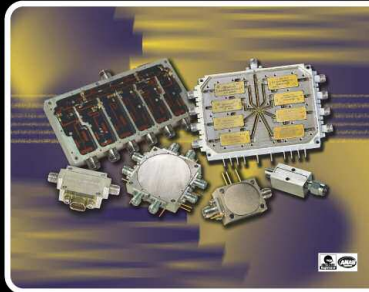


MICROWAVE CONTROL PRODUCTS



- PIN Switches
- Analog And Digital PIN Attenuators
- Analog And Digital Phase Shifters
- Custom Integrated Assemblies



 PIN Switches

 High Power Switches

 Custom Switch Applications

 Integrated Switch Assemblies

 Modulators

 Analog & Digital PIN Attenuators

 Analog & Digital Phase Shifters

 Custom Integrated Assemblies

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INTRODUCTION

This catalog provides designers with an overview of the microwave control products currently available from MITEQ. These products represent specific existing designs and the level of performance they provide. This catalog is organized into nine major sections:

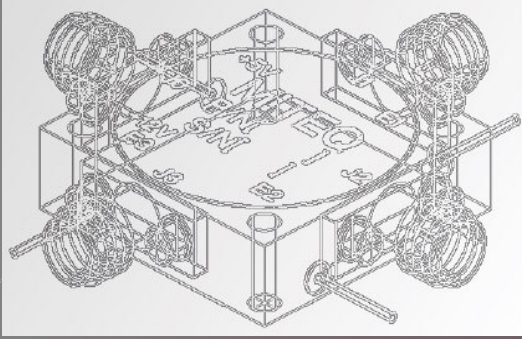
- PIN Switches
- High Power Switches
- Custom Switch Applications
- Integrated Switch Assemblies
- Modulators
- Analog and Digital PIN Attenuators
- Analog and Digital Phase Shifters
- Custom Integrated Assemblies

Included are technical notes and specification definitions to help you in understanding our component design parameters. These can assist you in defining your specific requirements.

In addition to these standard products, much of MITEQ's Microwave Control Department's production is devoted to custom designs. For variations on catalog performance or optimizing key parameters such as frequency range, insertion loss, power and VSWR, to meet your specific requirements, please contact MITEQ for assistance.

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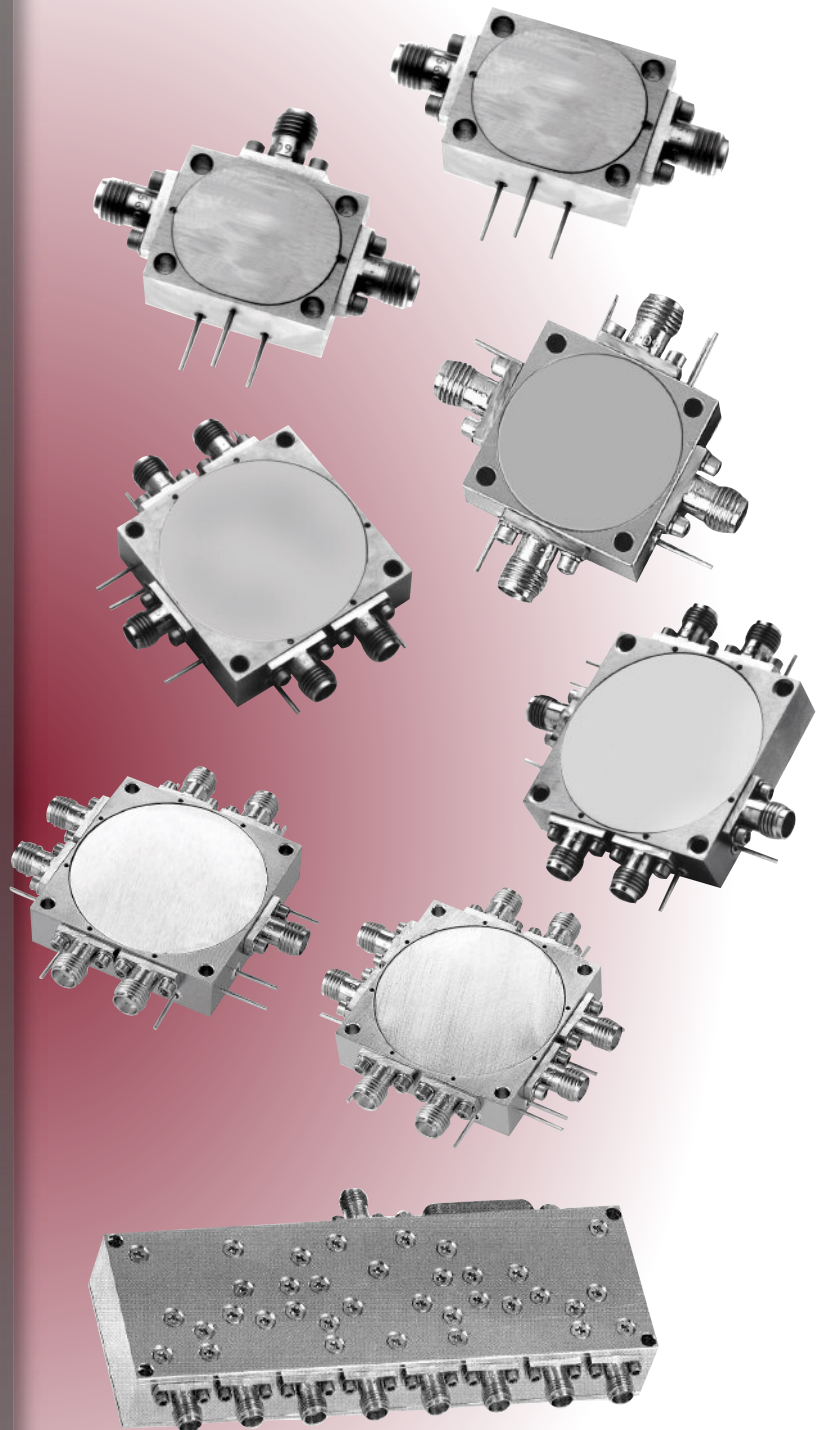
SWITCHES



MITEQ offers a broad line of switches covering multioctave bands from 80 MHz to 44 GHz. Single-pole, single-throw through single-pole, eight-throw switches are available as standard products. We can, on special request, provide switches up to single-pole, twelve-throw and can array switches to form switch matrices to handle signal routing in complex systems.

Our switches can be screened to the salient characteristics of MIL-STD-883 and we offer a variety of connector options including GPO and SMA. Custom high power switches capable of switching up to 500 Watts CW, 5K Watts peak are also available.

Our standard products achieve switching times as low as five nanoseconds for those applications requiring the ultimate in switching speed. We are able to accommodate special video filters and pulse-shaping networks as needed.



MULTIOCTAVE SWITCHES -80 TO 44 GHz, UP TO SINGLE-POLE 12-THROW

DEFINITIONS OF PIN DIODE SWITCHES

PIN diode switches are often used to control the path of RF signals. Depending on the performance requirements, the switch can consist of all series diodes, all shunt diodes or a combination of series and shunt diodes. The impedance of the diode is determined by its DC bias. When forward biased, the diode impedance is very low. When reverse biased, the diode impedance is high.

SWITCH TYPES

There are two types of PIN diode switches, reflective or absorptive. With reflective switches, the RF signal at the "off" port is reflected back to the source due to the poor match. In general, these switches are simple in design, slightly lower in cost and can handle higher power than absorptive switches.

Absorptive switches provide a matched termination to the inactive ports. Because they absorb the RF signal, they are limited by the power handling capability of the terminations. These switches are slightly more complex in their design.

INSERTION LOSS

The maximum loss a signal experiences in dB when sent in through the common port and out the port in the "on" state.

ISOLATION

The suppression of a signal in excess of the insertion loss by an "off" port. It is the ratio of the power level when the switch is "on" to the power level when the switch is "off".

VSWR

A measure of the relationship between the switch impedance (Z) and the source or load impedance (Z_0). MITEQ's switches are typically designed to perform in a 50 ohm system.

SWITCHING SPEED

The time to change the state of a switch arm from "on" to "off" or "off" to "on". It is characterized in two ways: rise/fall time and on/off time.

Rise time is the time period from the 10% to the 90% of the square law detected RF output as a switch arm is changed from an "off" state (isolation) to an "on" state (insertion loss).

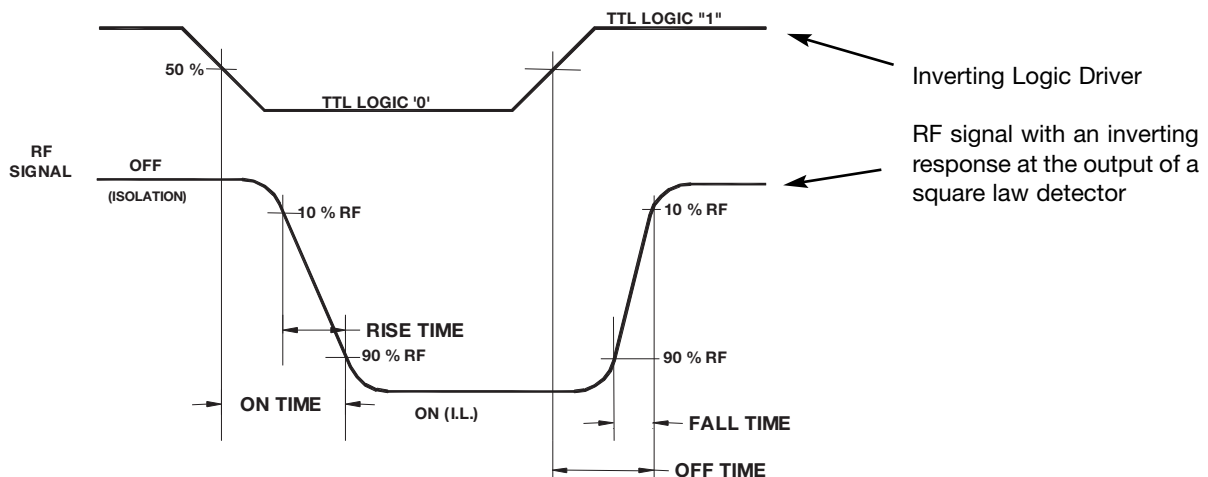
Fall time is the time period from the 90% to the 10% of the square law detected RF output as a switch arm is changed from an "on" state (insertion loss) to an "off" state (isolation).

Rise and fall times do not include the switch driver delay time.

On time is the time period from the 50% of the transition of the input command to 90% of the square law detected RF output as the switch arm is changed from an "off" state (isolation) to an "on" state (insertion loss).

Off time is the time period from the 50% of the transition of the input command to 10% of the square law detected RF output as the switch arm is changed from an "on" state (insertion loss) to an "off" state (isolation).

The "on" and "off" times include the driver propagation delay.



DEFINITIONS OF PIN DIODE SWITCHES (CONT.)

VIDEO LEAKAGE

Video leakage refers to the spurious signals present at the RF ports of the switch when it is switched without an RF signal present.

POWER HANDLING (FULL PERFORMANCE)

Defined as the maximum input power the switch can handle without degradation of performance.

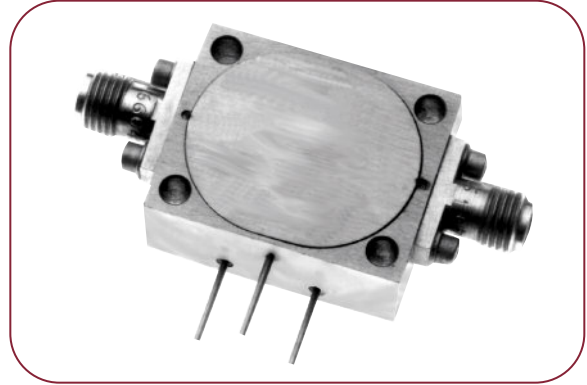
POWER HANDLING (NO DAMAGE)

Defined as the maximum input power the switch can handle without damaging the device but with degradation in performance.

SINGLE-POLE SINGLE-THROW SWITCHES

FEATURES

- Multioctave bands 0.2 to 18 GHz
- Current or TTL control
- Low insertion loss
- High isolation
- Ultra high speed models (5 ns) available
- Drop-in models available



Frequency Range (GHz)	Model Number	Insertion Loss (dB, Max.)	Isolation (dB, Min.)	VSWR* (Max.)	Type	Rise/Fall Time (ns, Typ.)	On/Off Time (ns, Typ.)	On/Off Time (ns, Max.)	DC Power Positive (mA, Max.)	DC Power Negative (mA, Min.)
STANDARD, MULTIOCTAVE BAND MODELS										
0.2–2	SW1-002020RN1NF	1.7	70	1.6:1	Reflective	10/10	20	35	35	70
	SW1-002020AN1NF	1.8	75	1.6:1	Absorptive	10/10	20	35	35	70
0.5–2	SW1-005020RN1NF	1.5	80	1.6:1	Reflective	10/10	20	35	35	70
	SW1-005020AN1NF	1.7	75	1.6:1	Absorptive	10/10	20	35	35	70
2–8	SW1-020080RN1NF	2	80	1.7:1	Reflective	10/10	20	35	35	70
	SW1-020080AN1NF	2.2	70	1.7:1	Absorptive	10/10	20	35	35	70
4–12	SW1-040120RN1NF	2.2	80	1.7:1	Reflective	10/10	20	35	35	70
	SW1-040120AN1NF	2.6	65	1.7:1	Absorptive	10/10	20	35	35	70
2–18	SW1-020180RN1NF	3	80	2:1	Reflective	10/10	20	35	35	70
	SW1-020180AN1NF	3	60	2:1	Absorptive	10/10	20	35	35	70
1–18	SW1-010180RN1NF	3	70	2:1	Reflective	10/10	20	35	35	70
	SW1-010180AN1NF	3.2	60	2:1	Absorptive	10/10	20	35	35	70
OPTIMIZED PERFORMANCE MODELS										
0.8–18	SW1-008180RN1NF	4	70	2:1	Reflective	5	35	40	35	35
0.1–20	SW1-001200RN1NF	5	80	2:1	Reflective	10	35	40	35	35
0.5–2	SW1-005020AN1NF	1.8	75	1.6:1	Absorptive	8	35	40	35	35
0.5–18	SW1-005180RN1NF	3	70	2:1	Reflective	10	35	40	35	70
2–2.2	SW1-020022RN1NF	1	40	1.7:1	Reflective	20	35	40	70	70
2–8	SW1-020080AN1NF	2	55	1.7:1	Absorptive	5	35	40	35	35
3–3.4	SW1-030034AN1NF	1	60	1.5:1	Absorptive	10	35	40	35	70
3–9	SW1-030090RN1NF	1.7	60	1.7:1	Reflective	10	35	40	35	70
3.5–4.5	SW1-035045AN1NF	2	80	1.7:1	Absorptive	20	35	40	60	60
9–9.2	SW1-090092RN1NF	1	70	1.7:1	Reflective	20	35	40	35	70
9.1–9.7	SW1-091097AI2NF	2.6	65	1.7:1	Absorptive	10	30	35	35	70

See outline drawing 193286.

Electrical performance of multioctave models can be optimized over narrower bandwidths, or for a particular parameter. Electrical options include: Lower insertion loss, lower VSWR, higher isolation, high power and flat amplitude response. Mechanical/Control options include: Custom packaging, single supply operation, and ultra-fast on/off time. Consult MITEQ for options.

*For reflective models, VSWR is not specified in the "Off" state. For absorptive models, VSWR in the "Off" state is defined for port J2 only.

TTL CONTROL LOGIC

Non-inverting	Logic 0 (low) (0 to 0.8 V)	Insertion loss
	Logic 1 (high) (2.4 to 4.7 V)	Isolation
Inverting	Logic 0 (low) (0 to 0.8 V)	Isolation
	Logic 1 (high) (2.4 to 4.7 V)	Insertion loss

SP1T	Non-inverting		Inverting	
	Control Input	Signal Path	Control Input	Signal Path
	E1	J1 – J2	E1	J1 – J2
	Low	I. loss	Low	Isolation
	High	Isolation	High	I. loss

SP1T SWITCH ORDERING INFORMATION

To order a switch, please include the model number derived from the following table. If requesting a quotation for a switch not listed in this catalog, please consult MITEQ. Include any additional specifications that are not listed.

	SW	1	- 020	180	A	N	1	N	F
SWITCH _____									
Number of throw(s) _____									
Frequency (100's of MHz)									
Lower frequency _____									
Upper frequency _____									
Type _____									
Absorptive.....									
Reflective									
Logic _____									
Non-inverting									
Inverting									
No driver									
Power Supply _____									
+5 V, -12 V									
+5 V, -5 V									
+5 V, -15 V									
+12 V, -12 V									
+15 V, -15 V									
No driver									
Hermeticity _____									
Non-hermetic									
Hermetic									
Connectors _____									
SMA-Female									
SMA-Male									

Note 1: For “no driver” option, unit is current controlled through logic control pin, -20 mA for low loss condition and +20 mA for isolation state. Switching speeds are not measured on driverless units.

Note 2: This option has 0.2 dB higher insertion loss, on/off time is 50 ns maximum and rise/fall time is 30 ns typical.

AVAILABLE OPTIONS

- Add suffix FS Ultra-fast switching (SP1T Reflective only with power supply Option 1)
- Add suffix VL1 Common port video filter
- Add suffix VL2 Output port(s) video filter
- Add suffix VL3 Both common port and output port(s) video filter
- Add suffix HP Higher power (alternate package configurations)

Example:

The above illustrated part number SW1-020180AN1NF is for the following:

- Switch SP1T
- 2 to 18 GHz
- Absorptive
- Non-inverting
- +5 V, -12 V
- Non-hermetic
- SMA-F connectors

Consult MITEQ for additional options.

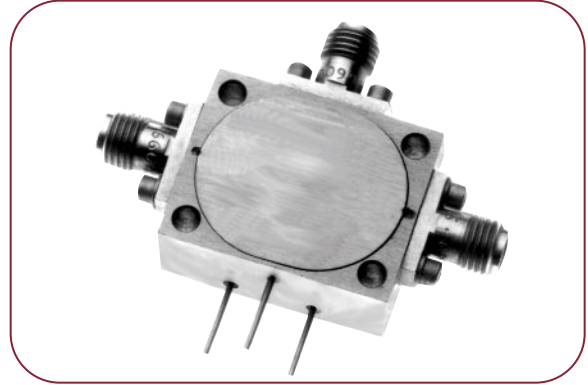
When additional options are ordered, MITEQ will add a 4 digit number (-SXXXX) suffix to the part number.



SINGLE-POLE TWO-THROW SWITCHES

FEATURES

- Multioctave bands 0.2 to 18 GHz
- Current or TTL control
- Low insertion loss
- High isolation
- Drop-in models available



Frequency Range (GHz)	Model Number	Insertion Loss (dB, Max.)	Isolation (dB, Min.)	VSWR (Max.)	Type	Rise/Fall Time (ns, Typ.)	On/Off Time (ns, Typ.)	On/Off Time (ns, Max.)	DC Power Positive (mA, Max.)	DC Power Negative (mA, Min.)
STANDARD, MULTIOCTAVE BAND MODELS										
0.2–2	SW2-002020RN1NF	1.5	70	1.6:1	Reflective	10/10	20	35	60	60
	SW2-002020AN1NF	2	75	1.6:1	Absorptive	10/10	20	35	60	60
0.5–2	SW2-005020RN1NF	1.3	80	1.6:1	Reflective	10/10	20	35	60	60
	SW2-005020AN1NF	1.8	75	1.6:1	Absorptive	10/10	20	35	60	60
2–8	SW2-020080RN1NF	1.8	80	1.7:1	Reflective	10/10	20	35	60	60
	SW2-020080AN1NF	2	70	1.7:1	Absorptive	10/10	20	35	60	60
4–12	SW2-040120RN1NF	2.2	80	1.7:1	Reflective	10/10	20	35	60	60
	SW2-040120AN1NF	2.2	65	1.7:1	Absorptive	10/10	20	35	60	60
2–18	SW2-020180RN1NF	2.8	80	2:1	Reflective	10/10	20	35	60	60
	SW2-020180AN1NF	3	60	2:1	Absorptive	10/10	20	35	60	60
1–18	SW2-010180RN1NF	3	70	2:1	Reflective	10/10	20	35	60	60
	SW2-010180AN1NF	3.2	60	2:1	Absorptive	10/10	20	35	60	60
OPTIMIZED PERFORMANCE MODELS										
0.1–10	SW2-001100AN1NF	3.5	60	2:1	Absorptive	20/20	35	40	60	60
0.3–5	SW2-003050AN1NF	2.5	60	2.2:1	Absorptive	20/20	30	35	60	60
0.8–4	SW2-008040RN1NF	1.5	70	1.7:1	Reflective	100/100	200	300	60	60
1.2–2	SW2-012020RN3NF	0.8	90	1.2:1	Reflective	20/50	70	100	250	150
3.1–4.3	SW2-031043AI3NF	1.5	90	1.8:1	Absorptive	20/50	70	100	150	150

See outline drawing 193287.

Electrical performance of multioctave models can be optimized over narrower bandwidths, or for a particular parameter. Electrical options include: Lower insertion loss, lower VSWR, higher isolation, high power and flat amplitude response. Mechanical/Control options include: Custom packaging, single supply operation, fast on/off time and BCD decoder. Consult MITEQ for options.

TTL CONTROL LOGIC

Non-inverting	Logic 0 (low) (0 to 0.8 V)	Insertion loss
	Logic 1 (high) (2.4 to 4.7 V)	Isolation
Inverting	Logic 0 (low) (0 to 0.8 V)	Isolation
	Logic 1 (high) (2.4 to 4.7 V)	Insertion loss

SP2T	Non-inverting			Inverting		
	Control Input E1	Control Input E2	Signal Path	Control Input E1	Control Input E2	Signal Path
	Low	High	J0 – J1	High	Low	J0 – J1
	High	Low	J0 – J2	Low	High	J0 – J2

SP2T SWITCH ORDERING INFORMATION

To order a switch, please include the model number derived from the following table. If requesting a quotation for a switch not listed in this catalog, please consult MITEQ. Include any additional specifications that are not listed.

	SW	2	-	020	180	A	N	1	N	F
SWITCH										
Number of throw(s)										
Frequency (100's of MHz)										
Lower frequency										
Upper frequency										
Type										
Absorptive.....	A									
Reflective.....	R									
Logic										
Non-inverting.....	N									
Inverting.....	I									
No driver.....	X (See Note 1)									
Power Supply										
+5 V, -12 V.....	1									
+5 V, -5 V.....	2 (See Note 2)									
+5 V, -15 V.....	3									
+12 V, -12 V.....	4									
+15 V, -15 V.....	5									
No driver.....	X									
Hermeticity										
Non-hermetic.....	N									
Hermetic.....	H									
Connectors										
SMA-Female.....	F									
SMA-Male.....	M									

Note 1: For "no driver" option, unit is current controlled through logic control pin, -20 mA for low loss condition and +20 mA for isolation state. Switching speeds are not measured on driverless units.

Note 2: This option has 0.2 dB higher insertion loss, on/off time is 50 ns maximum and rise/fall time is 30 ns typical.

AVAILABLE OPTIONS

- Add suffix AM..... Amplitude matching port-to-port
- Add suffix PM..... Phase matching port-to-port
- Add suffix VL1..... Common port video filter
- Add suffix VL2..... Output port(s) video filter
- Add suffix VL3..... Both common port and output port(s) video filter
- Add suffix HP..... Higher power (alternate package configurations)

Example:

The above illustrated part number SW2-020180AN1NF is for the following:

- Switch SP2T
- 2 to 18 GHz
- Absorptive
- Non-inverting
- +5 V, -12 V
- Non-hermetic
- SMA-F connectors

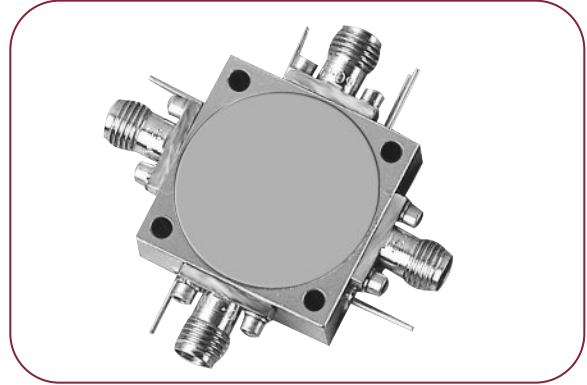
Consult MITEQ for additional options.

When additional options are ordered, MITEQ will add a 4 digit number (-SXXXX) suffix to the part number.

