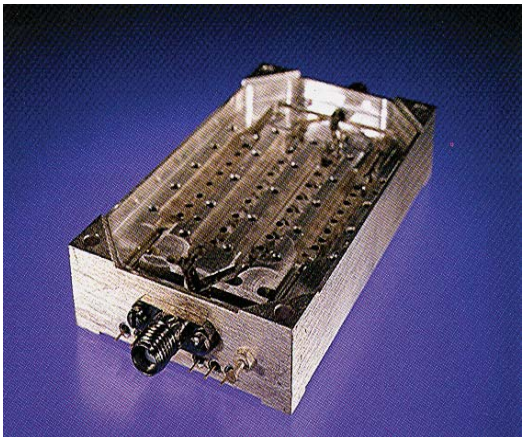
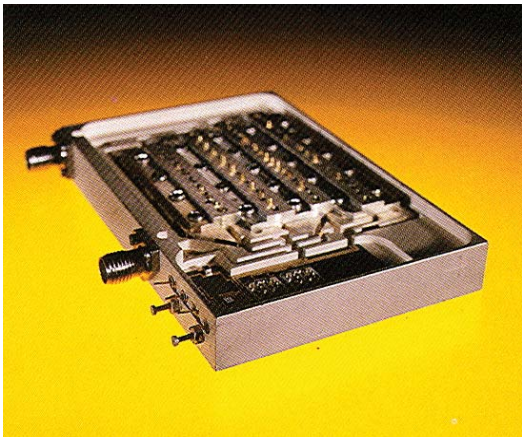
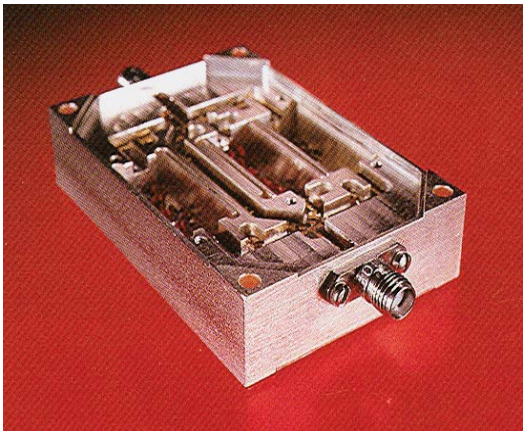
Switch Filters







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.

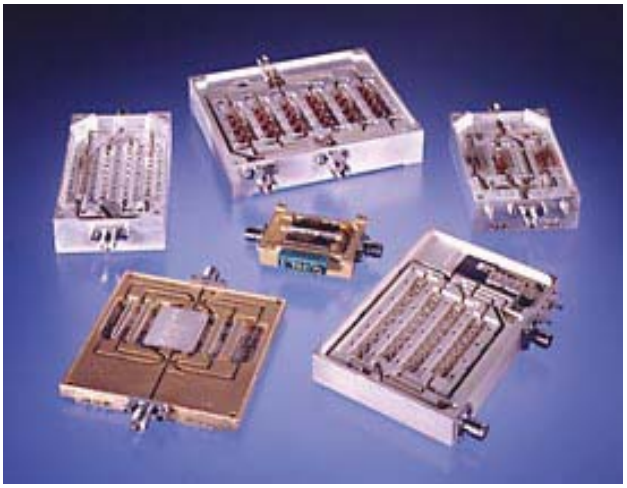
FILTERS Virtually any type of Microphase filter or multiplexer can be integrated into a switch filter assembly. Lumped element lowpass, highpass or bandpass filters are typically used at lower frequencies where size is a primary consideration. At higher frequencies, Combline bandpass filters are used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

Switch Filters

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

Switch Filters



Excellent Electrical Performance

High Isolation

Low Insertion Loss and Low VSWR

insertion loss generally limit their use to frequencies less than 4 GHz. 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

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Switch Filters

SM - Series SPMT

Solid-State Switch Modules with Integral Drivers

Switch Filters

Available Options

Higher Isolation

Alternative Logic

Special Mechanical Configurations

Choice of DC Power

Integrated Filters

Limiter Protection

Reliability Screening

SMA connectorized Versions Available

Lower Frequency Coverage

TTL CONTROL	
Logic "0"	Insertion Loss State
Logic "1"	High Isolation State

SWITCHING SPEED	
(50% TTL to 90% RF)	50 nses. max.
(50% TTL to 10% RF)	50 nses. max.

