and -5, -12 or -15 volts are standard bias voltages with the current draw determined by the specific assembly requirements. Normally, Binary Coded Descimal (BCD) parallel line TTL inputs are internally decoded to select the desired switch path. Alternately, a single line for each switch path may be specified.

SPECIFICATIONS	
Frequency Range	10 MHz to 22 GHz
Switching Speed	10 nsec. to 1 µsec.
Input Power	up to +27 dBm CW
Control	TTL Binary or Binary Coded Decimal
Power Supply	+ 5 volts and -5 or -12 or -15 volts
Size	2" x 1.5" x .25" (0.75 in.^{3}) to 7" x 4.6"x 1.63" (52 in.^{3})
Number of Channels	2 to 10
Insertion Loss	2 to 8 dB
Isolation	40 to 75 dB
VSWR	1.3:1 to 2.0:1

These units can be designed to your specification. Please contact Microphase for your special design requirements.