SINGLE-POLE THREE-THROW SWITCHES

FEATURES

- Multioctave bands 0.2 to 18 GHz
- Current or TTL control
- Low insertion loss
- High isolation
- Fast and high speed models
- Drop-in models available



Frequency Range (GHz)	Model Number	Insertion Loss (dB, Max.)	Isolation (dB, Min.)	VSWR (Max.)	Type	Rise/Fall Time (ns, Typ.)	On/Off Time (ns, Typ.)	On/Off Time (ns, Max.)	DC Power Positive (mA, Max.)	DC Power Negative (mA, Min.)
STANDARD, MULTIOCTAVE BAND MODELS										
0.2–2	SW3-002020RN1NF	1.6	70	1.6:1	Reflective	20/20	150	180	85	85
	SW3-002020AN1NF	2	75	1.6:1	Absorptive	20/20	150	180	85	85
0.5–2	SW3-005020RN1NF	1.5	80	1.6:1	Reflective	20/20	150	180	85	85
	SW3-005020AN1NF	1.9	75	1.6:1	Absorptive	20/20	150	180	85	85
2–8	SW3-020080RN1NF	1.9	80	1.7:1	Reflective	20/20	150	180	85	85
	SW3-020080AN1NF	2.1	70	1.7:1	Absorptive	20/20	150	180	85	85
4–12	SW3-040120RN1NF	2.4	90	1.7:1	Reflective	20/20	150	180	85	85
	SW3-040120AN1NF	2.5	65	1.7:1	Absorptive	20/20	150	180	85	85
2–18	SW3-020180RN1NF	3	80	2:1	Reflective	20/20	150	180	85	85
	SW3-020180AN1NF	3.2	60	2:1	Absorptive	20/20	150	180	85	85
1–18	SW3-010180RN1NF	3.1	70	2:1	Reflective	20/20	150	180	85	85
	SW3-010180AN1NF	3.4	60	2:1	Absorptive	20/20	150	180	85	85
OPTIMIZED PERFORMANCE MODEL										
1–1.1	SW3-010011AN1NF	1	40	1.2:1	Absorptive	500	700	1000	300	100

See outline drawing 193288.

Electrical performance of multioctave models can be optimized over narrower bandwidths, or for a particular parameter. Electrical options include: Lower insertion loss, lower VSWR, higher isolation, high power and flat amplitude response. Mechanical/Control options include: Custom packaging, single supply operation, ultra-fast on/off time and BCD decoder. Consult MITEQ for options.

TTL CONTROL LOGIC

Control	Logic	Voltage	Parameter
Non-inverting	Logic 0 (low)	0 to 0.8 V	Insertion loss
	Logic 1 (high)	2.4 to 4.7 V	Isolation
Inverting	Logic 0 (low)	0 to 0.8 V	Isolation
	Logic 1 (high)	2.4 to 4.7 V	Insertion loss

SP3T	Non-inverting				Inverting			
	Control Input			Signal Path	Control Input			Signal Path
	E1	E2	E3		E1	E2	E3	
	Low	High	High	J0 - J1	High	Low	Low	J0 - J1
	High	Low	High	J0 - J2	Low	High	Low	J0 - J2
	High	High	Low	J0 - J3	Low	Low	High	J0 - J3

SP3T SWITCH ORDERING INFORMATION

To order a switch, please include the model number derived from the following table. If requesting a quotation for a switch not listed in this catalog, please consult MITEQ. Include any additional specifications that are not listed.

	<i>SW</i>	<i>3</i>	<i>-</i>	<i>020</i>	<i>180</i>	<i>A</i>	<i>N</i>	<i>1</i>	<i>N</i>	<i>F</i>
SWITCH _____										
Number of throw(s) _____										
Frequency (100's of MHz)										
Lower frequency _____										
Upper frequency _____										
Type _____										
Absorptive..... A										
Reflective..... R										
Logic _____										
Non-inverting..... N										
Inverting..... I										
No driver..... X (See Note 1)										
Power Supply _____										
+5 V, -12 V..... 1										
+5 V, -5 V..... 2 (See Note 2)										
+5 V, -15 V..... 3										
+12 V, -12 V..... 4										
+15 V, -15 V..... 5										
No driver..... X										
Hermeticity _____										
Non-hermetic..... N										
Hermetic..... H										
Connectors _____										
SMA-Female..... F										
SMA-Male..... M										

Note 1: For "no driver" option, unit is current controlled through logic control pin, -20 mA for low loss condition and +20 mA for isolation state. Switching speeds are not measured on driverless units.

Note 2: This option has 0.2 dB higher insertion loss, on/off time is 150 ns maximum and rise/fall time is 30 ns typical.

AVAILABLE OPTIONS

- Add suffix AM..... Amplitude matching port-to-port
- Add suffix PM..... Phase matching port-to-port
- Add suffix VL1 Common port video filter
- Add suffix VL2 Output port(s) video filter
- Add suffix VL3 Both common port and output port(s) video filter
- Add suffix HP Higher power (alternate package configurations)

Example:

The above illustrated part number SW3-020180AN1NF is for the following:

- Switch SP3T
- 2 to 18 GHz
- Absorptive
- Non-inverting
- +5 V, -12 V
- Non-hermetic
- SMA-F connectors

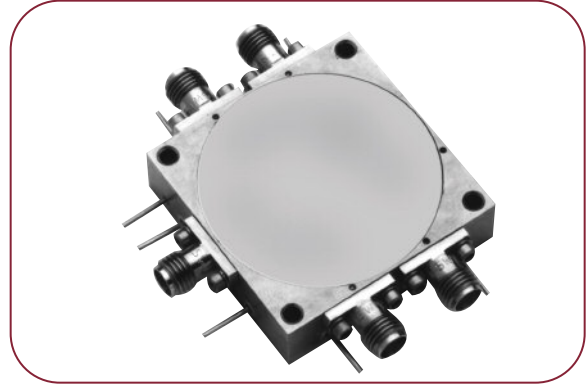
Consult MITEQ for additional options.

When additional options are ordered, MITEQ will add a 4 digit number (-SXXXX) suffix to the part number.

SINGLE-POLE FOUR-THROW SWITCHES

FEATURES

- Multioctave bands 0.2 to 18 GHz
- Current or TTL control
- Low insertion loss
- High isolation
- Fast and high speed models
- Drop-in models available



Frequency Range (GHz)	Model Number	Insertion Loss (dB, Max.)	Isolation (dB, Min.)	VSWR (Max.)	Type	Rise/Fall Time (ns, Typ.)	On/Off Time (ns, Typ.)	On/Off Time (ns, Max.)	DC Power Positive (mA, Max.)	DC Power Negative (mA, Min.)
STANDARD, MULTIOCTAVE BAND MODELS										
0.2–2	SW4-002020RN1NF	1.7	60	1.7:1	Reflective	20/20	150	180	110	110
	SW4-002020AN1NF	2.1	65	1.7:1	Absorptive	20/20	150	180	110	110
0.5–2	SW4-005020RN1NF	1.6	65	1.7:1	Reflective	20/20	150	180	110	110
	SW4-005020AN1NF	2	65	1.7:1	Absorptive	20/20	150	180	110	110
2–8	SW4-020080RN1NF	2	65	1.8:1	Reflective	20/20	150	180	110	110
	SW4-020080AN1NF	2.3	65	1.8:1	Absorptive	20/20	150	180	110	110
4–12	SW4-040120RN1NF	2.6	65	1.8:1	Reflective	20/20	150	180	110	110
	SW4-040120AN1NF	2.7	65	1.8:1	Absorptive	20/20	150	180	110	110
2–18	SW4-020180RN1NF	3.1	60	2:1	Reflective	20/20	150	180	110	110
	SW4-020180AN1NF	3.4	60	2:1	Absorptive	20/20	150	180	110	110
1–18	SW4-010180RN1NF	3.3	60	2:1	Reflective	20/20	150	180	110	110
	SW4-010180AN1NF	3.6	60	2:1	Absorptive	20/20	150	180	110	110
OPTIMIZED PERFORMANCE MODELS										
0.1–10	SW4-001100AN1NF	3	60	2:1	Absorptive	30/30	150	200	110	110
2–18	SW4-020180AN1NF	3	45	2:1	Absorptive	20/20	150	200	110	110
3–9	SW4-030090RN1NF	2	60	1.8:1	Reflective	35/35	150	500	100	110
9–10.5	SW4-090105AN1NF	2.5	60	1.8:1	Absorptive	40/40	110	150	160	100
1.2–1.96	SW4-012019AI3NF	1.5	90	1.3:1	Absorptive	50/50	90	100	100	75

See outline drawing 193291.

Electrical performance of multioctave models can be optimized over narrower bandwidths, or for a particular parameter. Electrical options include: Lower insertion loss, lower VSWR, higher isolation, high power and flat amplitude response. Mechanical/Control options include: Custom packaging, single supply operation, ultra-fast on/off time and BCD decoder. Consult MITEQ for options.

TTL CONTROL LOGIC

Non-inverting	Logic 0 (low) (0 to 0.8 V)	Insertion loss
	Logic 1 (high) (2.4 to 4.7 V)	Isolation
Inverting	Logic 0 (low) (0 to 0.8 V)	Isolation
	Logic 1 (high) (2.4 to 4.7 V)	Insertion loss

SP4T	Non-inverting Control Input				Signal Path	Inverting Control Input				Signal Path
	E1	E2	E3	E4		E1	E2	E3	E4	
	Low	High	High	High	J0 - J1	High	Low	Low	Low	J0 - J1
	High	Low	High	High	J0 - J2	Low	High	Low	Low	J0 - J2
	High	High	Low	High	J0 - J3	Low	Low	High	Low	J0 - J3
	High	High	High	Low	J0 - J4	Low	Low	Low	High	J0 - J4

SP4T SWITCH ORDERING INFORMATION

To order a switch, please include the model number derived from the following table. If requesting a quotation for a switch not listed in this catalog, please consult MITEQ. Include any additional specifications that are not listed.

	<i>SW</i>	<i>4</i>	<i>-</i>	<i>020</i>	<i>180</i>	<i>A</i>	<i>N</i>	<i>1</i>	<i>N</i>	<i>F</i>
SWITCH _____										
Number of throw(s) _____										
Frequency (100's of MHz)										
Lower frequency _____										
Upper frequency _____										
Type _____										
Absorptive..... A										
Reflective..... R										
Logic _____										
Non-inverting..... N										
Inverting..... I										
No driver..... X (See Note 1)										
Power Supply _____										
+5 V, -12 V..... 1										
+5 V, -5 V..... 2 (See Note 2)										
+5 V, -15 V..... 3										
+12 V, -12 V..... 4										
+15 V, -15 V..... 5										
No driver..... X										
Hermeticity _____										
Non-hermetic..... N										
Hermetic..... H										
Connectors _____										
SMA-Female..... F										
SMA-Male..... M										

Note 1: For “no driver” option, unit is current controlled through logic control pin, -20 mA for low loss condition and +20 mA for isolation state. Switching speeds are not measured on driverless units.

Note 2: This option has 0.2 dB higher insertion loss, on/off time is 150 ns maximum and rise/fall time is 30 ns typical.

AVAILABLE OPTIONS

- Add suffix AM..... Amplitude matching port-to-port
- Add suffix PM..... Phase matching port-to-port
- Add suffix VL1..... Common port video filter
- Add suffix VL2..... Output port(s) video filter
- Add suffix VL3..... Both common port and output port(s) video filter
- Add suffix HP..... Higher power (alternate package configurations)

Example:

The above illustrated part number SW4-020180AN1NF is for the following:

- Switch SP4T
- 2 to 18 GHz
- Absorptive
- Non-inverting
- +5 V, -12 V
- Non-hermetic
- SMA-F connectors

Consult MITEQ for additional options.

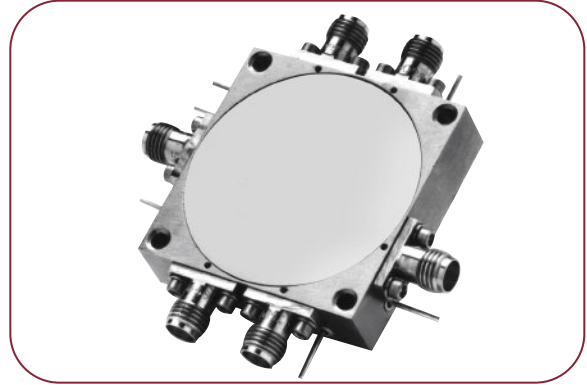
When additional options are ordered, MITEQ will add a 4 digit number (-SXXXX) suffix to the part number.



SINGLE-POLE FIVE-THROW SWITCHES

FEATURES

- Multioctave bands 0.2 to 18 GHz
- Current or TTL control
- Low insertion loss
- High isolation
- Medium and high speed models
- Drop-in models available



Frequency Range (GHz)	Model Number	Insertion Loss (dB, Max.)	Isolation (dB, Min.)	VSWR (Max.)	Type	Rise/Fall Time (ns, Typ.)	On/Off Time (ns, Typ.)	On/Off Time (ns, Max.)	DC Power Positive (mA, Max.)	DC Power Negative (mA, Min.)
STANDARD, MULTIOCTAVE BAND MODELS										
0.2–2	SW5-002020RN1NF	1.8	60	1.7:1	Reflective	20/20	150	180	135	135
	SW5-002020AN1NF	2.2	65	1.7:1	Absorptive	20/20	150	180	135	135
0.5–2	SW5-005020RN1NF	1.7	65	1.7:1	Reflective	20/20	150	180	135	135
	SW5-005020AN1NF	2.1	65	1.7:1	Absorptive	20/20	150	180	135	135
2–8	SW5-020080RN1NF	2.1	65	1.8:1	Reflective	20/20	150	180	135	135
	SW5-020080AN1NF	2.4	65	1.8:1	Absorptive	20/20	150	180	135	135
4–12	SW5-040120RN1NF	2.8	65	1.8:1	Reflective	20/20	150	180	135	135
	SW5-040120AN1NF	2.9	65	1.8:1	Absorptive	20/20	150	180	135	135
2–18	SW5-020180RN1NF	3.3	60	2:1	Reflective	20/20	150	180	135	135
	SW5-020180AN1NF	3.6	60	2:1	Absorptive	20/20	150	180	135	135
1–18	SW5-010180RN1NF	3.5	60	2:1	Reflective	20/20	150	180	135	135
	SW5-010180AN1NF	3.8	60	2:1	Absorptive	20/20	150	180	135	135

OPTIMIZED PERFORMANCE MODEL

3.5–4.5	SW5-035045AN3NF	2.9	80	1.8:1	Absorptive	35/35	150	300	135	135
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See outline drawing 193301.

Electrical performance of multioctave models can be optimized over narrower bandwidths, or for a particular parameter. Electrical options include: Lower insertion loss, lower VSWR, higher isolation, high power and flat amplitude response. Mechanical/Control options include: Custom packaging, single supply operation, ultra-fast on/off time and BCD decoder. Consult MITEQ for options.

TTL CONTROL LOGIC

Non-inverting	Logic 0 (low) (0 to 0.8 V)	Insertion loss
	Logic 1 (high) (2.4 to 4.7 V)	Isolation
Inverting	Logic 0 (low) (0 to 0.8 V)	Isolation
	Logic 1 (high) (2.4 to 4.7 V)	Insertion loss

SP5T	Non-inverting Control Input					Signal Path	Inverting Control Input					Signal Path
	E1	E2	E3	E4	E5		E1	E2	E3	E4	E5	
	Low	High	High	High	High	J0 - J1	High	Low	Low	Low	Low	J0 - J1
	High	Low	High	High	High	J0 - J2	Low	High	Low	Low	Low	J0 - J2
	High	High	Low	High	High	J0 - J3	Low	Low	High	Low	Low	J0 - J3
	High	High	High	Low	High	J0 - J4	Low	Low	Low	High	Low	J0 - J4
	High	High	High	High	Low	J0 - J5	Low	Low	Low	Low	High	J0 - J5

SP5T SWITCH ORDERING INFORMATION

To order a switch, please include the model number derived from the following table. If requesting a quotation for a switch not listed in this catalog, please consult MITEQ. Include any additional specifications that are not listed.

	<u>SW</u>	<u>5</u>	<u>- 020</u>	<u>180</u>	<u>A</u>	<u>N</u>	<u>1</u>	<u>N</u>	<u>F</u>
SWITCH _____									
Number of throw(s) _____									
Frequency (100's of MHz)									
Lower frequency _____									
Upper frequency _____									
Type _____									
Absorptive..... A									
Reflective..... R									
Logic _____									
Non-inverting..... N									
Inverting..... I									
No driver..... X (See Note 1)									
Power Supply _____									
+5 V, -12 V..... 1									
+5 V, -5 V..... 2 (See Note 2)									
+5 V, -15 V..... 3									
+12 V, -12 V..... 4									
+15 V, -15 V..... 5									
No driver..... X									
Hermeticity _____									
Non-hermetic..... N									
Hermetic..... H									
Connectors _____									
SMA-Female..... F									
SMA-Male..... M									

Note 1: For "no driver" option, unit is current controlled through logic control pin, -20 mA for low loss condition and +20 mA for isolation state. Switching speeds are not measured on driverless units.

Note 2: This option has 0.2 dB higher insertion loss, on/off time is 200 ns maximum and rise/fall time is 30 ns typical.

AVAILABLE OPTIONS

- Add suffix AM..... Amplitude matching port-to-port
- Add suffix PM..... Phase matching port-to-port
- Add suffix VL1..... Common port video filter
- Add suffix VL2..... Output port(s) video filter
- Add suffix VL3..... Both common port and output port(s) video filter
- Add suffix HP..... Higher power (alternate package configurations)

Example:

The above illustrated part number SW5-020180AN1NF is for the following:

- Switch SP5T
- 2 to 18 GHz
- Absorptive
- Non-inverting
- +5 V, -12 V
- Non-hermetic
- SMA-F connectors

Consult MITEQ for additional options.

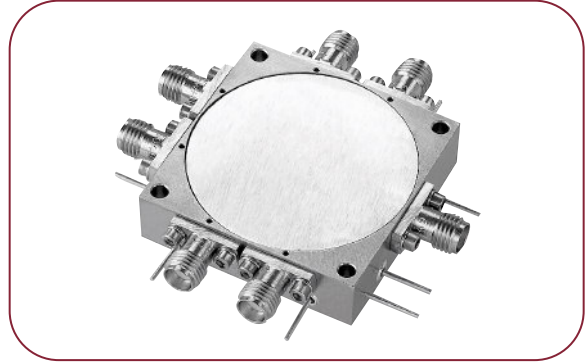
When additional options are ordered, MITEQ will add a 4 digit number (-SXXXX) suffix to the part number.



SINGLE-POLE SIX-THROW SWITCHES

FEATURES

- Multioctave bands 0.2 to 18 GHz
- Current or TTL control
- Low insertion loss
- High isolation
- Medium and high speed models
- Drop-in models available



Frequency Range (GHz)	Model Number	Insertion Loss (dB, Max.)	Isolation (dB, Min.)	VSWR (Max.)	Type	Rise/Fall Time (ns, Typ.)	On/Off Time (ns, Typ.)	On/Off Time (ns, Max.)	DC Power Positive (mA, Max.)	DC Power Negative (mA, Min.)
STANDARD, MULTIOCTAVE BAND MODELS										
0.2–2	SW6-002020RN1NF	1.9	60	1.7:1	Reflective	20/20	150	180	160	160
	SW6-002020AN1NF	2.3	65	1.7:1	Absorptive	20/20	150	180	160	160
0.5–2	SW6-005020RN1NF	1.8	65	1.7:1	Reflective	20/20	150	180	160	160
	SW6-005020AN1NF	2.2	65	1.7:1	Absorptive	20/20	150	180	135	135
2–8	SW6-020080RN1NF	2.2	65	1.8:1	Reflective	20/20	150	180	160	160
	SW6-020080AN1NF	2.5	65	1.8:1	Absorptive	20/20	150	180	160	160
4–12	SW6-040120RN1NF	2.9	65	1.8:1	Reflective	20/20	150	180	160	160
	SW6-040120AN1NF	3.1	65	1.8:1	Absorptive	20/20	150	180	160	160
2–18	SW6-020180RN1NF	3.5	60	2:1	Reflective	20/20	150	180	160	160
	SW6-020180AN1NF	3.8	60	2:1	Absorptive	20/20	150	180	160	160
1–18	SW6-010180RN1NF	3.7	60	2:1	Reflective	20/20	150	180	160	160
	SW6-010180AN1NF	4	60	2:1	Absorptive	20/20	150	180	160	160
OPTIMIZED PERFORMANCE MODELS										
0.1–10	SW6-001100AN2NF	4	60	2:1	Absorptive	35/35	140	150	160	160
0.5–18	SW6-005180AN1NF	3.7	45	2:1	Absorptive	20/20	140	150	160	160

See outline drawing 193302.

Electrical performance of multioctave models can be optimized over narrower bandwidths, or for a particular parameter. Electrical options include: Lower insertion loss, lower VSWR, higher isolation, high power and flat amplitude response. Mechanical/Control options include: Custom packaging, single supply operation, ultra-fast on/off time and BCD decoder. Consult MITEQ for options.

TTL CONTROL LOGIC

Non-inverting	Logic 0 (low) (0 to 0.8 V)	Insertion loss
	Logic 1 (high) (2.4 to 4.7 V)	Isolation
Inverting	Logic 0 (low) (0 to 0.8 V)	Isolation
	Logic 1 (high) (2.4 to 4.7 V)	Insertion loss

SP6T	Non-inverting Control Input						Signal Path	Inverting Control Input						Signal Path
	E1	E2	E3	E4	E5	E6		E1	E2	E3	E4	E5	E6	
	Low	High	High	High	High	High	J0 - J1	High	Low	Low	Low	Low	Low	J0 - J1
	High	Low	High	High	High	High	J0 - J2	Low	High	Low	Low	Low	Low	J0 - J2
	High	High	Low	High	High	High	J0 - J3	Low	Low	High	Low	Low	Low	J0 - J3
	High	High	High	Low	High	High	J0 - J4	Low	Low	Low	High	Low	Low	J0 - J4
	High	High	High	High	Low	High	J0 - J5	Low	Low	Low	Low	High	Low	J0 - J5
	High	High	High	High	High	Low	J0 - J6	Low	Low	Low	Low	Low	High	J0 - J6

SP6T SWITCH ORDERING INFORMATION

To order a switch, please include the model number derived from the following table. If requesting a quotation for a switch not listed in this catalog, please consult MITEQ. Include any additional specifications that are not listed.

	<i>SW</i>	<i>6</i>	<i>-</i>	<i>020</i>	<i>180</i>	<i>A</i>	<i>N</i>	<i>1</i>	<i>N</i>	<i>F</i>
SWITCH _____										
Number of throw(s) _____										
Frequency (100's of MHz)										
Lower frequency _____										
Upper frequency _____										
Type _____										
Absorptive.....										A
Reflective.....										R
Logic _____										
Non-inverting.....										N
Inverting.....										I
No driver.....										X (See Note 1)
Power Supply _____										
+5 V, -12 V.....										1
+5 V, -5 V.....										2 (See Note 2)
+5 V, -15 V.....										3
+12 V, -12 V.....										4
+15 V, -15 V.....										5
No driver.....										X
Hermeticity _____										
Non-hermetic.....										N
Hermetic.....										H
Connectors _____										
SMA-Female.....										F
SMA-Male.....										M

Note 1: For “no driver” option, unit is current controlled through logic control pin, -20 mA for low loss condition and +20 mA for isolation state. Switching speeds are not measured on driverless units.

Note 2: This option has 0.2 dB higher insertion loss, on/off time is 200 ns maximum and rise/fall time is 30 ns typical.

AVAILABLE OPTIONS

- Add suffix AM..... Amplitude matching port-to-port
- Add suffix PM..... Phase matching port-to-port
- Add suffix VL1 Common port video filter
- Add suffix VL2 Output port(s) video filter
- Add suffix VL3 Both common port and output port(s) video filter
- Add suffix HP Higher power (alternate package configurations)

Example:

The above illustrated part number SW6-020180AN1NF is for the following:

- Switch SP6T
- 2 to 18 GHz
- Absorptive
- Non-inverting
- +5 V, -12 V
- Non-hermetic
- SMA-F connectors

Consult MITEQ for additional options.

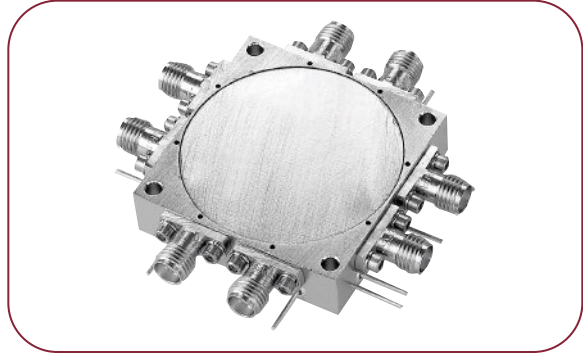
When additional options are ordered, MITEQ will add a 4 digit number (-SXXXX) suffix to the part number.



SINGLE-POLE SEVEN-THROW SWITCHES

FEATURES

- Multioctave bands 0.2 to 18 GHz
- Current or TTL control
- Low insertion loss
- High isolation
- Medium and high speed models
- Drop-in models available



Frequency Range (GHz)	Model Number	Insertion Loss (dB, Max.)	Isolation (dB, Min.)	VSWR (Max.)	Type	Rise/Fall Time (ns, Typ.)	On/Off Time (ns, Typ.)	On/Off Time (ns, Max.)	DC Power Positive (mA, Max.)	DC Power Negative (mA, Min.)
STANDARD, MULTIOCTAVE BAND MODELS										
0.2-2	SW7-002020RN1NF	2	60	1.7:1	Reflective	20/20	150	180	185	185
	SW7-002020AN1NF	2.4	65	1.7:1	Absorptive	20/20	150	180	185	185
0.5-2	SW7-005020RN1NF	1.9	65	1.7:1	Reflective	20/20	150	180	185	185
	SW7-005020AN1NF	2.3	65	1.7:1	Absorptive	20/20	150	180	185	185
2-8	SW7-020080RN1NF	2.3	65	1.8:1	Reflective	20/20	150	180	185	185
	SW7-020080AN1NF	2.6	65	1.8:1	Absorptive	20/20	150	180	185	185
4-12	SW7-040120RN1NF	3.1	65	1.8:1	Reflective	20/20	150	180	185	185
	SW7-040120AN1NF	3.2	65	1.8:1	Absorptive	20/20	150	180	185	185
2-18	SW7-020180RN1NF	3.7	60	2:1	Reflective	20/20	150	180	185	185
	SW7-020180AN1NF	4	50	2:1	Absorptive	20/20	150	180	185	185
1-18	SW7-010180RN1NF	3.9	60	2:1	Reflective	20/20	150	180	185	185
	SW7-010180AN1NF	4.2	50	2:1	Absorptive	20/20	150	180	185	185
OPTIMIZED PERFORMANCE MODEL										
1-1.5	SW7-010015AN1NF	1.5	60	1.6:1	Absorptive	100	200	1000	200	200

See outline drawing 193309.