POWER SUPPLY REQUIREMENTS	
	+5 volts and -5, -12 or -15 volts

ABSOLUTE MAXIMUM RATINGS	
Operating Temperature Range	-55°C to +95°C
Storage Temperature Range	-55°C to +125°C
Maximum RF Power	500 mW CW

DESCRIPTION The Microphase SM-Series SPMT broadband, multi-throw, solid-state switch modules, with integral drivers are suited for microwave systems and sub-assemblies where a number of components are integrated. Typical applications include high-speed channel selection and pulse modulation. Wideband performance of these switching networks is due to the lumped-element bias structures with passivated PIN diodes. An important feature of the SM-Series is that the RF portion of the unit is integrated with a buffered TTL driver, assuring true TTL compatibility.

ADVANTAGES The advantages of the SM Series switches can be conveniently mounted in any 50 Ohm microstrip, stripline or coaxial configuration. The internal layout of these devices is such that filters and limiters may be incorporated within the modules. Other options, such as higher isolation or lower insertion loss, as well as alternate voltage or logic requirements may be specified. Specific mechanical requirements can also be accommodated. These switches are conservatively rated, are hermetically sealed and offer high reliability in a rugged, compact package.

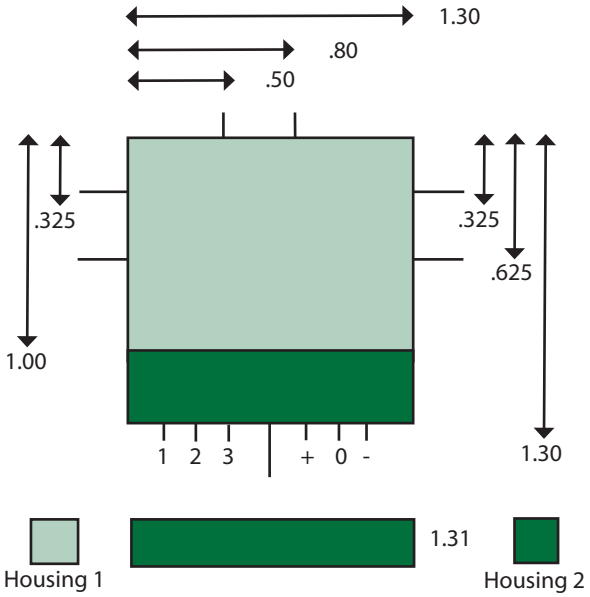
These units can be designed to your specification. Please contact Microphase for your special design requirements.

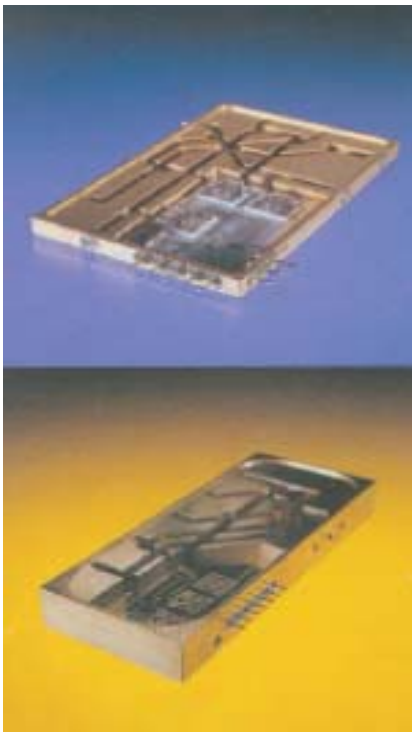
SM - Series SPMT

Solid-State Switch Modules with Integral Drivers

Switch Filters

- Excellent RF Performance
- Low Insertion Loss
- High Isolation
- Fast Switching





SPECIFICATIONS

	Frequency Range GHz	VSWR max.	Insertion Loss dB max.	Isolation dB min.	Housing
SP2T 2SM328	2-8	1.7:1	1.5	60	1
2SM3618	6-18	1.9:1	2.3	55	1
2SM3218	2-18	2.0:1	2.5	55	1
SP3T 3SM328	2-8	1.8:1	1.6	60	1
3SM3618	6-18	2.0:1	2.8	55	1
3SM3218	2-18	2.0:1	2.9	50	1
SP4T 4SM328	2-8	1.8:1	1.8	60	1
4SM3618	6-18	2.0:1	2.8	55	1
4SM3218	2-18	2.0:1	3.0	50	1
SP5T 5SM328	2-8	2.O:1	2.0	60	2
5SM3618	6-18	2.0:1	3.0	50	2
5SM3218	2-18	2.2:1	3.1	50	2
SP6T 6SM328	2-8	2.O:1	2.0	60	2
6SM3618	6-18	2.0:1	3.1	50	2
6SM3218	2-18	2.2:1	3.3	50	2

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