Electrical performance of multioctave models can be optimized over narrower bandwidths, or for a particular parameter. Electrical options include: Lower insertion loss, lower VSWR, higher isolation, high power and flat amplitude response. Mechanical/Control options include: Custom packaging, single supply operation, ultra-fast on/off time and BCD decoder. Consult MITEQ for options.

TTL CONTROL LOGIC

Non-inverting	Logic 0 (low) (0 to 0.8 V)	Insertion loss
	Logic 1 (high) (2.4 to 4.7 V)	Isolation
Inverting	Logic 0 (low) (0 to 0.8 V)	Isolation
	Logic 1 (high) (2.4 to 4.7 V)	Insertion loss

SP7T	Non-inverting							Signal Path	Inverting							Signal Path
	Control Input								Control Input							
	E1	E2	E3	E4	E5	E6	E7		E1	E2	E3	E4	E5	E6	E7	
Low	High	High	High	High	High	High	High	J0 - J1	High	Low	Low	Low	Low	Low	Low	J0 - J1
High	Low	High	High	High	High	High	High	J0 - J2	Low	High	Low	Low	Low	Low	Low	J0 - J2
High	High	Low	High	High	High	High	High	J0 - J3	Low	Low	High	Low	Low	Low	Low	J0 - J3
High	High	High	Low	High	High	High	High	J0 - J4	Low	Low	Low	High	Low	Low	Low	J0 - J4
High	High	High	High	Low	High	High	High	J0 - J5	Low	Low	Low	Low	High	Low	Low	J0 - J5
High	High	High	High	High	Low	High	High	J0 - J6	Low	Low	Low	Low	Low	High	Low	J0 - J6
High	High	High	High	High	High	High	Low	J0 - J7	Low	Low	Low	Low	Low	Low	High	J0 - J7

SP7T SWITCH ORDERING INFORMATION

To order a switch, please include the model number derived from the following table. If requesting a quotation for a switch not listed in this catalog, please consult MITEQ. Include any additional specifications that are not listed.

	SW	7	-	020	180	A	N	1	N	F
SWITCH _____										
Number of throw(s) _____										
Frequency (100's of MHz)										
Lower frequency _____										
Upper frequency _____										
Type _____										
Absorptive..... A										
Reflective..... R										
Logic _____										
Non-inverting..... N										
Inverting..... I										
No driver..... X (See Note 1)										
Power Supply _____										
+5 V, -12 V..... 1										
+5 V, -5 V..... 2 (See Note 2)										
+5 V, -15 V..... 3										
+12 V, -12 V..... 4										
+15 V, -15 V..... 5										
No driver..... X										
Hermeticity _____										
Non-hermetic..... N										
Hermetic..... H										
Connectors _____										
SMA-Female..... F										
SMA-Male..... M										

Note 1: For "no driver" option, unit is current controlled through logic control pin, -20 mA for low loss condition and +20 mA for isolation state. Switching speeds are not measured on driverless units.

Note 2: This option has 0.2 dB higher insertion loss, on/off time is 200 ns maximum and rise/fall time is 30 ns typical.

AVAILABLE OPTIONS

- Add suffix AM..... Amplitude matching port-to-port
- Add suffix PM..... Phase matching port-to-port
- Add suffix VL1 Common port video filter
- Add suffix VL2 Output port(s) video filter
- Add suffix VL3 Both common port and output port(s) video filter
- Add suffix HP Higher power (alternate package configurations)

Example:

The above illustrated part number SW7-020180AN1NF is for the following:

- Switch SP7T
- 2 to 18 GHz
- Absorptive
- Non-inverting
- +5 V, -12 V
- Non-hermetic
- SMA-F connectors

Consult MITEQ for additional options.

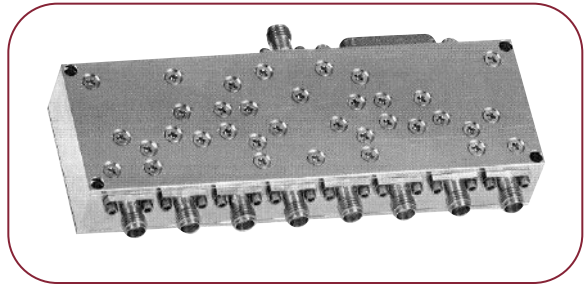
When additional options are ordered, MITEQ will add a 4 digit number (-SXXXX) suffix to the part number.



SINGLE-POLE EIGHT-THROW SWITCHES

FEATURES

- Wide frequency range..... 1–18 GHz
- High Isolation 50 dB minimum
- Low insertion loss..... 4.5 dB maximum
- In/Out VSWR..... 2:1 maximum
- Total switching speed..... <300 ns
- DC supply..... +5, -12 VDC



Frequency Range (GHz)	Model Number	Insertion Loss (dB, Max.)	Isolation (dB, Min.)	VSWR (Max.)	Type	Rise/Fall Time (ns, Typ.)	On/Off Time (ns, Typ.)	On/Off Time (ns, Max.)	DC Power Positive (mA, Max.)	DC Power Negative (mA, Min.)
STANDARD, MULTIOCTAVE BAND MODELS										
0.2–2	SW8-002020RN1NF	1.5	65	1.7:1	Reflective	30/30	200	300	215	215
	SW8-002020AN1NF	2	65	1.7:1	Absorptive	30/30	200	300	215	215
0.5–2	SW8-005020RN1NF	1.5	65	1.7:1	Reflective	30/30	200	300	215	215
	SW8-005020AN1NF	2	65	1.7:1	Absorptive	30/30	200	300	215	215
2–8	SW8-020080RN1NF	2.2	65	2:1	Reflective	30/30	200	300	215	215
	SW8-020080AN1NF	2.9	65	2:1	Absorptive	30/30	200	300	215	215
4–12	SW8-040120RN1NF	2.7	65	2:1	Reflective	30/30	200	300	215	215
	SW8-040120AN1NF	3.2	65	2:1	Absorptive	30/30	200	300	215	215
2–18	SW8-020180RN1NF	3.8	60	2:1	Reflective	30/30	200	300	215	215
	SW8-020180AN1NF	4.2	60	2:1	Absorptive	30/30	200	300	215	215
1–18	SW8-010180RN1NF	3.9	60	2:1	Reflective	30/30	200	300	215	215
	SW8-010180AN1NF	4.5	60	2:1	Absorptive	30/30	200	300	215	215
OPTIMIZED PERFORMANCE MODEL										
1–18	SW8-010180AB3NF*	4.5	50	2:1	Absorptive	300	400	500	105	185

* Includes built-in 3 bit TTL decoder.

See outline drawing 192958.

Electrical performance of multioctave models can be optimized over narrower bandwidths, or for a particular parameter. Electrical options include: Lower insertion loss, lower VSWR, higher isolation, high power and flat amplitude response. Mechanical/Control options include: Custom packaging, single supply operation, ultra-fast on/off time and BCD decoder. Consult MITEQ for options.

TTL CONTROL LOGIC

Control Input	Logic	Insertion loss
Non-inverting	Logic 0 (low) (0 to 0.8 V)	Insertion loss
	Logic 1 (high) (2.4 to 4.7 V)	Isolation
Inverting	Logic 0 (low) (0 to 0.8 V)	Isolation
	Logic 1 (high) (2.4 to 4.7 V)	Insertion loss

Non-Inverting								Inverting									
15 Pin D Connector								15 Pin D Connector									
Pin 1	Pin 9	Pin 2	Pin 10	Pin 5	Pin 6	Pin 7	Pin 8	Signal Path	Pin 1	Pin 9	Pin 2	Pin 10	Pin 5	Pin 6	Pin 7	Pin 8	Signal Path
Low	High	High	High	High	High	High	High	J0 - J1	High	Low	Low	Low	Low	Low	Low	Low	J0 - J1
High	Low	High	High	High	High	High	High	J0 - J2	Low	High	Low	Low	Low	Low	Low	Low	J0 - J2
High	High	Low	High	High	High	High	High	J0 - J3	Low	Low	High	Low	Low	Low	Low	Low	J0 - J3
High	High	High	Low	High	High	High	High	J0 - J4	Low	Low	Low	High	Low	Low	Low	Low	J0 - J4
High	High	High	High	High	Low	High	High	J0 - J5	Low	Low	Low	Low	High	Low	Low	Low	J0 - J5
High	High	High	High	High	Low	High	High	J0 - J6	Low	Low	Low	Low	Low	High	Low	Low	J0 - J6
High	High	High	High	High	High	Low	High	J0 - J7	Low	Low	Low	Low	Low	Low	High	Low	J0 - J7
High	High	High	High	High	High	High	Low	J0 - J8	Low	Low	Low	Low	Low	Low	Low	High	J0 - J8

SP8T SWITCH ORDERING INFORMATION

To order a switch, please include the model number derived from the following table. If requesting a quotation for a switch not listed in this catalog, please consult MITEQ. Include any additional specifications that are not listed.

	<u>SW</u>	<u>8</u>	<u>-</u>	<u>020</u>	<u>180</u>	<u>A</u>	<u>N</u>	<u>1</u>	<u>N</u>	<u>F</u>
SWITCH										
Number of throw(s)										
Frequency (100's of MHz)										
Lower frequency										
Upper frequency										
Type										
Absorptive.....										A
Reflective.....										R
Logic										
Non-inverting.....										N
Built-in decoder.....										B
Power Supply										
+5 V, -12 V.....										1
+5 V, -15 V.....										3
Hermeticity										
Non-hermetic.....										N
Hermetic.....										H
Connectors										
SMA-Female.....										F
SMA-Male.....										M

AVAILABLE OPTIONS

- Add suffix AM..... Amplitude matching port-to-port
- Add suffix PM..... Phase matching port-to-port
- Add suffix VL1..... Common port video filter
- Add suffix VL2..... Output port(s) video filter
- Add suffix VL3..... Both common port and output port(s) video filter
- Add suffix HP..... Higher power (alternate package configurations)

Example:

The above illustrated part number SW8-020180AN1NF is for the following:

Switch SP8T
2 to 18 GHz
Absorptive
Non-inverting
+5 V, -12 V
Non-hermetic
SMA-F connectors

Consult MITEQ for additional options.

When additional options are ordered, MITEQ will add a 4 digit number (-SXXXX) suffix to the part number.

GENERAL SWITCH SPECIFICATIONS

Operating temperature..... 0 to 70°C	Power handling (full performance) 20 dBm
Storage temperature -30 to +85°C	Power handling (no damage) 30 dBm
Humidity..... 95%, noncondensing	Input -1 dB compression 30 dBm typical
Vibration..... 12 g's rms, 20-2000 Hz	Input third-order intercept point..... 35 dBm typical
Per MIL-STD-810B	Video leakage for "F" model
Method 514, Procedure 5	(rms power)..... < -53 dBm typical (> 2 GHz)
	< -42 dBm typical (< 2 GHz)

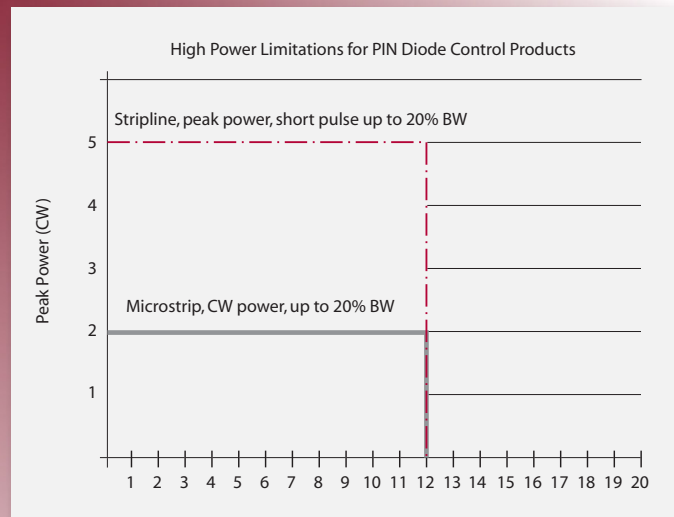
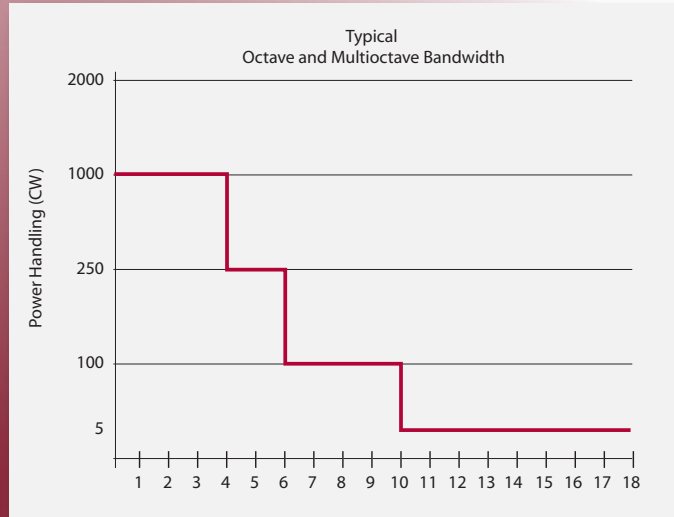


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HIGH POWER SWITCHES

MITEQ offers a series of reliable broadband high power solid state switches to cover a myriad of applications which include ground, airborne, transmit/receive, filter banks, as well as complex high power switch matrices. Offering both standard and custom designs, MITEQ's switches cover the frequency ranges from 2 to 18 GHz in octave and multi-octave bandwidths up to 1000 watts. Our high power switches offer fast switching speeds, while providing the extremely high reliability that is expected of a MITEQ product.

Most of our high power switches are built to customer specifications in order to optimize specific parameters such as: long pulses, switching speed, isolation and high CW power. So if you require broadband, high speed and high isolation, long pulses or high CW operating power, MITEQ can meet your needs.



HIGH POWER SWITCHES

FEATURES

- High power handling
- Low insertion loss
- High isolation
- TTL control
- Fast switching



Frequency Range (GHz)	Model Number	# Throw	Insertion Loss (dB, Typ.) (dB, Max.)		Isolation (dB, Min.)	VSWR (Max.)	Type	Power Handling (Watts, CW)(Watts, Peak)		On/Off Time (ns, Max.)
HIGH POWER MODELS										
3.1–3.5	HPSW1-031035RN1NSF	SPST	0.5	0.8	110	1.25:1	Reflective	20	200	100
0.96–1.215	HPSW2-009012RN2NNF	SP2T	0.3	0.5	27	1.15:1	Reflective	60	3 kW	200
5–5.1	HPSW4-050051RN3NNF	SP4T	0.5	0.8	55	1.25:1	Reflective	40	200	2000
9.5–10.5	HPSW5-095105RN1NSF	SP5T	0.7	1.1	50	1.25:1	Reflective	4	500	200
1–1.1	HPSW6-010011RB4NNF	SP6T	0.45	1.5	40	1.20:1	Reflective	200	2 kW	2000

See outline drawing 193509.

Electrical performance of multioctave models can be optimized over narrower bandwidths, or for a particular parameter. Electrical options include: Lower insertion loss, lower VSWR, higher isolation, high power, flat amplitude response and amplitude tracking. Mechanical/Control options include: Custom packaging, single supply operation, ultra-fast on/off time, single TTL control line and BCD decoder. Consult MITEQ for options.

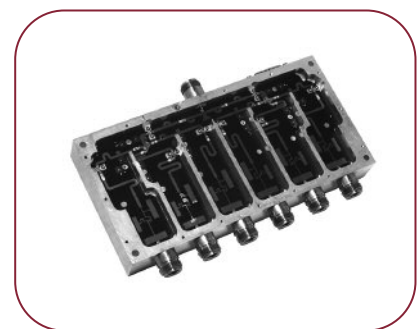
ENVIRONMENTAL CONDITIONS

- Operating temperature 0 to 70°C
- Storage temperature -40 to +85°C
- Humidity 95%, noncondensing
- Vibration 12 g's rms, 20-2000 Hz Per MIL-STD-810B Method 514, Procedure 5

SP6T SWITCH FOR IFF, 2 kW WITH LONG PULSES

Model: HPSW6-010011RB4NNF

- Frequency range 1015–1105 MHz
- Peak power 2 kW peak, 222 μsec pulses, 10% duty cycle
- Insertion loss..... 0.45 dB typical, 0.6 dB maximum
- Isolation 43 typical, 40 dB minimum
- VSWR 1.2:1 maximum
- Switching speed 2 μsec maximum
- Temperature range -40 to +75°C
- Spurious signals internal -60 dBc
- Reflective
- TTL control
- Size..... 8.0" [203.2 mm] x 4.0" [101.6 mm] x 1.2" [30.5 mm]

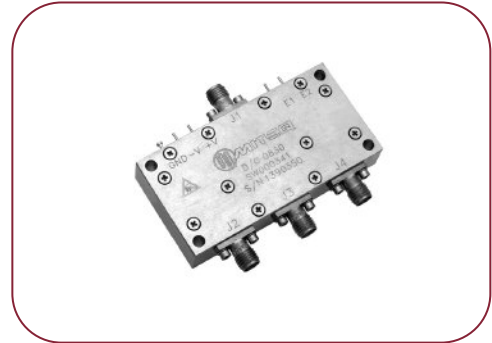


HIGH POWER SWITCHES (CONT.)

BROADBAND HIGH CW POWER, 150-6000 MHz

Model: SW000341

- Frequency range 150–6000 MHz
- Peak power 150 W CW up to 1 GHz,
20 W CW 1-6 GHz
- Insertion loss 1.6 dB maximum
- Isolation 55 dB minimum
- VSWR 2:1 maximum
- Switching speed 20 µsec maximum
- Temperature range 0 to 70°C
- Size 3.5" [88.9 mm] x 1.25" [31.8 mm]
x .75" [19.1 mm]



BROADBAND AIRBORNE IFF SPDT, 600-1600 MHz

Model: HPSW2-006016RN5NNF

- Frequency range 600–1600 MHz
- Peak power 3.5 kW peak, 35 µsec pulses,
1.6% duty cycle
- Insertion loss 0.33 dB typical,
0.6 dB maximum
- Isolation 40 dB typical, 35 dB minimum
- VSWR 1.35:1 maximum
- Switching speed 2 µsec typical,
3 µsec maximum
- Temperature range -55 to +91°C
- Altitude 70,000 feet
- Size 2.5" [63.5 mm] x 2.5" [63.5 mm]
x 1.0" [25.4 mm]



HIGH SPEED AND ISOLATION AT HIGH POWER, 70 nsec, 80 dB Isolation

Model: HPSW2-091093RI5NF

- Frequency range 9.1–9.3 GHz
- Peak power 100 W peak, 1 µsec pulses,
.5% duty cycle
- Insertion loss 1.1 dB typical,
1.2 dB maximum
- Isolation 80 dB minimum
- VSWR 1.35:1 maximum
- Switching speed 70 nsec maximum
- Rise/Fall time 40 nsec maximum
- Temperature range -55 to +85°C
- Size 1.5" [38.1 mm] x 1.5" [38.1 mm]
x .4" [10.16 mm]



Frequency Range (GHz)	Model Number	Insertion Loss (dB, Typ.)	Isolation (dB, Min.)	VSWR (Max.)	RF Input (WCW)	Switch Speed (µs, Typ.)	Temp Range (°C)	DC Power Positive (mA, Max.)	Negative (mA, Max.)	Connector (Female)		
NARROW HIGH CW POWER MODELS												
1.6-1.65	SW000413	0.6	0.8	60	1:301	125	1	2	0-70	+5 @ 120	-28 @ 20	N
4.4-5.0	SW000382	0.7	0.8	60	1.35:1	125	1.5	2	0-70	+5 @ 200	NR	SMA
1.25-1.40	SW000418	0.5	0.8	60	1.35:1	120	2	4	0-70	+15 @ 160	-70 @ 30	N
										+15 @ 40		

HIGH POWER SWITCH ORDERING INFORMATION

To order a switch, please include the model number derived from the following table. If requesting a quotation for a switch not listed in this catalog, please consult MITEQ. Include any additional specifications that are not listed.

	HPSW	6	- 010	011	R	B	4	N	N	F	S
HIGH POWER SWITCH	_____										
Number of throw(s)	_____										
Frequency (100's of MHz)	_____										
Lower frequency	_____										
Upper frequency	_____										
Type	_____										
Absorptive.....	A										
Reflective	R										
Logic	_____										
Non-inverting	N										
Inverting	I										
Built-in decoder	B										
Power Supply	_____										
+5 V, -15 V	1										
+5 V, -70 V	2										
+5 V, -24 V	3										
+5 V, +15, -70 V	4										
Hermeticity	_____										
Non-hermetic	N										
Hermetic	H										
Connector Type	_____										
SMA	S										
Type N.....	N										
Connector	_____										
Female	F										
Male	M										
Power Handling on non-catalog products	_____										
Consult MITEQ on non-catalog products											

AVAILABLE OPTIONS

- Add suffix AM Amplitude matching port-to-port
- Add suffix PM Phase matching port-to-port
- Add suffix VL Low video leakage

Example:

The above illustrated part number HPSW6-010011RB4NNF is for the following: High Power Switch SP6T
 1 to 1.1 GHz
 Reflective
 Built-in decoder
 +5 V, +15 V, -70 V
 Non-hermetic
 Type N – F connectors

Consult MITEQ for additional options.

When additional options are ordered, MITEQ will add a 4 digit number (-SXXXX) suffix to the part number.

CUSTOM SWITCH APPLICATIONS

MITEQ has extensive experience in switch design and development for critical space, telemetry, transceiver, radar, and EW applications. We specialize in offering customized solutions that meet your needs for applications that require extremely fast switching time. Our solid-state switches incorporate a wide variety of techniques to achieve high performance over a wide range of specification requirements. MITEQ can provide switches as drop-in functions for those applications that require higher levels of integration. We offer MIL-STD-883 screening of our switches and can accommodate special connector requirements.

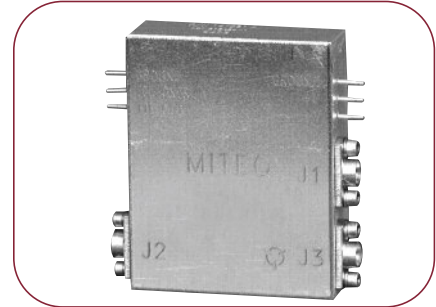


HIGH RELIABILITY SWITCH APPLICATIONS

SP2T HERMETIC SWITCH WITH INTERNAL THRESHOLD DETECTOR MODEL: DSW-092101RN2HS

FEATURES

- Frequency range..... 9.2–10.1 GHz
- Insertion loss 2 dB maximum
- Flatness vs. frequency ± 0.25 dB
- Isolation..... 40 dB minimum
- In/Out VSWR 1.5:1 maximum
- On/Off time..... 500 ns maximum
- Input power (P1dB) +16 dBm minimum
- Bite output..... TTL
- DC power +5 V @ 150 mA maximum,
-5 V @ 70 mA maximum
- RF connectors Blind mate GPO
- Size 1.5" [38.1 mm] x 1.2" [30.5 mm] x 0.4" [10.2 mm]



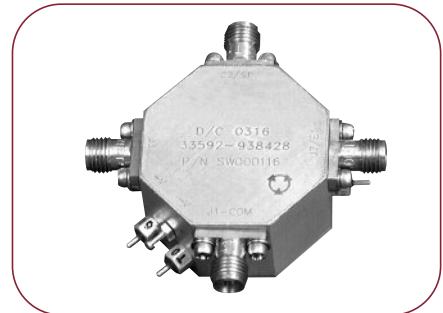
ENVIRONMENTAL CONDITIONS

- Operating temperature -40 to +70°C
Storage temperature..... -55 to +95°C
Mechanical shock..... MIL-883 Condition B, 1500 g's rms
Temperature cycle MIL-883, Method 1010, Condition B1

SP3T HERMETIC SWITCH MODEL: SW3-010011RN3NF

FEATURES

- Frequency range 1–1.1 GHz
- Insertion loss 0.6 dB maximum
- Isolation..... 40 dB minimum
- In/Out VSWR 1.2:1 maximum
- On/Off time..... 1 μ s maximum
- DC power +5 V @ 300 mA maximum,
-15 V @ 100 mA maximum
- Power handling..... 10 W maximum
- RF connectors SMA female
- Size 1.25" [31.8 mm] x 1.25" [31.8 mm] x 0.7" [17.8 mm]



ENVIRONMENTAL CONDITIONS

- Operating temperature -55 to +85°C
Storage temperature -65 to +125°C
Thermal shock MIL-STD-202 Method 107, Condition B
Vibration..... MIL-STD-202 Method 204, Condition B
Shock..... MIL-STD-202 Method 213, Condition B
Temperature altitude -55 to +85°C, MIL-STD-202 Method 105, Condition A

HIGH RELIABILITY SWITCH APPLICATIONS (CONT.)

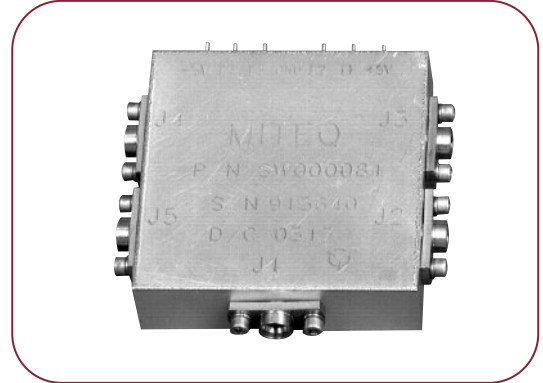
SP4T HERMETIC SWITCH MODEL: SW4-090105AI2HS

FEATURES

- Frequency range 9–10.5 GHz
- Insertion loss 2.5 dB maximum
- Isolation 60 dB minimum
- In/Out VSWR 1.8:1 maximum
- Absorptive
- On/Off time 150 ns maximum
- Input power (P1dB) +22 dBm minimum
- DC power +5 V @ 160 mA maximum,
-5 V @ 100 mA maximum
- RF connectors Blind mate GPO
- Size 1.4" [35.6 mm] x 1.4" [35.6 mm]
x 0.4" [10.2 mm]

ENVIRONMENTAL CONDITIONS

- Operating temperature -40 to +85°C
- Storage temperature -55 to +125°C
- Mechanical shock MIL-883 Condition B, 1500 g's rms
- Temperature cycle MIL-883 Method 1010, Condition B1



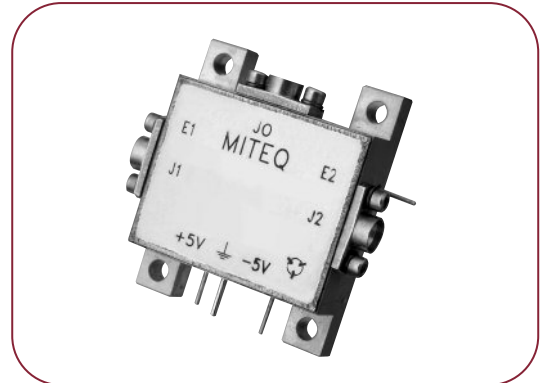
SP2T HERMETIC SWITCH MODEL: SW2-120180AN2HS

FEATURES

- Frequency range 12–18 GHz
- Insertion loss 3 dB maximum
- Isolation 50 dB minimum
- In/Out VSWR 2:1 maximum
- Absorptive
- On/Off time 200 ns maximum
- Rise/Fall time ≥ 100 ns,
 ≤ 150 ns
- DC power +5 V @ 60 mA maximum,
-5 V @ 60 mA maximum
- RF connectors Blind mate GPO
- Size 1.2" [30.5 mm] x 1" [25.4 mm] x 0.32" [8.1 mm]

ENVIRONMENTAL CONDITIONS

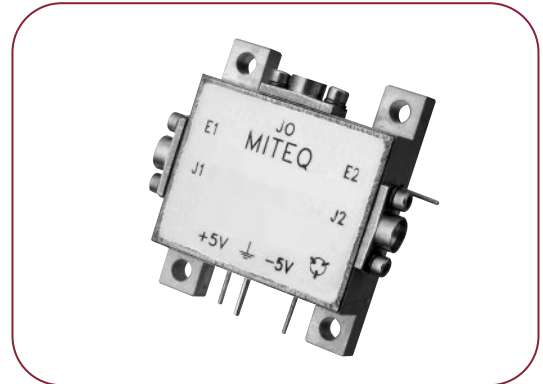
- Operating temperature -40 to +85°C
- Storage temperature -55 to +125°C
- Thermal shock MIL-STD-202 Method 107, Test Condition A1
- Humidity MIL-STD-202 Method 103, Condition B
- Vibration MIL-STD-810 Method 514.4, Procedure 1
- Shock 11.25 g's, 6.7 rms, 1/2 sine
- Temperature altitude -40 to +85°C, 40,000 feet operational, 50,000 feet non-operational,
MIL-STD-202 Method 105, Condition A



SP2T HERMETIC SWITCH MODEL: SW2-120180AI2HS

FEATURES

- Frequency range 12–18 GHz
- Insertion loss 2.8 dB maximum
- Isolation 50 dB minimum
- In/Out VSWR..... 2:1 maximum
- Absorptive
- On/Off time 35 ns maximum
- Rise/Fall time..... 20 ns maximum
- DC power +5 V @ 60 mA maximum,
-5 V @ 60 mA maximum
- RF connectors..... Blind mate GPO
- Size 1.2" [30.5 mm] x 1" [25.4 mm]
x 0.32" [8.1 mm]



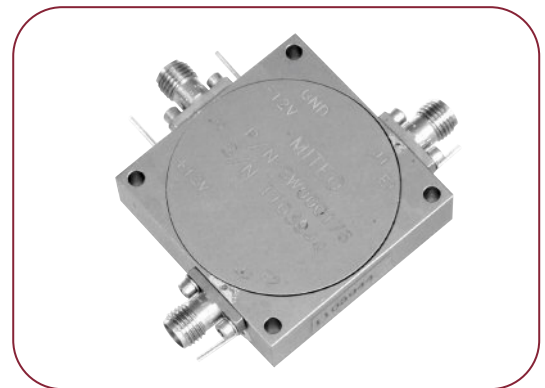
ENVIRONMENTAL CONDITIONS

- Operating temperature -40 to +85°C
- Storage temperature..... -55 to +125°C
- Thermal shock MIL-STD-202 Method 107, Test Condition A1
- Vibration MIL-STD-202 Method 103, Condition B
- Shock 11.25 g's, 6.7 rms, 1/2 sine
- Temperature altitude -40 to +85°C, 40,000 feet operational, 50,000 feet non-operational,
MIL-STD-202 Method 105, Condition A

SP2T SWITCH MODEL: SW2-092092AN4NF

FEATURES

- Frequency range 9.2 GHz
- Insertion loss 1.1 dB maximum
- Isolation..... 80 dB minimum
- In/Out VSWR..... 1.5:1 maximum
- Absorptive
- On/Off time 20 ns maximum
- Rise/Fall time 10 ns
- DC power +12 V @ 60 mA maximum,
-12 V @ 60 mA maximum
- RF connectors SMA female
- Size 1.5" [38.1 mm] x 1.5" [38.1 mm]
x 0.4" [10.2 mm]



ENVIRONMENTAL CONDITIONS

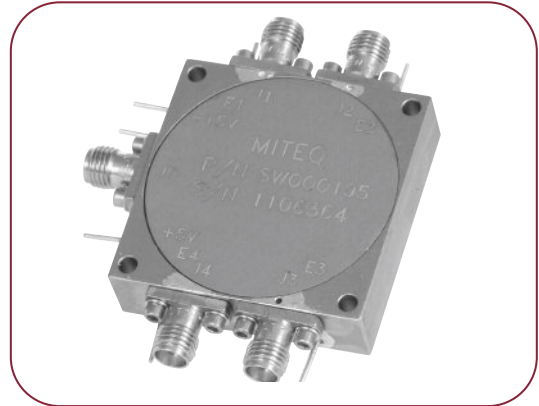
- Operating temperature 0 to 70°C
- Storage temperature..... -40 to +85°C
- Humidity 95%, noncondensing
- Vibration 12 g's rms, 20-2000 Hz Per
MIL-STD-810B Method 514, Procedure 5

HIGH RELIABILITY SWITCH APPLICATIONS (CONT.)

SP4T SWITCH MODEL: SW4-092092RN3NF

FEATURES

- Frequency range 9.215–9.245 GHz
- Insertion loss 1 dB maximum
- Isolation 40 dB minimum
- In/Out VSWR 1.5:1 maximum
- Absorptive
- On/Off time 500 ns maximum
- Input power (P1dB) +21 dBm minimum
- DC power +5 V @ 110 mA maximum,
-15 V @ 110 mA maximum
- RF connectors SMA female
- Size 1.5" [38.1 mm] x 1.5" [38.1 mm]
x 0.4" [10.2 mm]



ENVIRONMENTAL CONDITIONS

- Operating temperature 0 to 70°C
- Storage temperature -40 to +85°C
- Humidity 95%, noncondensing
- Vibration 12 g's rms, 20-2000 Hz Per
MIL-STD-810B Method 514, Procedure 5

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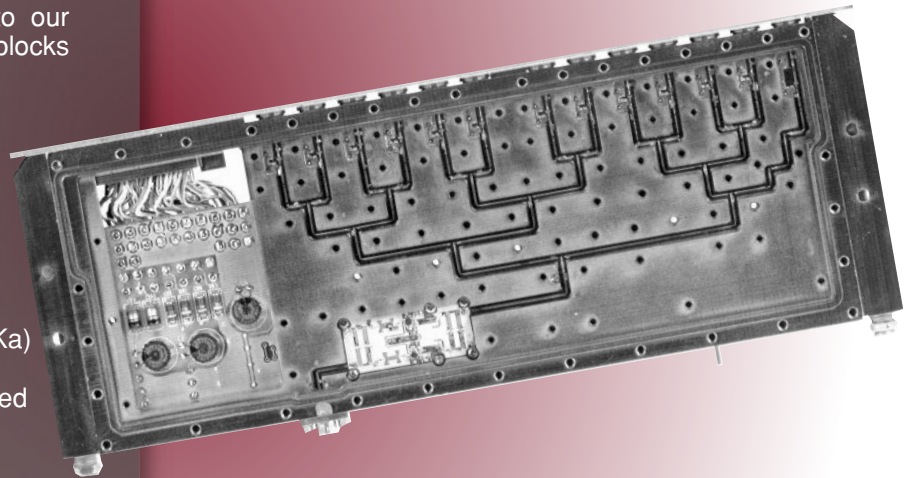
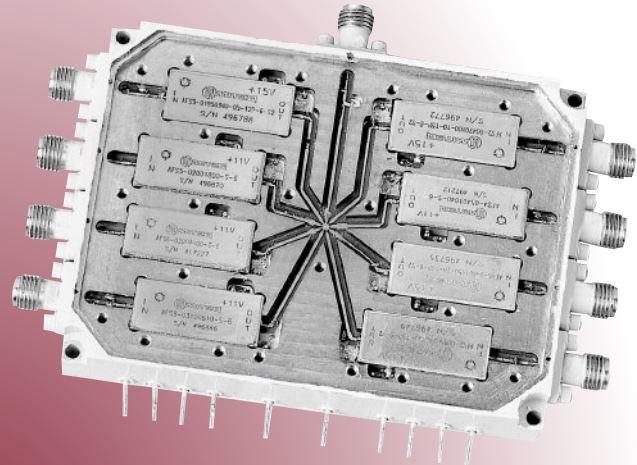
INTEGRATED SWITCH ASSEMBLIES

For over 25 years MITEQ has been providing advanced innovative switch assembly solutions for some of the most demanding applications, including space. With the experience and expertise in all types of solid-state switches, MITEQ prides itself in the expertise in arraying switches to form matrices able to handle signal routing in complex, demanding systems.

Along with MITEQ's extensive expertise in basic system building blocks, integration of a wide variety of components and functions into our switch assemblies is easy. These building blocks include:

- Amplifiers
- Attenuators - PIN Diode
- Bias Tees
- Diode-Limiters
- Directional Couplers
- Four-Channel Downconverter
- Frequency Discriminators
- Frequency Generation Products
 - Frequency Synthesizers (VHF thru Ka)
 - Oscillators
 - Dual Output Ku-Band Phase Locked Oscillator
 - Free-Running Oscillator (DROs)
 - Ku-Band Phase-Locked Oscillator
- Hybrid Couplers 90/180°
- IF Logarithmic Amplifier
- Microwave & Millimeter-Wave Conversion
 - Image Rejection Mixers
 - Mixers
- Modulators
- Multipliers
- PIN Diode Switches
- Power Dividers/Combiners
- Receivers

Add all this to MITEQ's additional expertise in microprocessor control and monitoring, RF signal monitoring, and power supply conditioning, along with advanced manufacturing capabilities and project management, provides you with optimum, state-of-the-art performance and reliability in all our integrated switch assemblies.

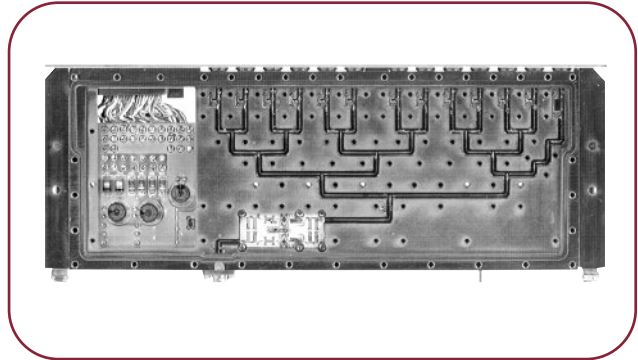


INTEGRATED SWITCH ASSEMBLIES

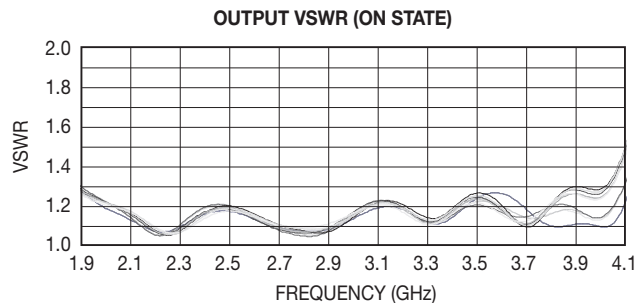
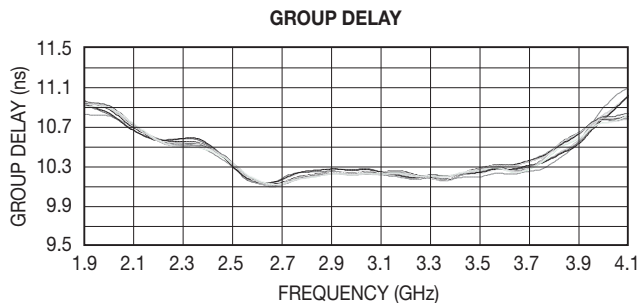
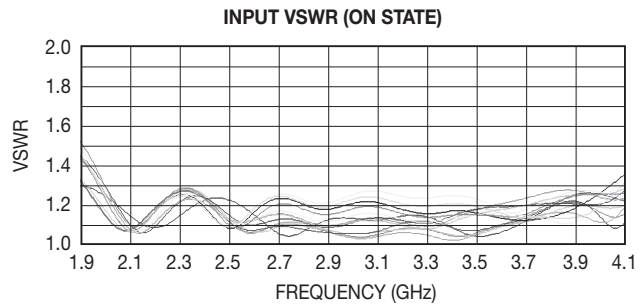
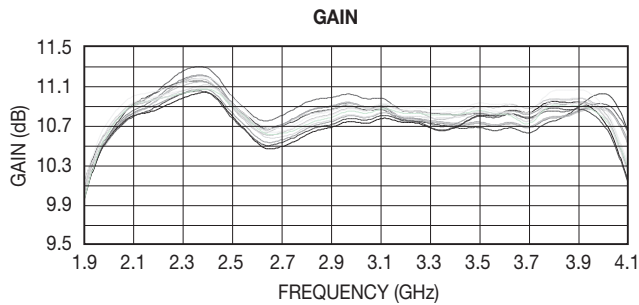
SP13T SWITCH MATRIX, WITH OUTPUT AMPLIFIER MODEL: SW-13T-AMP-02000400

FEATURES

- High reliability space application
- 13 input ports, common output port
- Frequency range..... 2–4 GHz
- Nominal gain 10.5 dB
- Gain vs. frequency..... ± 0.3 dB
- Port-to-port gain variation..... ± 0.2 dB
- Noise figure 6.5 dB typical
- Input power (P1dB)..... +13 dBm typical
- Group delay vs. frequency..... 0.2 ns
- Port-to-port isolation 80 dB typical
- In VSWR, ON state..... 1.3:1
- Out VSWR, ON state..... 1.3:1
- In VSWR, OFF state 1.4:1
- Out VSWR, OFF state 2:1



TYPICAL TEST DATA



Note: Test data supplied at 25°C, for a group of 9.

ENVIRONMENTAL CONDITIONS

- Operating temperature 0 to 70°C
- Storage temperature..... -40 to +85°C
- Humidity 95% noncondensing
- Vibration..... 12 g's rms, 20-2000 Hz per MIL-STD-810B Method 514, Procedure 5

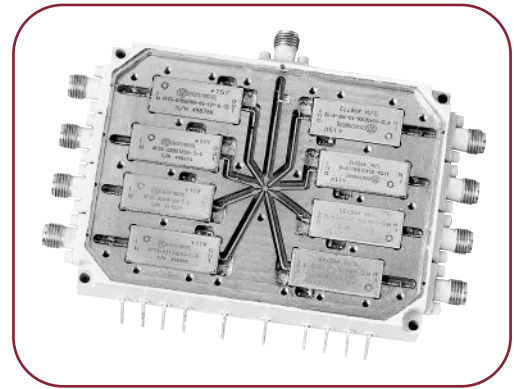


INTEGRATED SWITCH ASSEMBLIES (CONT.)

AMPLIFIER/SWITCH ASSEMBLY MODEL: SW-A-047180

FEATURES

- High reliability military application
- 8 input ports, common output port
- Limiter protection on six amplifiers
- Broadband RF coverage 0.475–18.5 GHz
- RF gain 23 dB nominal
- Channel-to-channel isolation 30 dB minimum
- In/Out VSWR 1.8:1 typical, 2.2:1 maximum
- Low noise figure 3.5 dB typical, 4.8 dB maximum
- Weight 520 grams typical



Band	Frequency Range (GHz)	Gain (dB, Min.)	Gain (dB, Max.)	Noise Figure (dB, Max.)	Flatness (±dB)	P1dB Comp. (dB, Min.)	Output IP ₃ (+dB, Min.)	Output IP ₂ (+dB, Min.)	Max Input CW Max. (+dBm, Max.)	(No Damage) Pulse (+dBm, Max.)
1	0.475–1.05	18	22	2	1	11	21	30	32	57
2	0.95–2.1	18	22	2.2	1	11	21	30	32	57
3	1.95–3.8	20	24	2	1.25	8	18	27	32	57
4	3.1–6.1	22	26	2.6	1.25	8	18	27	31	56
5	5.4–10.4	24	30	2.7	1.5	7	16.5	25	31	56
6	9.6–18.5	28	32	5	2	6	15	23	30	55
7	2–18	20	26	4.5	2	9	19	22	10	N/A
8	2–18	25	32	4.5	2	9	19	22	10	N/A

ELECTRICAL SPECIFICATIONS

PARAMETERS	LIMITS	CONDITIONS
VSWR	2.2:1 maximum	
Stability	Unconditional	Source impedance is BPF with passband VSWR < 2:1
On/Off isolation	30 dB minimum	
Switching speed	200 μs maximum	
Video feedthru	-75 dBm maximum from 1 kHz to 4 GHz	PRF = 1 kHz
Control	TTL	
Control logic	"1" = Channel On, "0" = Channel Off	No input = "0"
Blanking	All "0" = Blanking	
DC bias	12 V @ 650 mA maximum, -12 V @ 250 mA maximum	
Outline drawing		195909

ENVIRONMENTAL CONDITIONS

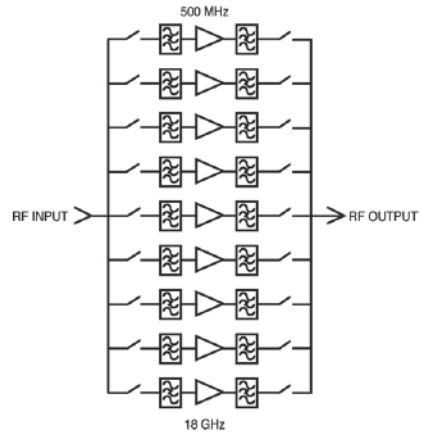
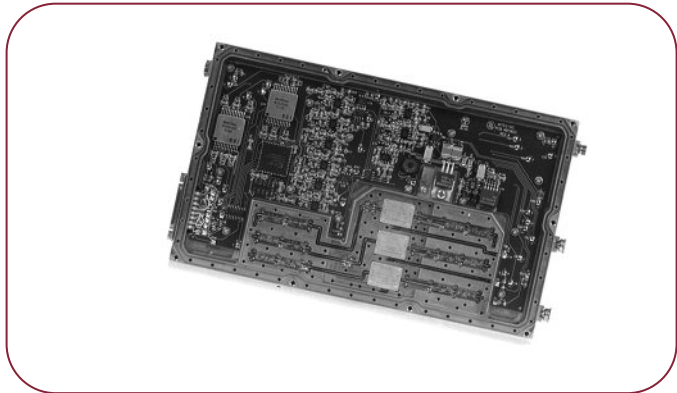
- Operating temperature -54 to +71°C
- Storage temperature -54 to +71°C
- Humidity 95% noncondensing
- Vibration 12 g's rms, 20-2000 Hz per MIL-STD-810B Method 300.2, Procedure 1

INTEGRATED SWITCH ASSEMBLIES (CONT.)

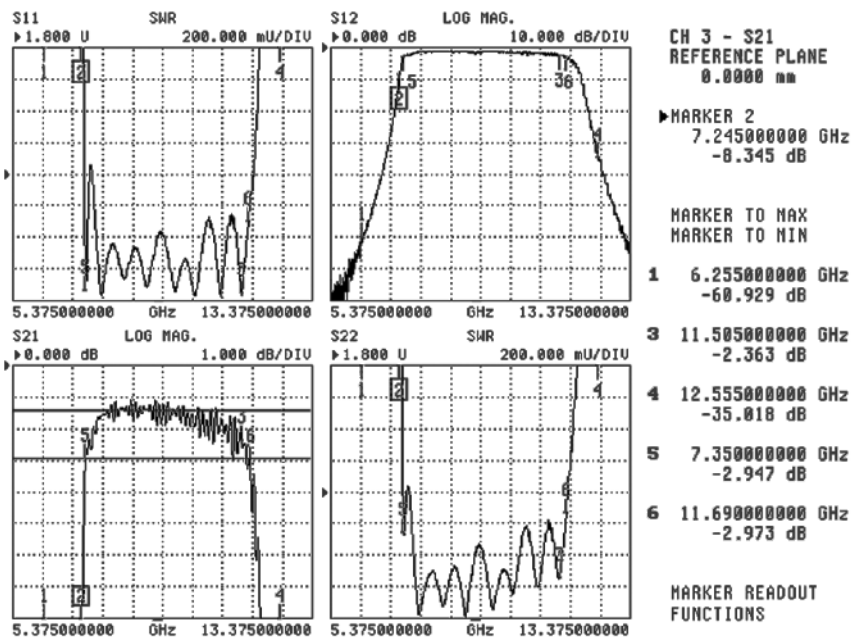
SWITCH FILTER BANK 9 SELECTABLE FREQUENCIES OVER 0.5-18 GHz

FEATURES

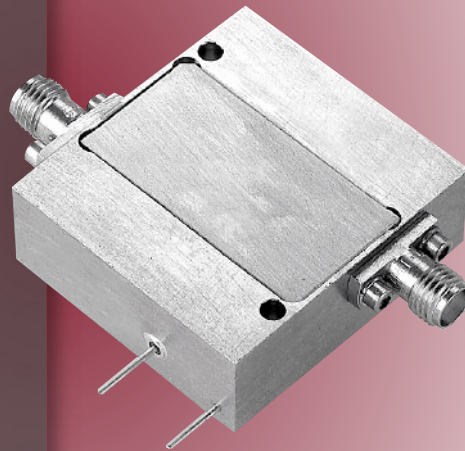
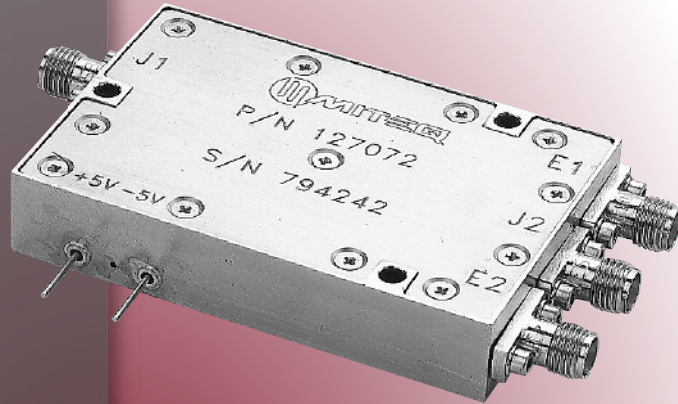
- RF gain..... Up to 27 dB
- High rejection >70 dBc
- Low noise figure 4.5 dB typical
- In/Out VSWR..... 1.8:1 typical
- Low DC current 700 mA (+12 VDC)
- Weight 900 grams typical
- Control TTL 4 bit address



TYPICAL TEST DATA



MODULATORS



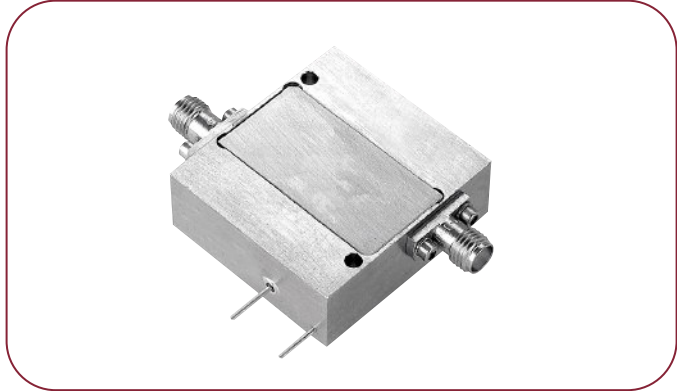
MITEQ supports the wireless markets with QPSK modulators that can handle data rates as high as 200 Mb/s. We can offer spectral shaping filters to control spectral content and thereby achieve optimal spectrum utilization. RRC and Butterworth baseband shaping filters can be provided. Our modulators feature very good linearity to minimize spectral regrowth after shaping is performed. BIT error rates within 1 dB of theoretical can be achieved.

Modulators supporting carrier frequencies up to 18 GHz and data rates as high as 200 Mb/s are available. Our communications expertise is available to support you in achieving the optimum solution to your system problem.

MODULATORS

FEATURES

- Voltage controlled
- Low insertion loss
- High ON/OFF ratio
- High frequency



SPECIFICATIONS - MODEL MVC-13501450

RF frequency range	13.5–14.5 GHz
Insertion loss	3 dB maximum
Input/output VSWR	1.7:1 maximum
On/off ratio	60 dB minimum
Switching speed	150 ns maximum
DC control voltages	0 V = Off 5 V = On
Outline drawing	195911

ENVIRONMENTAL CONDITIONS

Operating temperature 0 to 70°C
Storage temperature -30 to +85°C
Humidity 95% noncondensing
Vibration 12 g's rms, 20-2000 Hz per
MIL-STD-810B Method 514, Procedure 5

ORDERING INFORMATION

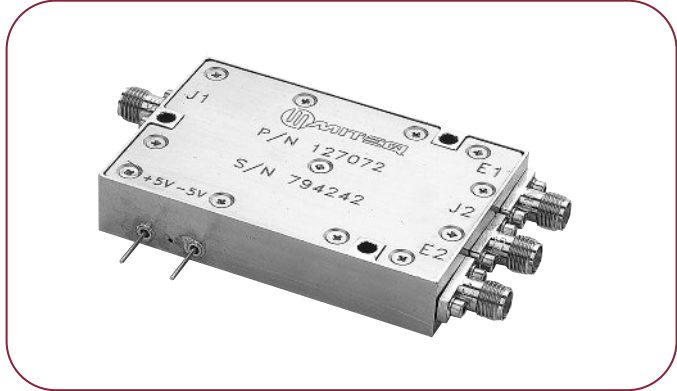
Please contact MITEQ.

Additional frequency ranges and modular parameter values are available. Please contact MITEQ for options.

QPSK MODULATORS

FEATURES

- Switching speed 150 ns maximum
- Phase accuracy $\pm 5^\circ$ maximum
- Amplitude balance ± 0.75 dB



ELECTRICAL SPECIFICATIONS

PARAMETERS	MODEL MQPSK-02200230	MODEL MQPSK-13301410
Function	Phase shifter, 2-BIT (QPSK)	Phase shifter, 2-BIT (QPSK)
Frequency range	2.2–2.3 GHz	13.3–14.1 GHz
Phase states	0°, 90°, 180°, 270°	0°, 90°, 180°, 270°
Insertion loss	8 dB maximum	8 dB maximum
VSWR		
J1, RF input	2:1 maximum	2:1 maximum
J2, RF output	3:1 maximum	3:1 maximum
Control TTL, 2 lines	(E1, E2)	TTL, 2 lines (E1, E2)
Switching speed	150 ns maximum	150 ns maximum
Phase accuracy	$\pm 5^\circ$ maximum	$\pm 5^\circ$ maximum
Amplitude balance	± 0.75 dB maximum	± 0.75 dB maximum
DC power	± 5 V @ 75 mA maximum each	± 5 V @ 75 mA maximum each
Control logic	E1 E2 State	
	0 0 0°	
	0 1 90°	
	1 0 -90°	
	1 1 180°	
Outline Drawing	195912	

ENVIRONMENTAL CONDITIONS

- Operating temperature 0 to 70°C
- Storage temperature -30 to +85°C
- Humidity 95% noncondensing
- Vibration 12 g's rms, 20-2000 Hz per MIL-STD-810B Method 514, Procedure 5

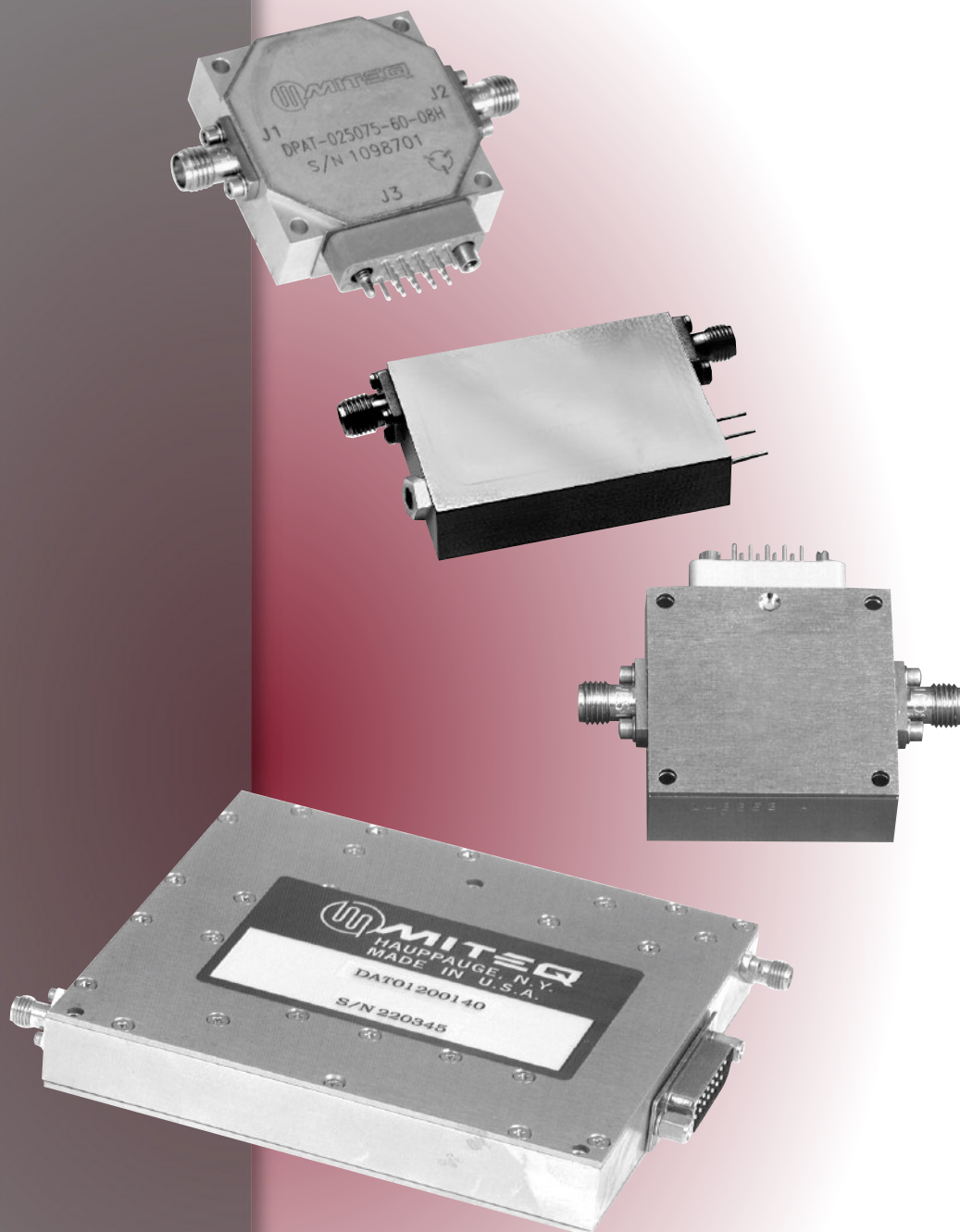
ORDERING INFORMATION

Please contact MITEQ.

Additional frequency ranges and modular parameter values are available. Please contact MITEQ for options.

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ANALOG AND DIGITAL PIN ATTENUATORS



Analog PIN attenuators optimized for the communication bands are available from MITEQ. Attenuation ranges up to 64 dB can be obtained with our standard products. We also offer custom products including 8-bit digital attenuators with an LSB of 0.125 dB and maximum attenuation of 82 dB (see Digital Attenuator section). Custom PIN attenuators that cover octave bands are also available.

ATTENUATOR DEFINITIONS

Attenuators are used to control the amplitude of a signal and can be fixed, mechanically variable or electrically variable. MITEQ attenuators are electrically variable, solid-state devices with high speed adjustment capability.

OPERATING FREQUENCY RANGE

Range of frequencies over which the attenuator will meet the specified parameters.

INSERTION LOSS

The loss a signal experiences in dB when it transitions through the attenuator in the "no attenuation" state.

ATTENUATION

The amount of signal suppression in dB experienced in excess of the insertion loss at any given frequency.

MEAN ATTENUATION

The average of the minimum and maximum attenuation within the minimum frequency range of the attenuator for a specified control input.

ACCURACY OF MEAN ATTENUATION

The difference between the ideal attenuation and the mean attenuation of the attenuator for a specified control input.

ATTENUATION FLATNESS

The maximum difference between the mean attenuation and the minimum or maximum attenuation within the minimum frequency range of the attenuator.

POWER HANDLING (FULL PERFORMANCE)

Defined as the maximum input power the attenuator can handle without degradation of performance.

POWER HANDLING (NO DAMAGE)

Defined as the maximum input power the attenuator can handle without damaging the device, but with performance degradation.

INPUT AND OUTPUT VSWR

Most RF and microwave systems are designed around a 50 ohm impedance system. An absorptive attenuators impedance is designed to be as close as possible to 50 ohms.

The VSWR is derived from the reflection coefficient Γ , where Γ is a ratio of the normalized impedance:

$$\Gamma = \frac{Z - Z_0}{Z + Z_0}$$

and:

$$VSWR = \frac{1 + |\Gamma|}{1 - |\Gamma|}$$

VSWR is "measured" with either a scalar or vector network analyzer. The reflection coefficients are determined by comparing the incident power and the reflected power at both ports of the device which in turn are converted and displayed as VSWR. The ratio of the reflected power to the incident power is also known as the return loss.

ATTENUATOR DEFINITIONS (CONT.)

SWITCHING SPEED

The time to change the state of an attenuator from insertion loss to maximum mean attenuation or from maximum mean attenuation to insertion loss. It is characterized in two ways: rise/fall time and on/off time.

RISE TIME

The time period from 10% to 90% of the square-law detected RF output as an attenuator is changed from a maximum attenuation to an insertion loss state.

FALL TIME

The time period from 90% to 10% of the square-law detected RF output as a switch arm is changed from an insertion loss to a maximum attenuation state.

Rise Time and Fall Time does not include the attenuator driver delay time.

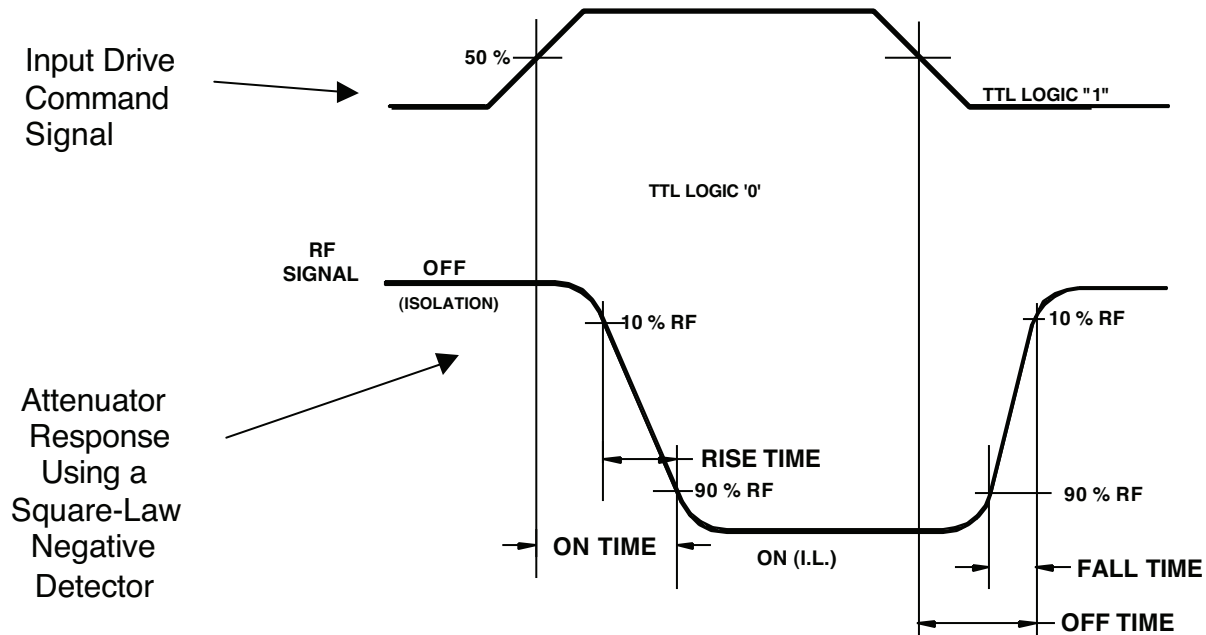
ON TIME

The time period from 50% of the transition of an input command word to 90% of the square-law detected RF output as an attenuator is changed from a maximum attenuation to an insertion loss state.

OFF TIME

The time period from 50% of the transition of an input command word to 10% of the square-law detected RF output as a switch arm is changed from an insertion loss to a maximum attenuation state.

On Time and Off Time includes the driver propagation delay.



ANALOG PIN ATTENUATORS

FEATURES

- Attenuation range of up to 60 dB
- Up to octave bandwidths
- Voltage control
- Standard field replaceable RF connectors



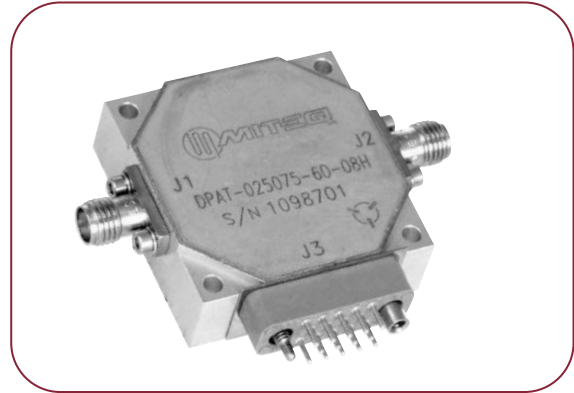
Frequency Range (GHz)	Model Number	Insertion Loss (dB, Max.)	VSWR* In/Out (Max.)	Amplitude Response** (±dB)	Atten. Range Options (dB, Min.)	Control Options*** (VDC)	Outline
STANDARD, NARROWBAND VOLTAGE-CONTROLLED MODELS							
0.95–1.75	MPAT-00950175-	1.2	1.5:1	See notes	10–60	0–20	174335
1.275–1.48	MPAT-01270148-	2.5	1.5:1	See notes	0–30	0–20	174337
1.5–1.8	MPAT-01500180-	1.1	1.5:1	See notes	10–60	0–20	174336
2.1–2.7	MPAT-02100270-	1.5	1.5:1	See notes	10–60	0–20	174336
2–2.2	MPAT-02000220-	1.7	1.5:1	0.3 in band	0–37	0–6	174336
3.1–3.5	MPAT-03100350-	2.2	1.3:1	0.25 in band	0–15	0–5	Contact MITEQ
3.4–4.2	MPAT-03400420-	2.2	1.5:1	See notes	10–60	0–20	174336
3.8–4.1	MPAT-03800410-	1.3	1.5:1	1 max. at 20–80 dB atten.	10–60	0–5	174336
4.5–4.8	MPAT-04500480-	2.2	1.5:1	See notes	10–60	0–20	174336
5.845–6.43	MPAT-05840643-	2.2	1.5:1	See notes	10–60	0–20	174336
6.4–7.2	MPAT-06400720-	2.2	1.5:1	See notes	10–60	0–20	174336
7.25–7.75	MPAT-07250775-	2.2	1.5:1	See notes	10–60	0–20	174336
7.5–8.5	MPAT-07500850-	1.8	1.5:1	0.25 in band	0–10	0–10	174338
7.9–8.4	MPAT-07900840-	2.2	1.5:1	See notes	10–60	0–20	174336
10.7–12.5	MPAT-10701250-	2.2	1.5:1	See notes	10–60	0–20	174337
10.95–12.75	MPAT-10951275-	2.2	1.5:1	See notes	10–60	0–20	174337
11.7–12.75	MPAT-11701275-	2.2	1.5:1	See notes	10–60	0–20	174337
12.75–13.25	MPAT-12751325-	2.5	1.5:1	See notes	10–60	0–20	174337
13.75–14.5	MPAT-13751450-	2.5	1.5:1	See notes	10–60	0–20	174337
14–14.8	MPAT-14001480-	2.7	1.5:1	See notes	10–60	0–20	174337
17.3–18.1	MPAT-17301810-	3	1.5:1	See notes	10–60	0–20	174338
17.7–20.2	MPAT-17702020-	3	1.5:1	See notes	10–60	0–20	174338

* VSWR performance is specified over full attenuation range.
 ** Amplitude response: ±0.2 dB over any 40 MHz window, ±1 dB over full band from 0–30 dB attenuation.
 *** Insertion loss occurs at 0 V control.
 Data presented in this table refers to room temperature.
 Custom models featuring broader bandwidths, and/or optimized specifications are also available. Consult MITEQ for options.

DIGITAL PIN ATTENUATORS

FEATURES

- Frequency range 2.5–12 GHz
- Attenuation range..... 0 to 63.75 dB
with .25 dB step size
- RF input power +20 dBm maximum
- Switching time..... less than 1 usec
- Monotonicity..... Guaranteed
- Hermetically sealed units are available upon request
- Standard field replaceable RF connectors
- Narrowband models can be optimized
for premium performance
- Small size 1.34" [34.04 mm] x 1.34" [34.04 mm] x 0.463" [11.760 mm]
(excludes connectors)



Frequency Range (GHz)	Model* Number	Insertion Loss (dB, Max.)	VSWR** (Max.)	Amplitude Response (±dB)	Mean Attenuation Range (±dB)	Attenuation Accuracy (±dB)	DC Power	Digital Control
STANDARD MODELS								
2.5-7.5	DPAT-02500750-60-08	3	2.5	0.7 at up to 10 dB 1.7 at up to 20 dB 2.5 at up to 30 dB 3.4 at up to 40 dB 4.5 at up to 60 dB	0–63.75	0.75	+12 V/140 mA -12 V/50 mA	TTL 8 bits
8–12	DPAT-08001200-60-08	4	2.5	0.7 at up to 10 dB 1.7 at up to 20 dB 2.5 at up to 30 dB 3.4 at up to 40 dB 4.5 at up to 60 dB	0–63.75	0.75	+12 V/140 mA -12 V/50 mA	TTL 8 bits
See outline drawing 162219.								
* For hermetically sealed units, add an "H" at the end of the model number e.g. DPAT-0250750-60-08H								
** VSWR performance is specified over full attenuation range.								
Data presented in this table refers to room temperature.								
Custom models featuring broader bandwidths, and/or optimized specifications are also available. Consult MITEQ for options.								

ENVIRONMENTAL CONDITIONS

Operating temperature 0 to 70°C
 Storage temperature -40 to +85°C
 Humidity..... 95% noncondensing
 Vibration..... 12 g's rms, 20-2000 Hz per
 MIL-STD-810B Method 514, Procedure 5

ORDERING INFORMATION

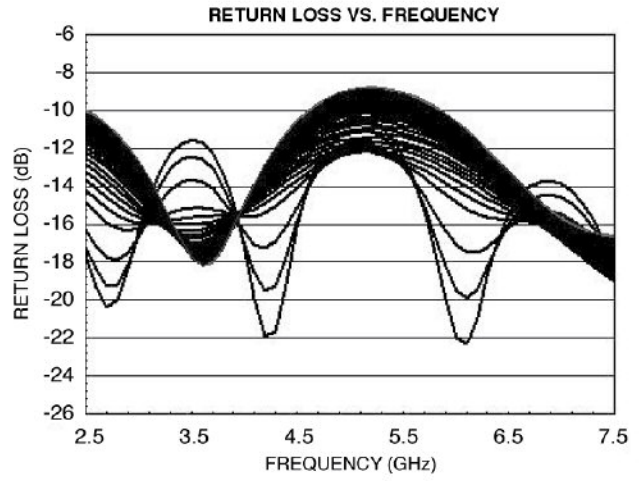
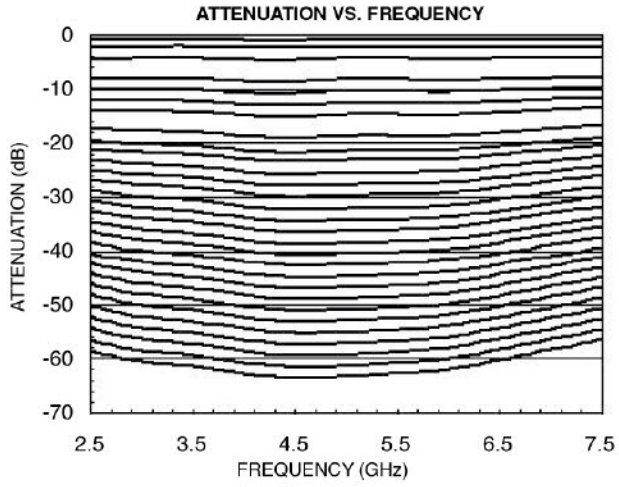
Please contact MITEQ.

ORDERING INFORMATION FOR RF CONNECTORS

Unless otherwise specified, all units will be shipped with field replaceable SMA female connectors on the input and outputs. If male connectors are desired on any port, please specify on the purchase order.

TYPICAL TEST DATA

DPAT-02500750-60-08

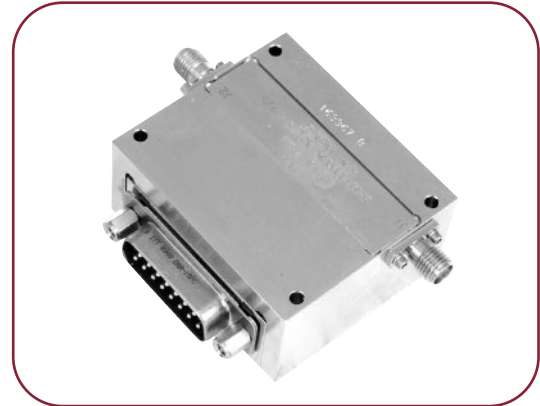


DIGITAL PHASE INVARIANT ATTENUATOR

MODEL: DPAT-13501450-32-08-0.125

FEATURES

- Frequency range 13.5–14.5 GHz
- Insertion loss 2.5 dB maximum
- In/Out VSWR 2:1 maximum
- Attenuation range..... 0–32 dB
- Attenuation accuracy..... ± 1 dB
- Minimum attenuation step 0.125 dB (LSB)
- Phase variation..... $\pm 10^\circ$ to 31.875 dB typical
- Power handling 20 dBm maximum
CW or peak
- Monotonicity..... Guaranteed
- Switching time..... 1 usec maximum
- Digital control..... 8 bits TTL binary
- DC power +12 V @ 150 mA maximum,
-12 V @ 10 mA maximum
- Size 0.34 [8.64" mm] x 0.34 [8.64" mm] x 12.7" [322.58 mm]
(excludes connectors)



See outline drawing 193524.

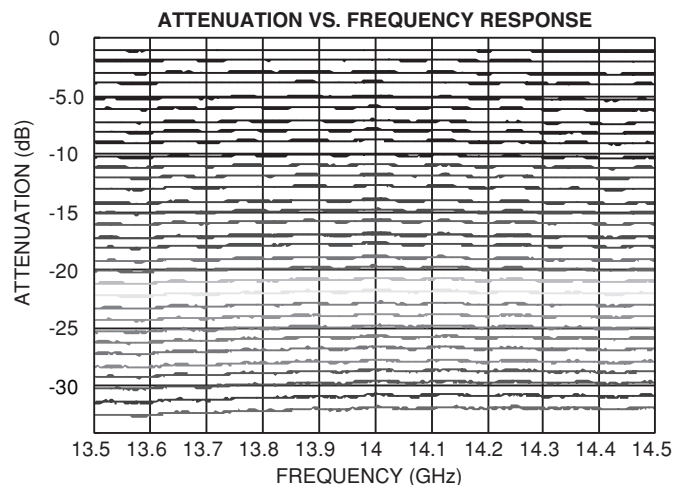
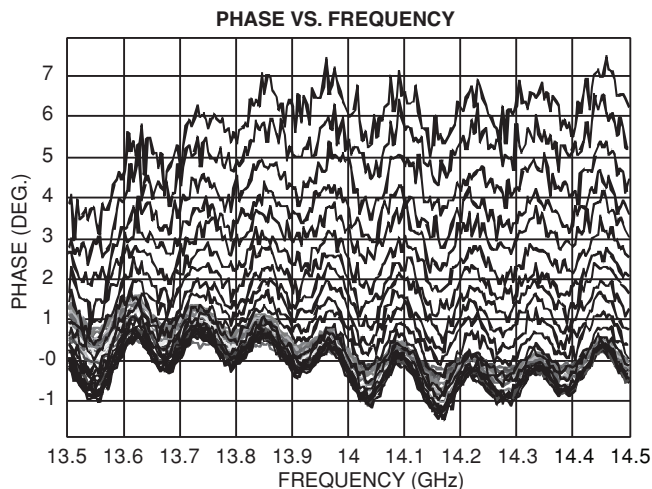
ORDERING INFORMATION

Please contact MITEQ.

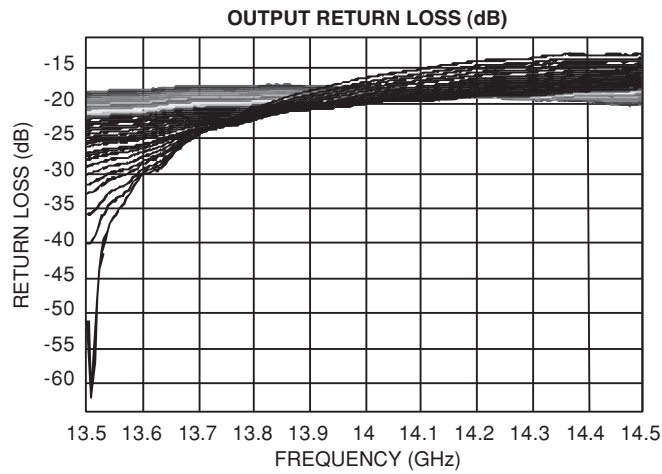
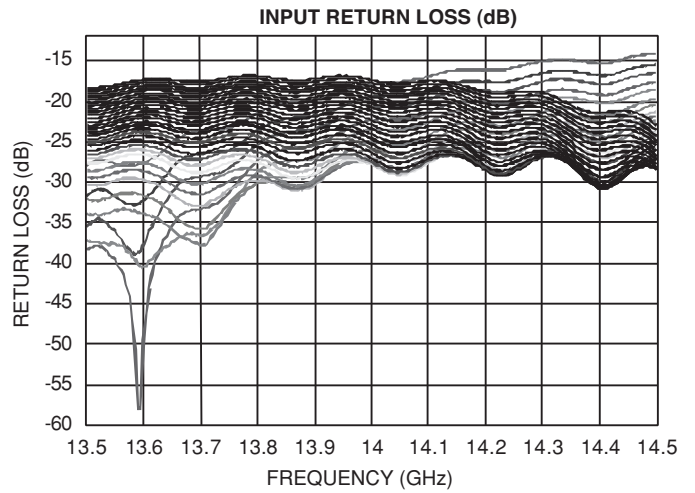
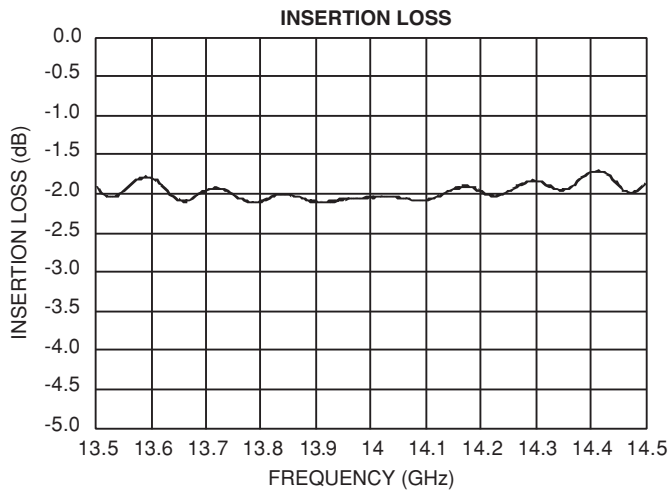
ORDERING INFORMATION FOR RF CONNECTORS

Unless otherwise specified, all units will be shipped with field replaceable SMA female connectors on the input and outputs. If male connectors are desired on any ports, please specify on the purchase order.

TYPICAL TEST DATA



TYPICAL TEST DATA (CONT.)



DIGITAL PIN ATTENUATORS (CONT.)

MODEL: DATT-01200140

FEATURES

- Frequency range 1.2–1.4 GHz
- Insertion loss 5 dB maximum
- In/Out VSWR at any attenuation .. 1.5:1 maximum
- Attenuation 82 dB maximum
- Number of control bits 8
bit 0 = 50 dB OFF/bit 1 = 50 dB ON
8 bits over 32 dB range, LSB = 0.125 dB
- Attenuation accuracy/flatness..... ± 0.9 dB
- On/Off switching speed..... 200 ns maximum
- RF input power, operating..... +10 dBm maximum
- Power handling capability..... +20 dBm minimum (no damage)



See outline drawing 193518.

ORDERING INFORMATION

Please contact MITEQ.

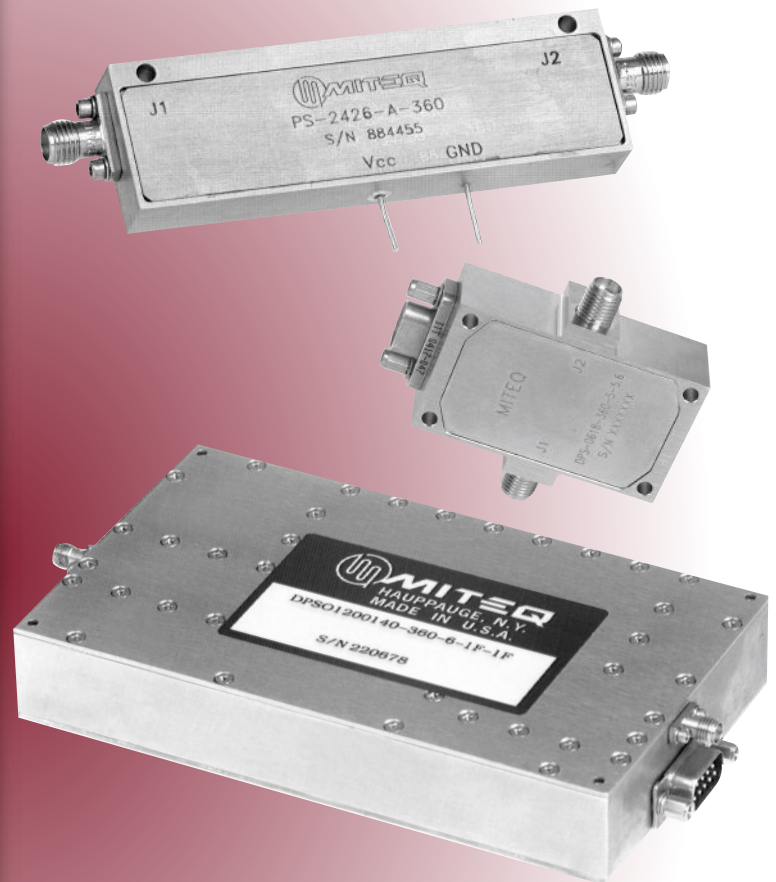
ORDERING INFORMATION FOR RF CONNECTORS

Unless otherwise specified, all units will be shipped with field replaceable SMA female connectors on the input and outputs. If male connectors are desired on any port, please specify on the purchase order.

ANALOG AND DIGITAL PHASE SHIFTERS

MITEQ has extensive experience in digital or analog phase shifter design and development for critical space, telemetry, transceiver, radar, and EW applications. We specialize in offering customized solutions that meet your needs for applications that require extremely fast response time. Our solid-state phase shifters incorporate a wide variety of techniques to achieve high performance over a wide range of specification requirements. MITEQ can provide phase shifters as drop-in functions for those applications that require higher levels of integration. We offer MIL-STD-883 screening of our phase shifters and can accommodate special connector requirements.

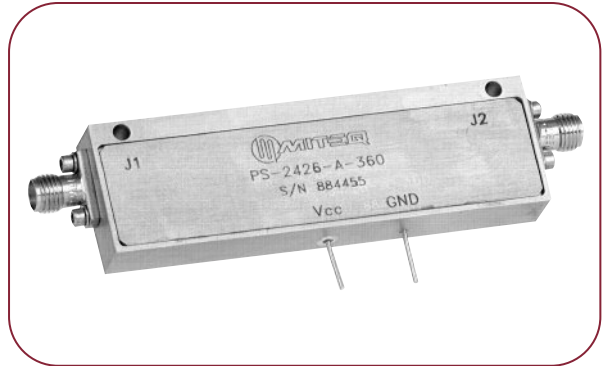
A combination of switched line, loaded line, and switched reflection techniques are used to achieve minimum loss and increased performance in constant phase designs. All designs are implemented using microstrip construction which enable circuits to achieve high isolation and low VSWR. Integral TTL compatible logic circuits are included in all digital phase shifters as standard. Designs are optimized to handle power levels as high as 1 Watt CW.



ANALOG PHASE SHIFTERS

FEATURES

- Optimized for fast switching speeds (down to 20 ns maximum)
- Optimized for lowest phase deviation over band
- RMS phase error $\leq 5^\circ$ typical
- Low insertion loss
- Power handling up to 30 dBm
- OIP³ (typically 25 dBm)
- Hermetic sealing available



2.4-2.6 GHz

MODEL APS-02400260-270-1F-1FS

Frequency range	2.4-2.6 GHz
Insertion loss	10 dB maximum
Phase shift	0-270° minimum
Phase error	$\pm 5^\circ$ pk-pk maximum
Input voltage range	0 to +15 VDC
Switching speed	2 μ s maximum
Insertion loss variation over phase noise	± 3 dB maximum
Input VSWR	2:1 maximum
Output VSWR	2:1 maximum
RF input power	+10 dBm maximum
Outline drawing	174341

4.9-5.1 GHz

MODEL APS-04900510-180-1F-1FS

Frequency range	4.9-5.1 GHz
Insertion loss	6 dB maximum
Phase shift	0-180° minimum
Input voltage range	-18 to 0 VDC
Switching speed	10 ms maximum
Input VSWR	2:1 maximum
Output VSWR	2:1 maximum
RF input power	+10 dBm maximum
Outline drawing	174342

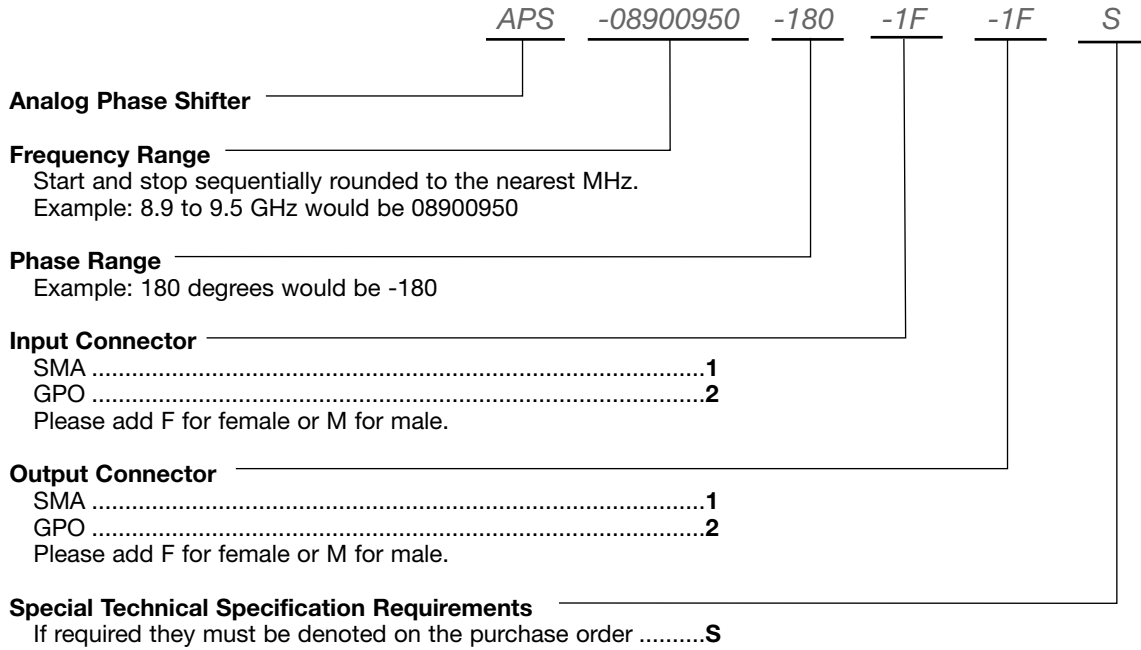
8-9 GHz

MODEL APS-08000900-180-1F-1FS

Frequency range	8-9 GHz
Insertion loss	5 dB maximum
Phase shift	0-180° minimum
Phase error	$\pm 7^\circ$ pk-pk maximum
Input voltage range	-18 to 0 VDC
Switching speed	20 ns maximum
Insertion loss variation over phase noise	± 0.3 dB maximum
Input VSWR	2:1 maximum
Output VSWR	2:1 maximum
RF input power	+10 dBm maximum
Outline drawing	174342

ORDERING INFORMATION

To order an analog phase shifter, please include the model number derived from the following table. If requesting a quotation for an analog phase shifter not listed in this catalog, please consult MITEQ. Include any additional specifications that are not listed.



Using the above information to order or request a phase shifter with other technical requirements placed in the purchase order or in the RFQ documentation would result in ordering a APS-08900950-180-1F-1FS, a 8.9 to 9.5 GHz, 180° analog phase shifter with other technical requirements denoted on purchase order. Other special technical specification requirements would typically be switching speed, in/out VSWR, IIP³, size, etc.

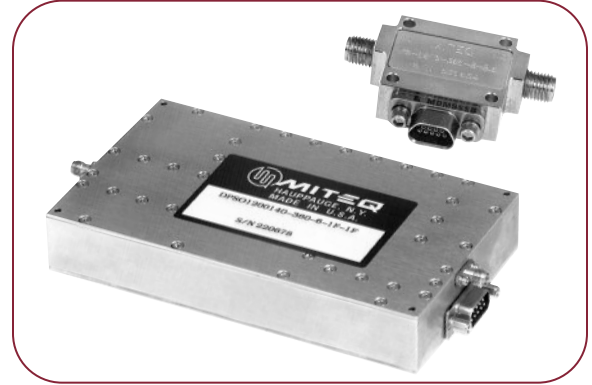
ENVIRONMENTAL CONDITIONS

Operating temperature..... 0 to 70°C
 Storage temperature -30 to +85°C
 Humidity..... 95% noncondensing
 Vibration..... 12 g's rms, 20-2000 Hz per
 MIL-STD-810B, Method 514,
 Procedure 5

DIGITAL PHASE SHIFTERS

FEATURES

- Optimized for fast switching speeds (down to 20 ns maximum)
- Optimized for lowest phase deviation over band
- RMS phase error $\leq 3^\circ$ typical
- Low insertion loss
- Power handling up to 30 dBm
- OIP³ (typically 25 dBm)
- Hermetic sealing available



MITEQ offers a 6 bit, 6 to 18 GHz digital phase shifter operating as high as 18 GHz for EW applications. This product offers exceptional power handling capability in excess of 25 dBm and switching speed of 20 ns maximum. This device is ideally suited for phased array applications and interferometric receivers. We also offer a number of narrowband analog phase shifters denoted in the Analog Phase Shifter Section that utilize switched line and reflection phase shifter topologies.

7 BIT, 650–1550 MHz

DPS-00650155-180-7-IF-IF

Frequency range	650–1550 MHz 0 to 180° in 1.4° steps @ 700 MHz
Phase	(phase changes linearly w/frequency)
Phase accuracy	$\pm 1.0^\circ$ @ 700 MHz at 25°C
Insertion phase variation	± 2 dB maximum
Insertion loss	1.5 dB typical, 2.0 dB maximum
Input/output VSWR	2:1 maximum
Power	20 Watts CW, 300 Watts Peak 2 ms pulse length, 6% max duty cycle
Speed	300 ns typ., 750 ns maximum
Size	5.0" [127 mm] x 2.5" [63.5 mm] x 0.75" [19.05 mm]
DC input	+5 V @ 750 mA max. -15 V @ 60 mA max.

6 BIT, 1.2–1.4 GHz

DPS-01200140-360-6-1F-1F

Frequency range	1.2–1.4 GHz
Insertion loss	3.5 dB maximum
Insertion loss variation over phase range	± 3 dB maximum
Phase shift	0–360° minimum
Phase error	$\pm 3^\circ$ maximum
Switching speed	200 ns maximum
Input/output VSWR	1.65:1 maximum
RF input power (working)	+10 dBm maximum
RF input power (no damage)	+20 dBm maximum
Outline drawing	174343

4 BIT, 2.9–3.1 GHz

DPS-02900310-360-2-1F-1F

Phase states	4 0° (Ref.), 22.5°, 45°, 90°, 180°
Frequency range	2.9–3.1 GHz
Insertion loss	3 dB maximum
Input/output VSWR	1.5:1 maximum
Switching speed	25 ns maximum
Phase accuracy	1° maximum
Amplitude accuracy	0.25 dB maximum
Control	TTL, "0" = Path on
Outline drawing	174339

6 BIT, 3.1–3.7 GHz

DPS-03100370-360-6-1F-1F

Frequency range	3.1–3.7 GHz
Peak phase error	$\pm 2^\circ$ maximum
Phase	0–360° in 5.6° steps
Insertion phase variation	± 2 dB maximum
Insertion loss	1.2 dB typical, 1.4 dB maximum
Input/output VSWR	1.4:1 maximum
Power	50 Watts CW maximum
Speed	0.5 ms maximum
Size	2.5" [63.5 mm] x 1.5" [38.1 mm] x 0.5" [12.7 mm]
DC input	+5/-15 V

DIGITAL PHASE SHIFTERS (CONT.)

3 BIT, 9–10 GHz

DPS-09001000-360-3-1F-1F

Phase states	0° (Ref.), 90°, 180°, 270°		
Frequency range	9–10 GHz		
Insertion loss	7 dB maximum		
Input/output VSWR	1.7:1 maximum		
Switching speed	20 ns maximum		
Phase accuracy	±5° maximum		
Amplitude balance	±0.5 dB maximum		
Control	TTL, 2 lines		
Logic truth table	E1	E2	Phase
	0	0	0°
	0	1	90°
	1	0	180°
	1	1	270°
DC power	±5 V @ 50 mA maximum		
Outline drawing	174339		

6 BIT, 7–14 GHz

DPS-07001400-360-6-IF-IF

RF frequency range	7–14 GHz
Insertion loss	10.5 dB typical, 11 dB maximum
Input/output VSWR	2.5:1 maximum
Phase shift	360° maximum
Phase shift step size	5.6° minimum
Phase error	3° typical midband, 6° maximum
Input third order intercept	40 dBm typical, 35 dBm maximum
DC power	+5 VDC
Control input	6-bit TTL
Outline drawing	174340

4 and 6 BIT, 0–360°, 5.03–5.09 GHz Design Family

Parameters	Option #1 Low Loss 22.5° Steps		Option #2 High Stability 22.5° Steps		Option #3 High Stability 5.6° Steps	
	(Typ.)	(Max.)	(Typ.)	(Max.)	(Typ.)	(Max.)
Peak phase error	2°	2.5°	2°	2.5°	2.7°	3.3°
Phase	1.3°	1.5°	1.3°	1.5°	1.2°	1.4°
Insertion phase vs. temperature	0.3°/°C	1°/°C	0.05°/°C	0.1°/°C	0.05°/°C	0.1°/°C
Insertion phase variation unit to unit	±3°	±5°	±3°	±5°	±3°	±5°
Insertion loss, maximum	1.4 dB	1.5 dB	1.65 dB	1.75 dB	1.75 dB	1.85 dB
Insertion loss vs. phase and frequency	0.4 dB	0.5 dB	0.4 dB	0.5 dB	0.45 dB	0.6 dB
Loss \varnothing at any phase setting unit to unit	±0.18 dB	±0.25 dB	±0.18 dB	±0.25 dB	±0.25 dB	±0.3 dB
Operating power level	4W CW	10W CW	4W CW	10W CW	4W CW	10W CW
Switching speed	0.2 us	0.5 us	0.2 us	0.5 us	0.2 us	0.5 us
DC input	+5/-15 V		+5/-15 V		+5/-15 V	

DPS-06001800-360-6-5.6

RF frequency range	6–18 GHz
Insertion loss	15.5 dB maximum
Input/output VSWR	3:1 maximum
Phase shift	360° maximum
Phase shift step size	5.6° minimum
Phase error	3° typical midband, 6° maximum
Input third order intercept	40 dBm typical, 35 dBm maximum
DC power	+5 VDC
Control input	6-bit TTL
Outline drawing	174340



ORDERING INFORMATION

To order a digital phase shifter, please include the model number derived from the following table. If requesting a quotation for a phase shifter not listed in this catalog, please consult MITEQ. Include any additional specifications that are not listed when creating the model number.

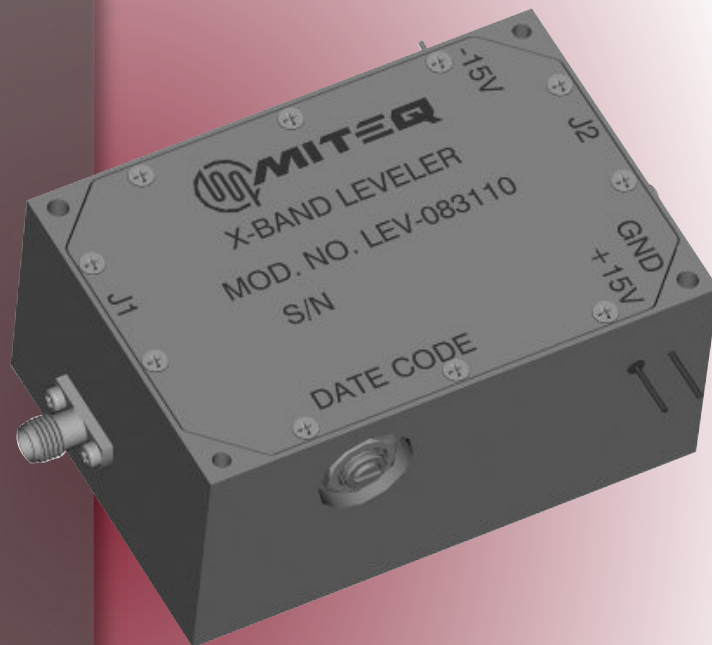
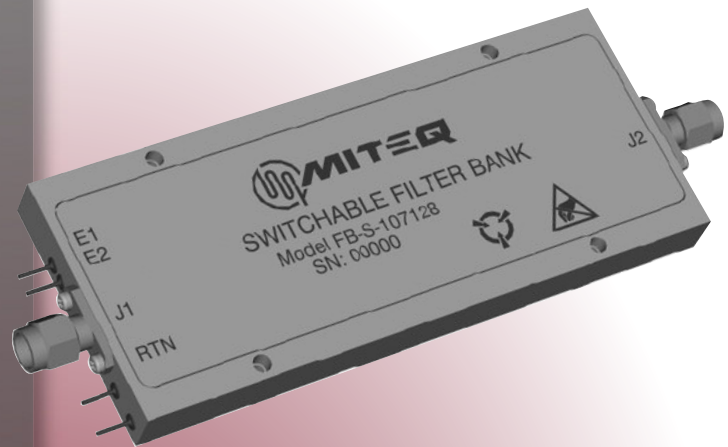
	DPS	-06001800	-360	-6	-1F1F	S
Digital Phase Shifter _____						
Frequency Range _____ Start and stop sequentially rounded to the nearest MHz. Example: 6 to 18 GHz would be 06001800						
Phase Range _____ Example: 360 degrees would be -360						
Number Of Bits _____ -3 3 bit -4 4 bit -6 6 bit						
Input Connector _____ SMA 1 GPO 2 Please add F for female or M for male.						
Output Connector _____ SMA 1 GPO 2 Please add F for female or M for male.						
Special Technical Specification Requirements _____ If required they must be denoted on the purchase order S						

Using the above information to order or request a phase shifter with other technical requirements placed in the purchase order or in the RFQ documentation would result in ordering a DPS-06001800-360-6-1F1FS, a 6 to 18 GHz, 180° digital phase shifter with other technical requirements denoted on purchase order. Other special technical specification requirements would typically be switching speed, in/out VSWR, IIP3, size, etc.

ENVIRONMENTAL CONDITIONS

Operating temperature..... 0 to 70°C
 Storage temperature -30 to +85°C
 Humidity 95% noncondensing
 Vibration 12 g's rms, 20-2000 Hz per
 MIL-STD-810B Method 514,
 Procedure 5

CUSTOM INTEGRATED ASSEMBLIES



MITEQ offers years of experience in the design and development of the most demanding custom integrated assemblies. We can offer superior sub-system solutions because we have complete capabilities in all of the components that go into the most advanced systems. The breadth of experience includes low noise signal sources, low- and medium-power amplifiers, mixers, switches, high-performance filters and filter banks, mixers, etc. All of this capability under one roof ensures the highest standard in system performance.

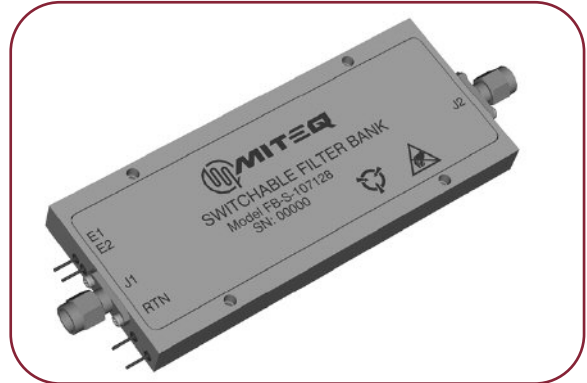
We can offer highly integrated solutions to your system problems and routinely offer densely packed slices containing as many as 50 microwave functions in a small volume.

SWITCHABLE FILTER BANK

MODEL: FB-S-107128

FEATURES

- Single input and output
- Insertion loss 5 dB maximum
- Amplitude balance 0.5 dB maximum
- VSWR 1.5:1 maximum



MITEQ's Model FB-S-107128 integrated, two part, switchable filter bank features two channelized, printed circuit filter banks, individually selectable by TTL driven, SP2T PIN switches the input and output. MITEQ's Microwave Control Products Group specializes in the manufacture of integrated switch filter assemblies and is able to offer a wide range of frequency ranges and a number of channels.

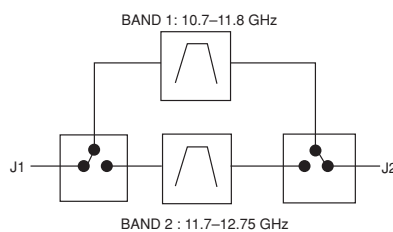
ELECTRICAL SPECIFICATIONS

PARAMETERS	BAND 1	BAND 2
Passband frequency	10.7–11.8 GHz	11.7–12.75 GHz
Insertion loss	5 dB maximum	5 dB maximum
Insertion loss flatness	0.7 dB maximum, 0.2 dB any 36 MHz band	0.7 dB maximum, 0.2 dB any 36 MHz band
Difference in band level	0.5 dB maximum	0.5 dB maximum
VSWR	1.5:1 maximum	1.5:1 maximum
Group delay (any 40 MHz band)		
Linear	0.01 ns/MHz maximum	0.01 ns/MHz maximum
Ripple	0.5 ns p-p maximum	0.5 ns p-p maximum
Rejection	14.88–15.98 GHz > 80 dB 12.79–13.89 GHz > 50 dB	15.88–16.91 GHz > 80 dB 13.79–14.84 GHz > 50 dB
Switch positions	Select E1 = 0 V	Select E2 = 0 V
Return voltage	5 V	5 V
Outline drawing	195910	

ENVIRONMENTAL CONDITIONS

Operating temperature..... 0 to 70°C
 Storage temperature..... -30 to +85°C
 Humidity..... 95% noncondensing
 Vibration..... 12 g's rms, 20-2000 Hz per MIL-STD-810B Method 514, Procedure 5

FUNCTIONAL BLOCK DIAGRAM



X-BAND LEVELER

MODEL: LEV-083103

FEATURES

- Used as microwave leveling loop
- Ultra-miniaturized self-contained AGC feedback loop
- External threshold adjust for setting desired output power
- Output power settability of ± 0.2 dB
- -45 to $+85^\circ\text{C}$ operation over airborne environments



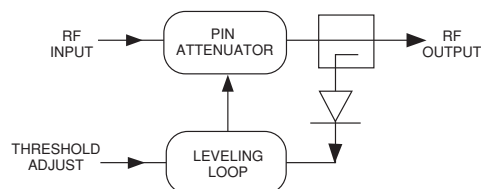
ELECTRICAL SPECIFICATIONS

PARAMETERS	LIMITS
Frequency range	8.3–10.3 GHz
Insertion loss	2.5 dB maximum
Insertion loss flatness	0.4 dB maximum
VSWR	1.5:1 maximum
Input power	23 dBm maximum
Output level adjust	-4.5 to +16 dBm
Output level flatness	± 0.2 dB maximum
Output level vs. temperature	0.5 dB maximum
Response time	Rise/fall time 100 ns, delay 200 ns maximum
Second harmonic	30 dBc maximum @ $P_{in} = 20$ dBm
Spurious	-60 dBc
DC power	15 V @ 50 mA maximum, -15 V @ 10 mA maximum
Weight	50 grams
Outline drawing	185648

ENVIRONMENTAL CONDITIONS

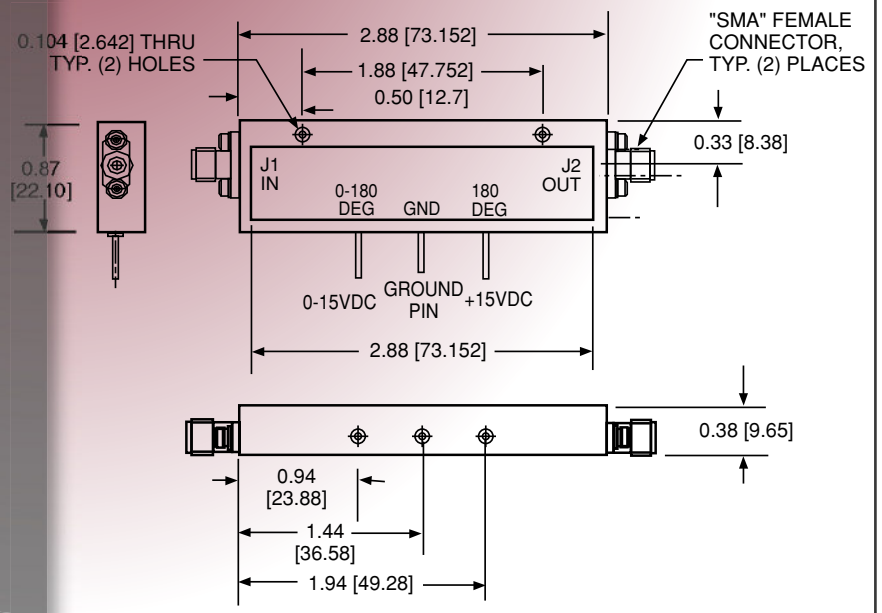
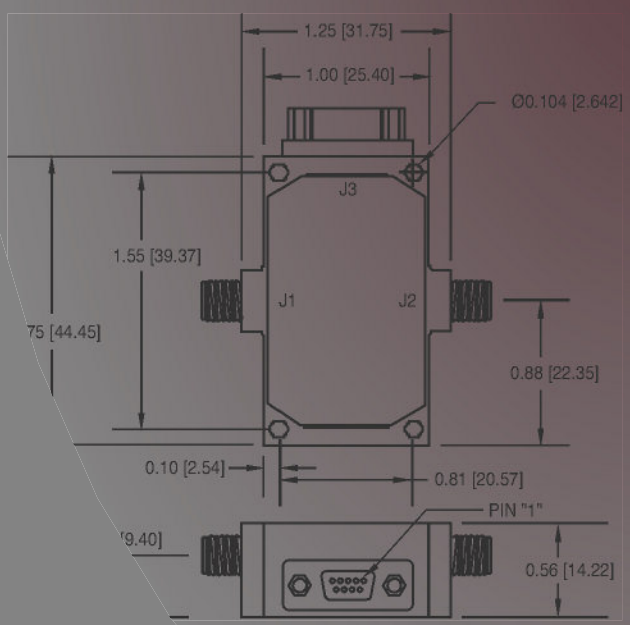
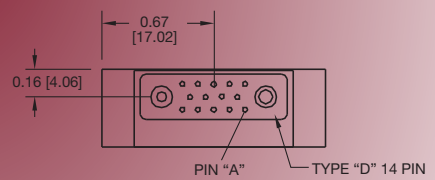
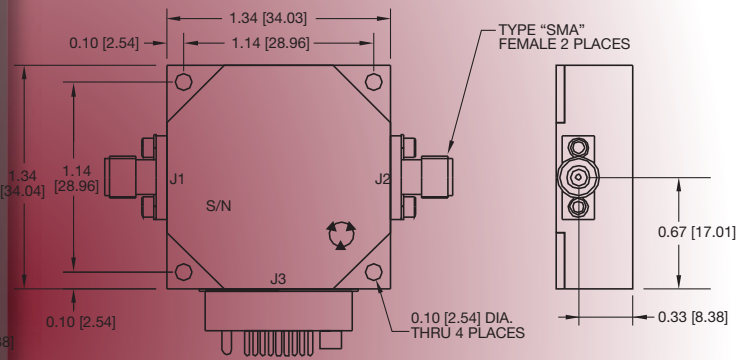
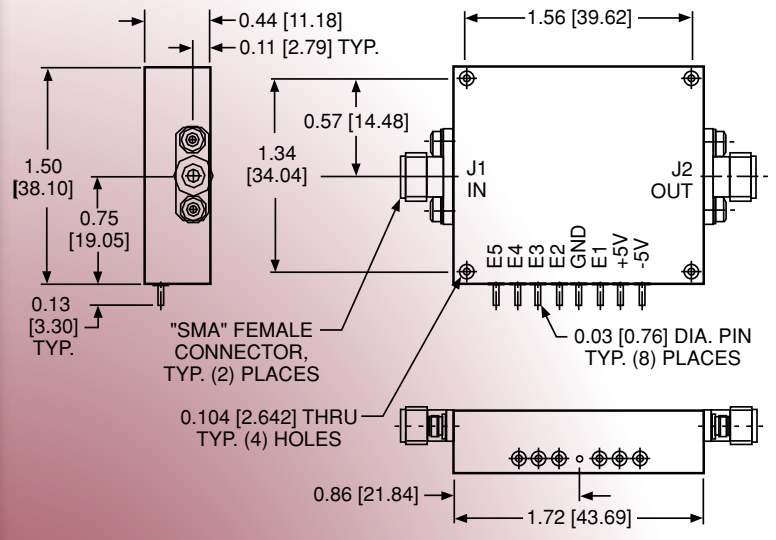
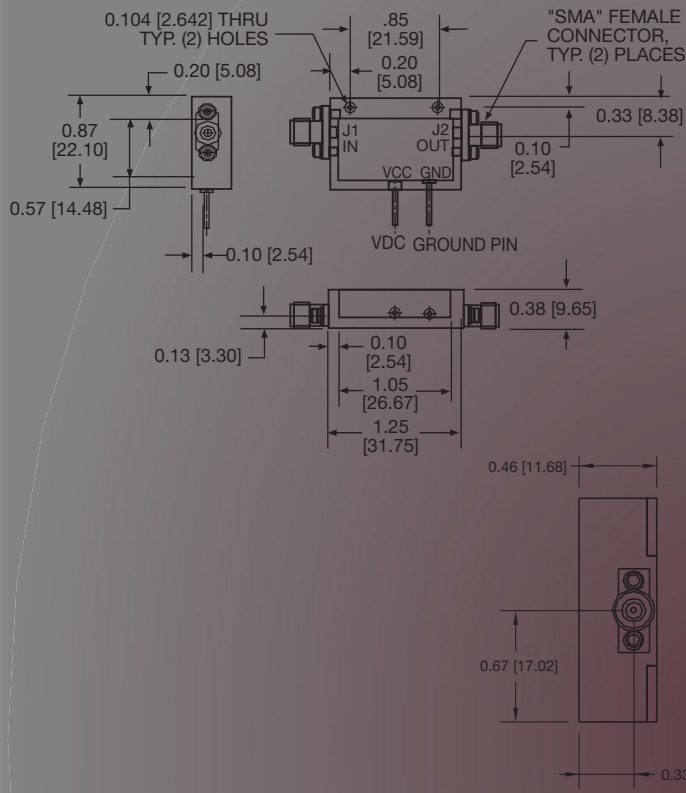
Operating temperature..... 0 to 70°C
 Storage temperature -30 to $+85^\circ\text{C}$
 Humidity 95% noncondensing
 Vibration 12 g's rms, 20-2000 Hz per
 MIL-STD-810B Method 514, Procedure 5

FUNCTIONAL BLOCK DIAGRAM



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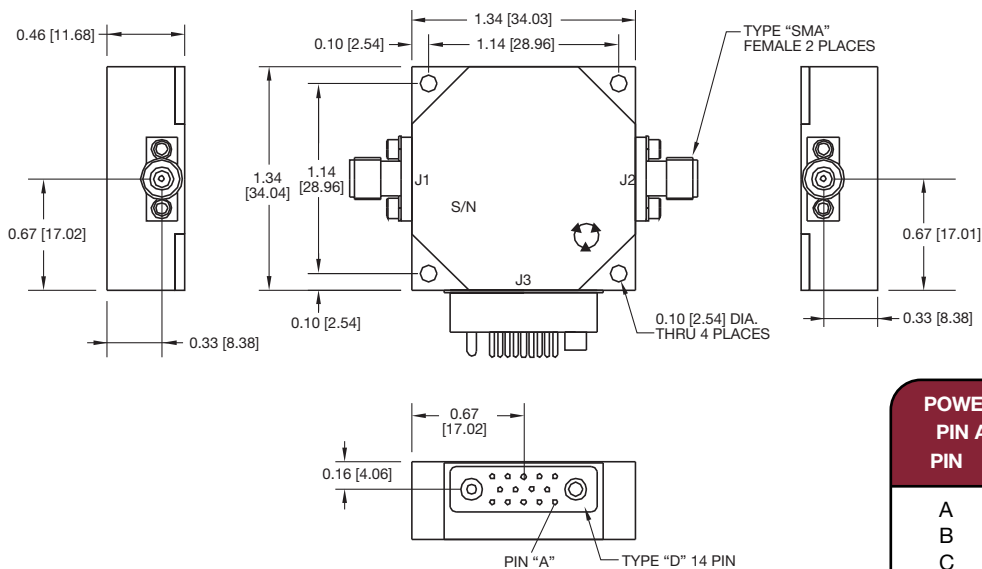
OUTLINE DRAWINGS



OUTLINE DRAWINGS

OUTLINE DRAWINGS

162219



POWER CONNECTOR PIN ASSIGNMENTS	
PIN	DESIGNATION
A	GND
B	N.C.
C	-12 V
D	.25 dB
E	0.5 dB
F	1 dB
H	4 dB
J	2 dB
K	16 dB
L	32 dB
M	+12 V
N	8 dB
P	GND
R	N.C.

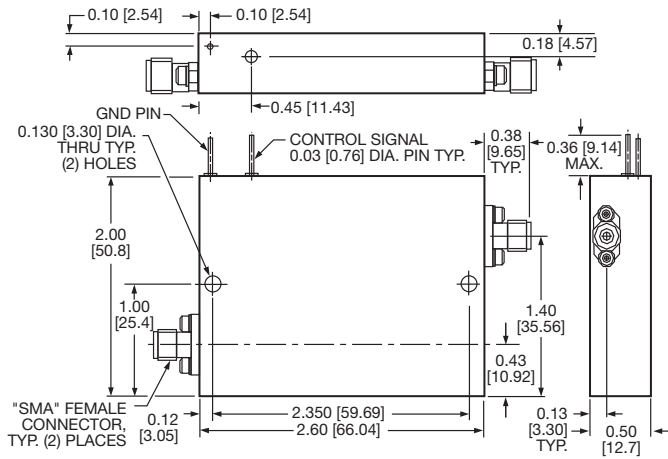
GENERAL NOTES:

1. Dimensions shown in brackets [] are in millimeters.
2. Unless specified, all connectors are type SMA female field replaceable. SMA male also available, see ordering options.
3. Tolerance as follows: .xx = ±0.01 [.xx = ±0.25], .xxx = ±0.005 [.xxx = ±0.13]

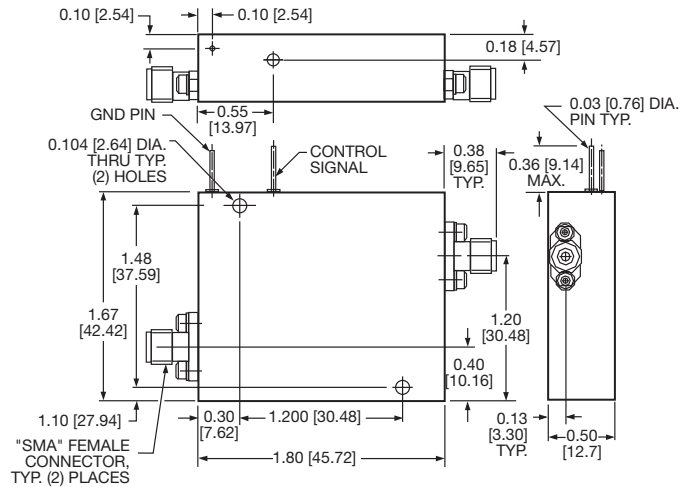


OUTLINE DRAWINGS (CONT.)

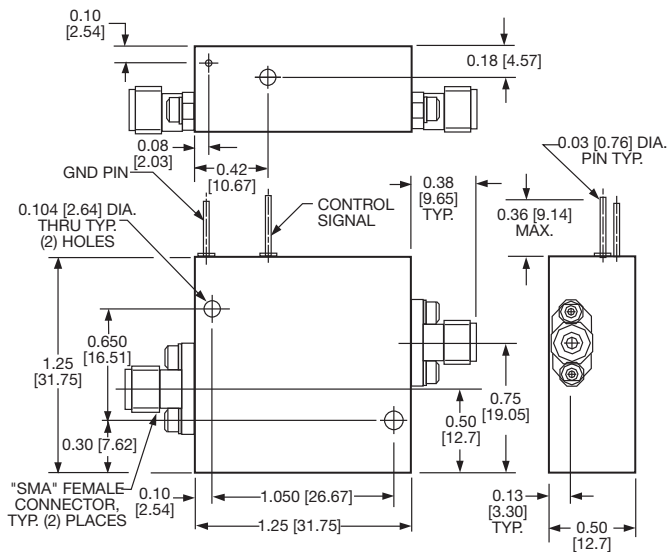
174335



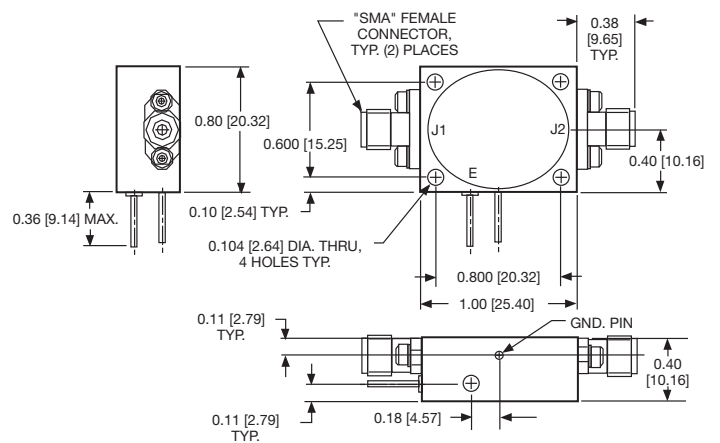
174336



174337



174338

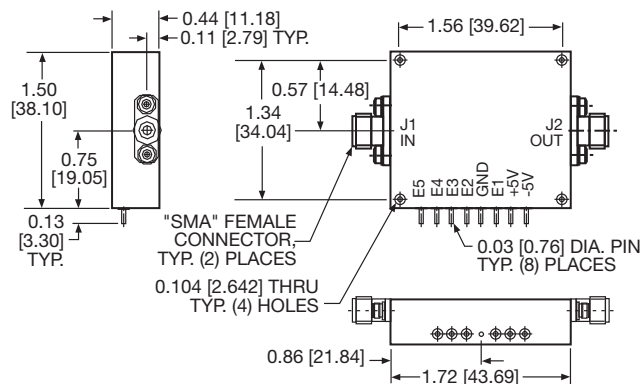


GENERAL NOTES:

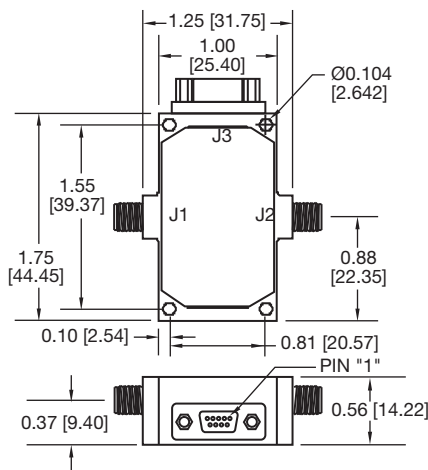
1. Dimensions shown in brackets [] are in millimeters.
2. Unless specified, all connectors are type SMA female field replaceable.
3. Tolerance as follows: .xx = ± 0.01 [.xx = ± 0.25], .xxx = ± 0.005 [.xxx = ± 0.13]

OUTLINE DRAWINGS (CONT.)

174339

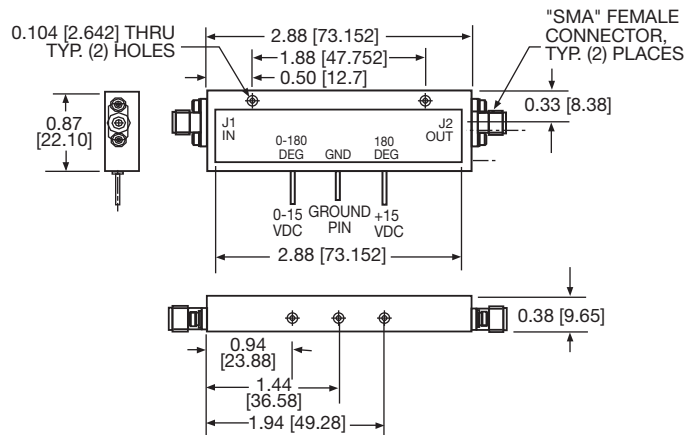


174340



13 PIN OUT	
PIN NUMBER	FUNCTION (DEG.)
1	180°
2	90°
3	45°
4	22.5°
5	11.25°
6	5.6°
7	GND
8	+5 VDC
9	not used

174341

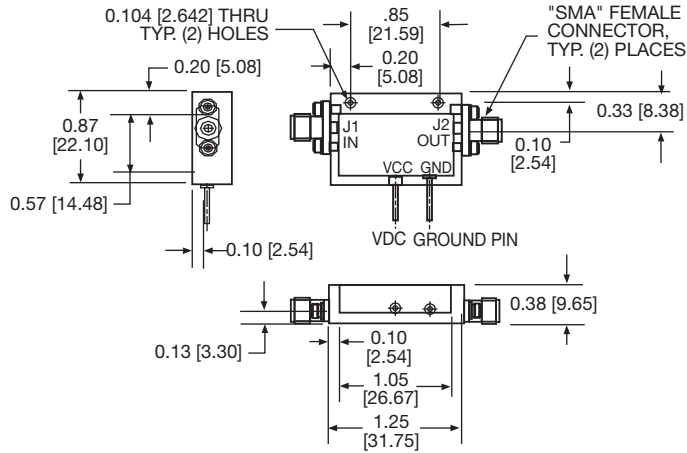


GENERAL NOTES:

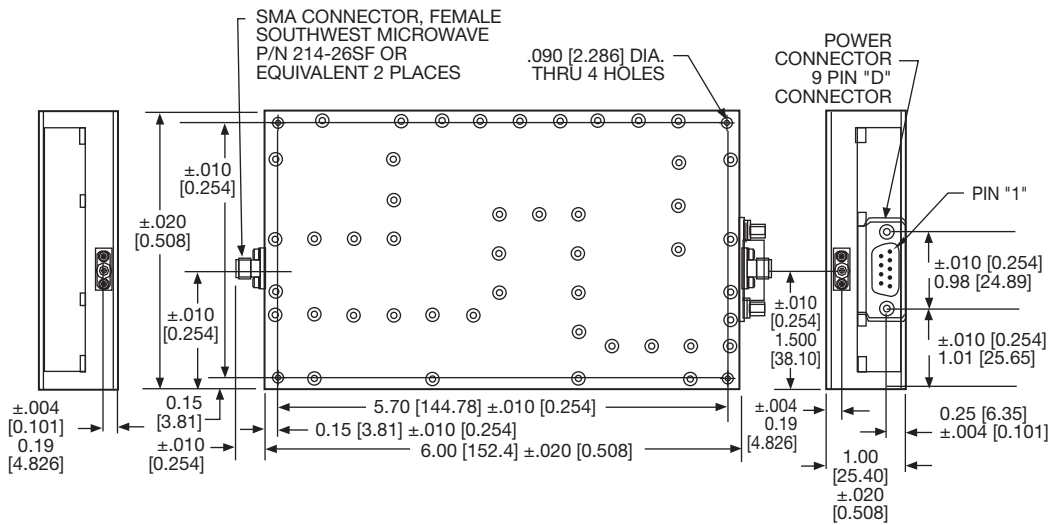
1. Dimensions shown in brackets [] are in millimeters.
2. Unless specified, all connectors are type SMA female field replaceable.
3. Tolerance as follows: .xx = ± 0.01 [.xx = ± 0.25], .xxx = ± 0.005 [.xxx = ± 0.13]

OUTLINE DRAWINGS (CONT.)

174342



174343



POWER CONNECTOR PIN ASSIGNMENTS

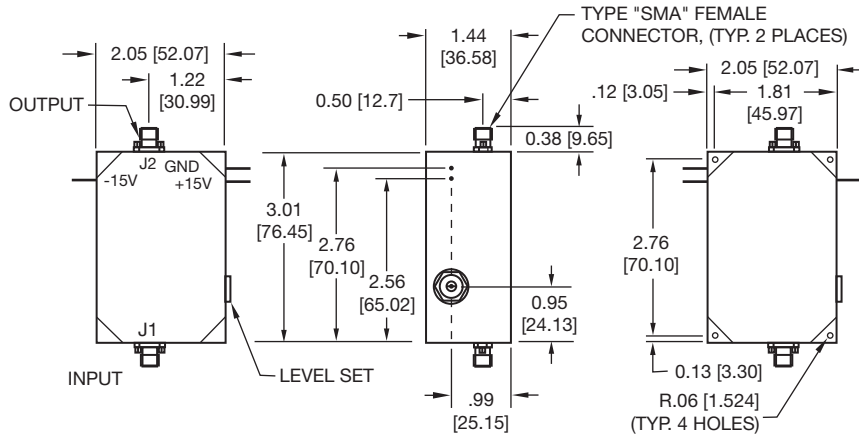
PIN	DESIGNATION
1	5.625°
2	11.25°
3	22.5°
4	45°
5	90°
6	180°
7	GND
8	+15V
9	-15V

GENERAL NOTES:

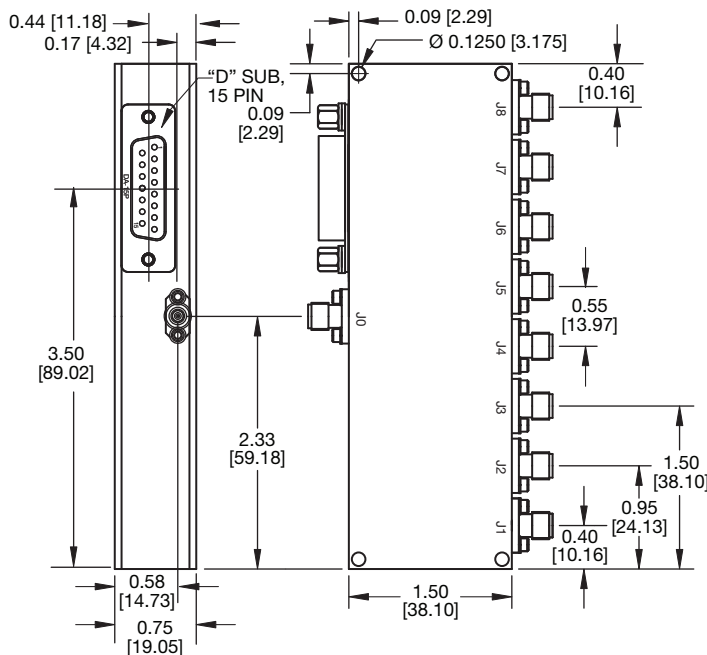
1. Dimensions shown in brackets [] are in millimeters.
2. Unless specified, all connectors are type SMA female field replaceable. SMA male also available, see ordering options.
3. Tolerance as follows: .xx = ±0.01 [xx = ±0.25], .xxx = ±0.005 [xxx = ±0.13]

OUTLINE DRAWINGS (CONT.)

185648



192958



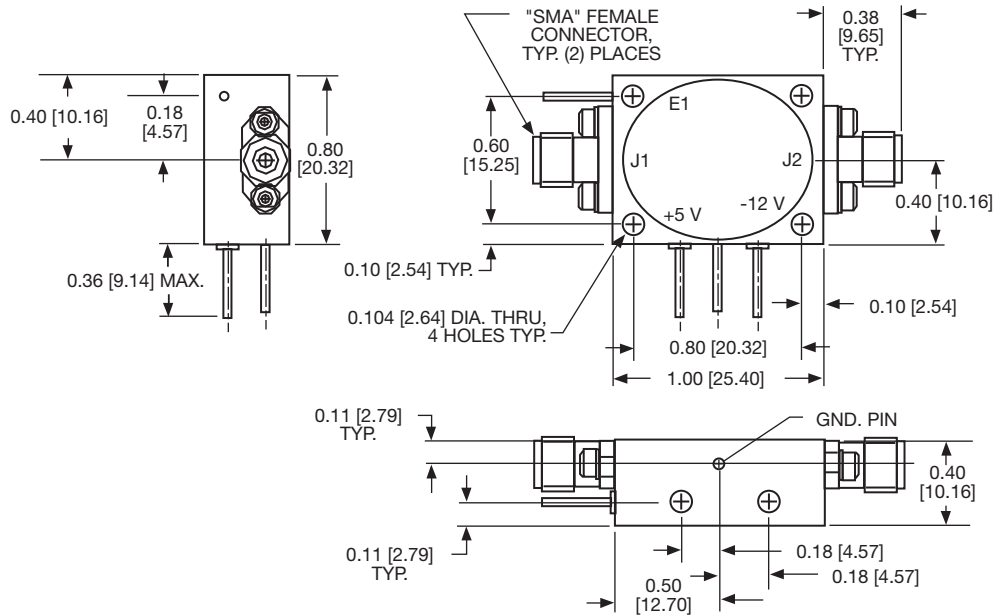
PIN	FUNCTION
1	J1 Control
2	J3 Control
3	+5 VDC
4	GND
5	J5 Control
6	J6 Control
7	J7 Control
8	J8 Control
9	J2 Control
10	J4 Control
11	N/C
12	N/C
13	N/C
14	-V
15	N/C

GENERAL NOTES:

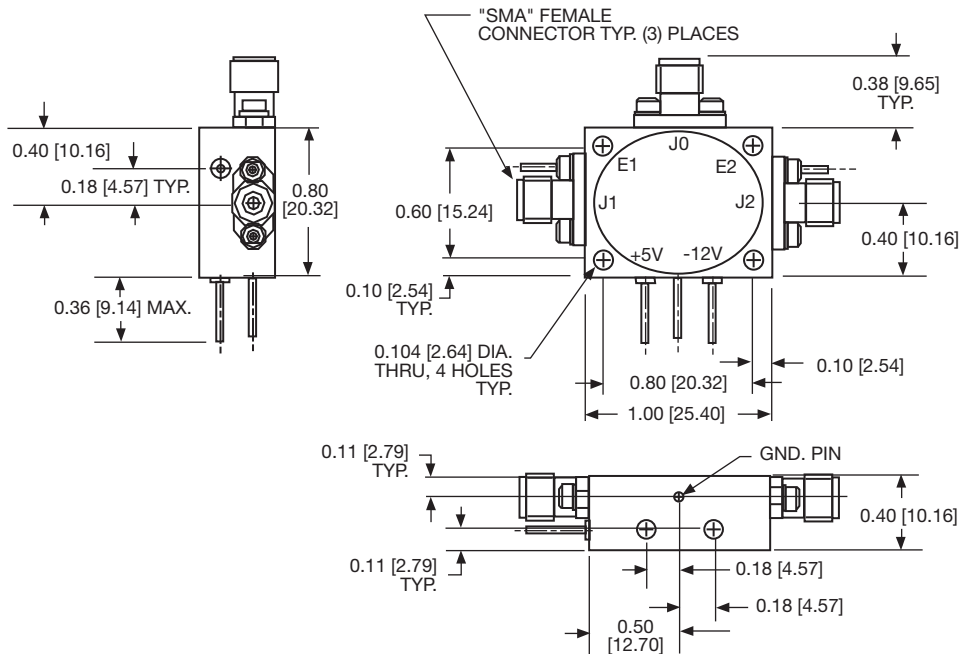
1. Dimensions shown in brackets [] are in millimeters.
2. Unless specified, all connectors are type SMA female field replaceable. SMA male also available, see ordering options.
3. Tolerance as follows: .xx = ±0.01 [xx = ±0.25], .xxx = ±0.005 [xxx = ±0.13]

OUTLINE DRAWINGS (CONT.)

193286



193287

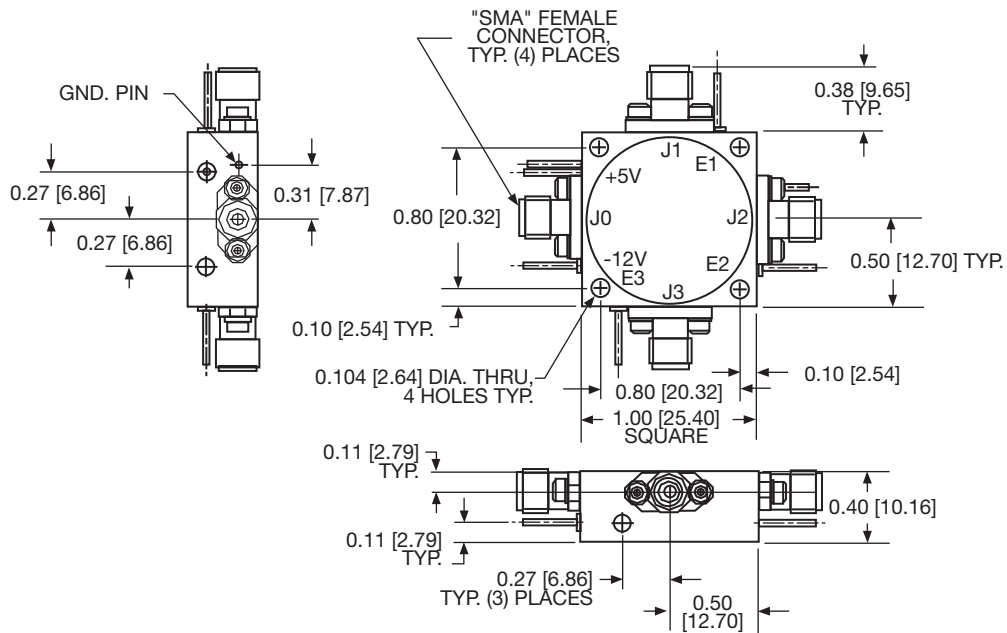


GENERAL NOTES:

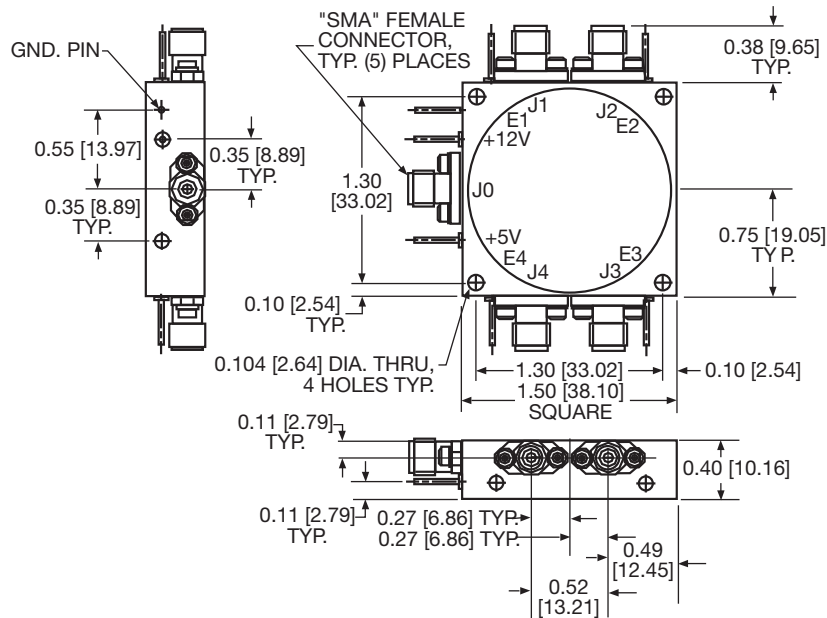
1. Dimensions shown in brackets [] are in millimeters.
2. Unless specified, all connectors are type SMA female field replaceable. SMA male also available, see ordering options.
3. Tolerance as follows: .xx = ± 0.01 [.xx = ± 0.25], .xxx = ± 0.005 [.xxx = ± 0.13]

OUTLINE DRAWINGS (CONT.)

193288



193291

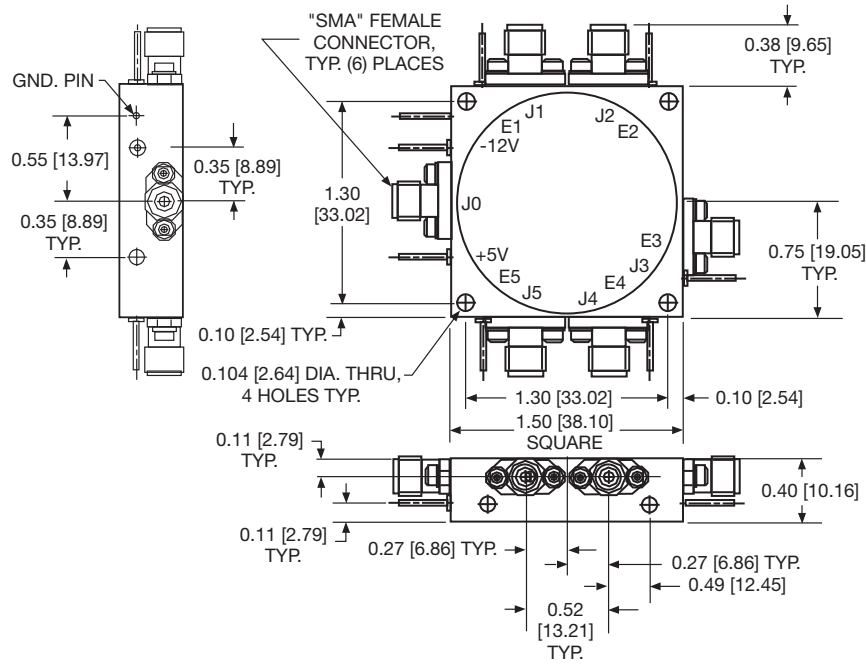


GENERAL NOTES:

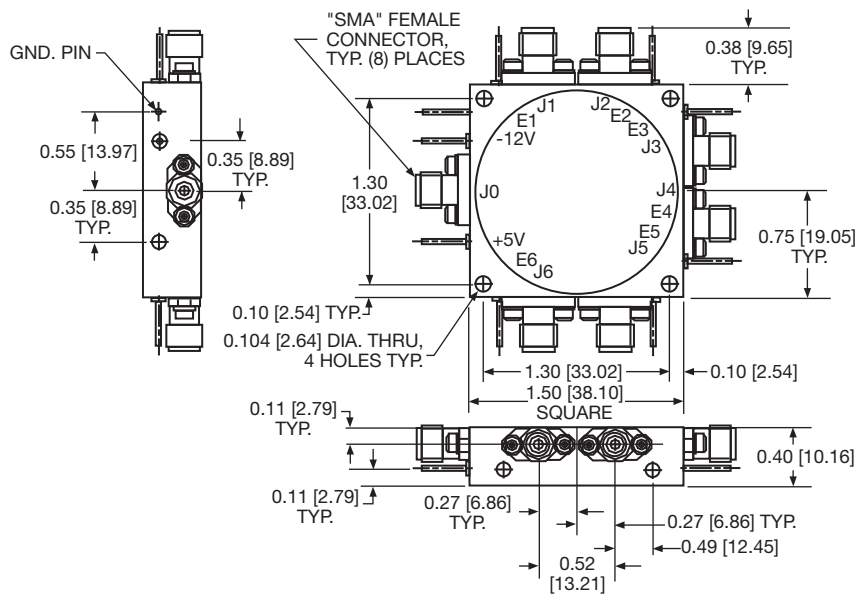
1. Dimensions shown in brackets [] are in millimeters.
2. Unless specified, all connectors are type SMA female field replaceable. SMA male also available, see ordering options.
3. Tolerance as follows: .xx = ± 0.01 [.xx = ± 0.25], .xxx = ± 0.005 [.xxx = ± 0.13]

OUTLINE DRAWINGS (CONT.)

193301



193302

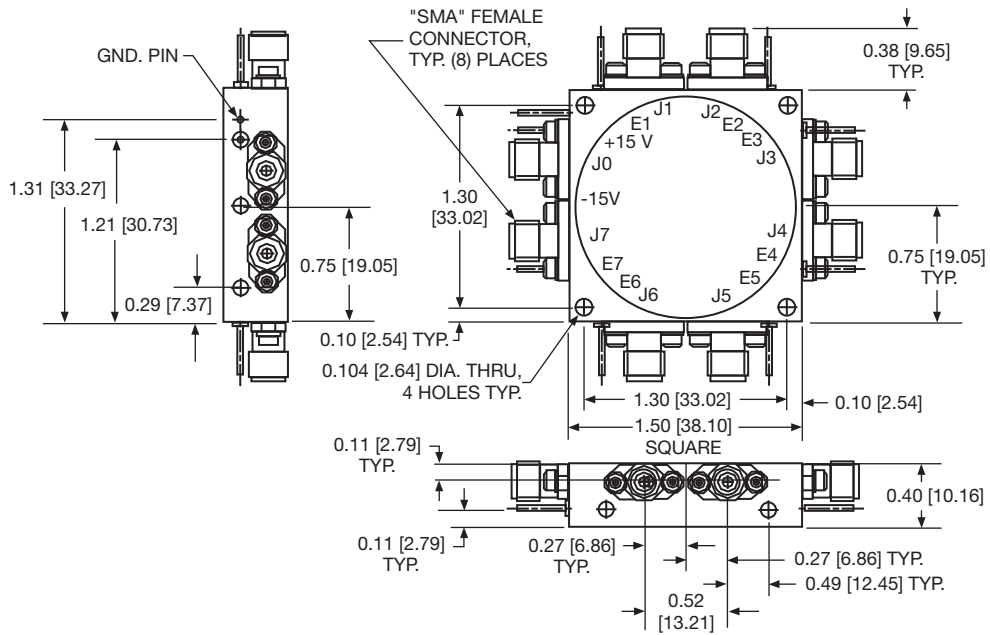


GENERAL NOTES:

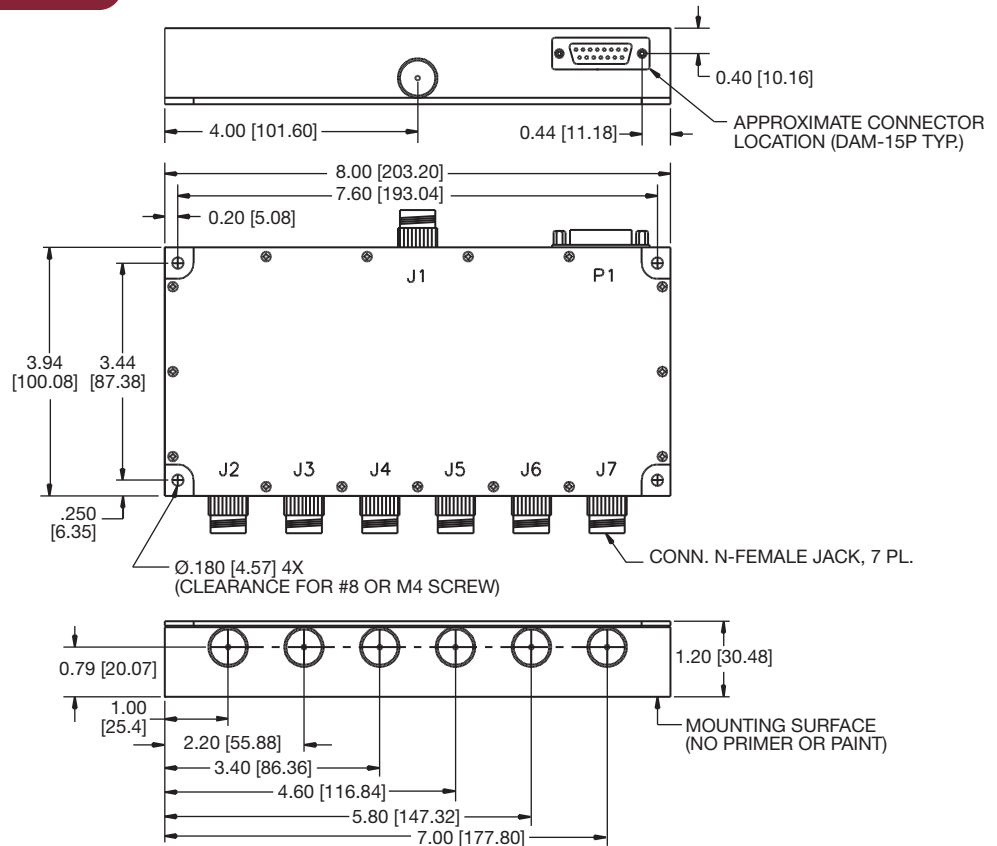
1. Dimensions shown in brackets [] are in millimeters.
2. Unless specified, all connectors are type SMA female field replaceable. SMA male also available, see ordering options.
3. Tolerance as follows: .xx = ± 0.01 [.xx = ± 0.25], .xxx = ± 0.005 [.xxx = ± 0.13]

OUTLINE DRAWINGS (CONT.)

193309



193509

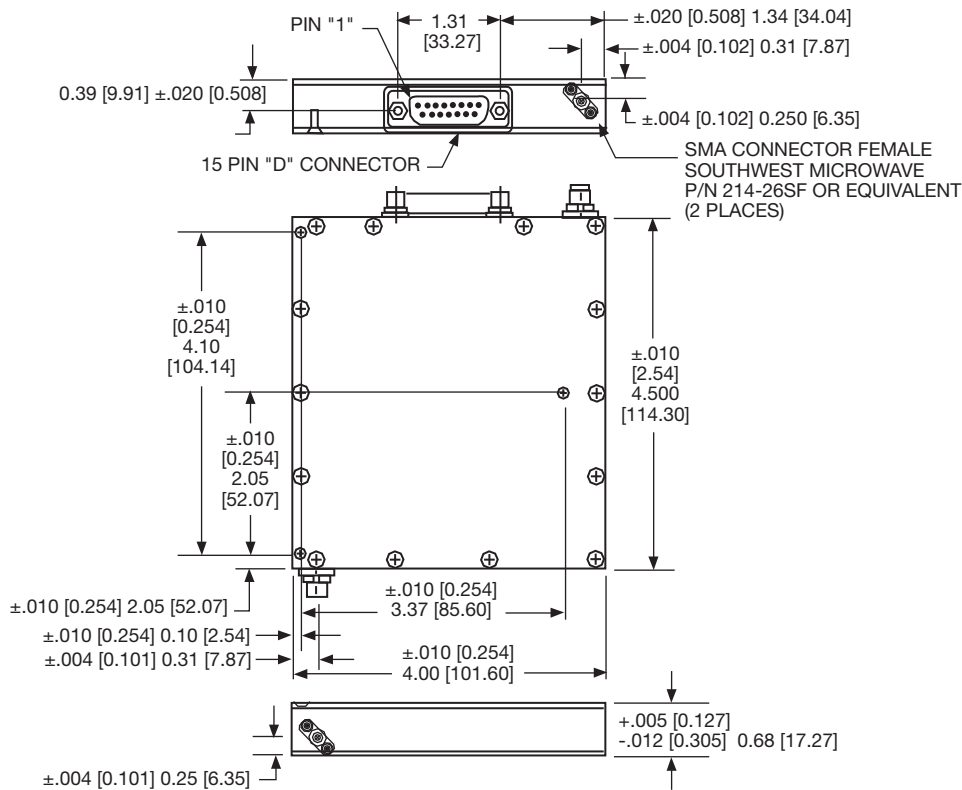


GENERAL NOTES:

1. Dimensions shown in brackets [] are in millimeters.
2. Unless specified, all connectors are type SMA female field replaceable. SMA male also available, see ordering options.
3. Tolerance as follows: .xx = ± 0.01 [.xx = ± 0.25], .xxx = ± 0.005 [.xxx = ± 0.13]

OUTLINE DRAWINGS (CONT.)

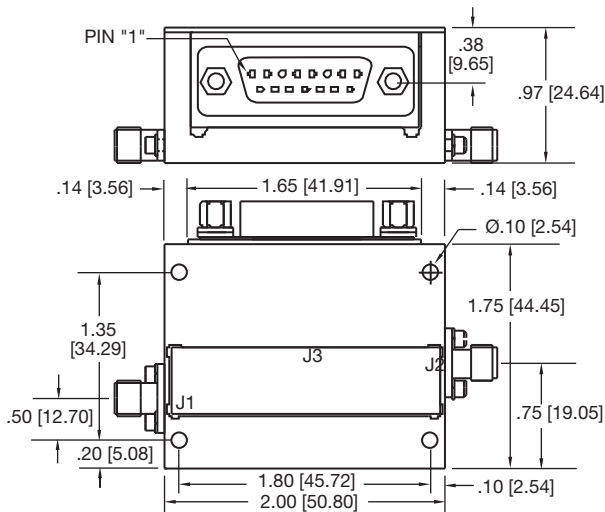
193518



POWER CONNECTOR PIN ASSIGNMENTS

PIN	DESIGNATION
1	0.125 dB
2	0.25 dB
3	0.5 dB
4	1 dB
5	2 dB
6	4 dB
7	8 dB
8	16 dB
9	50 dB
10	N.C.
11	N.C.
12	N.C.
13	+15 V
14	-15 V
15	GND

193524



POWER CONNECTOR PIN ASSIGNMENTS

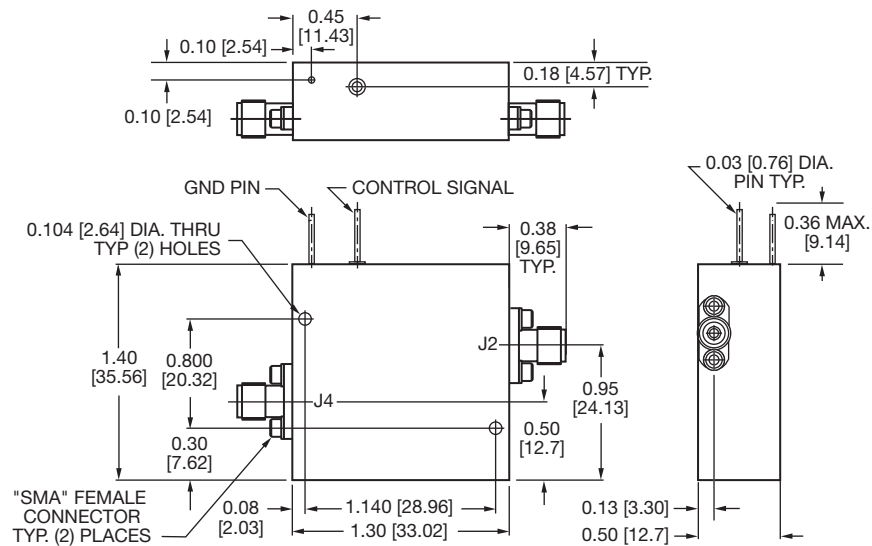
PIN	DESIGNATION
1	-12 V
2	+12 V
3	N.C.
4	0.125 dB
5	0.5 dB
6	4 dB
7	16 dB
8	8 dB
9	GND
10	N.C.
11	2 dB
12	0.25 dB
13	1 dB
14	N.C.
15	N.C.

GENERAL NOTES:

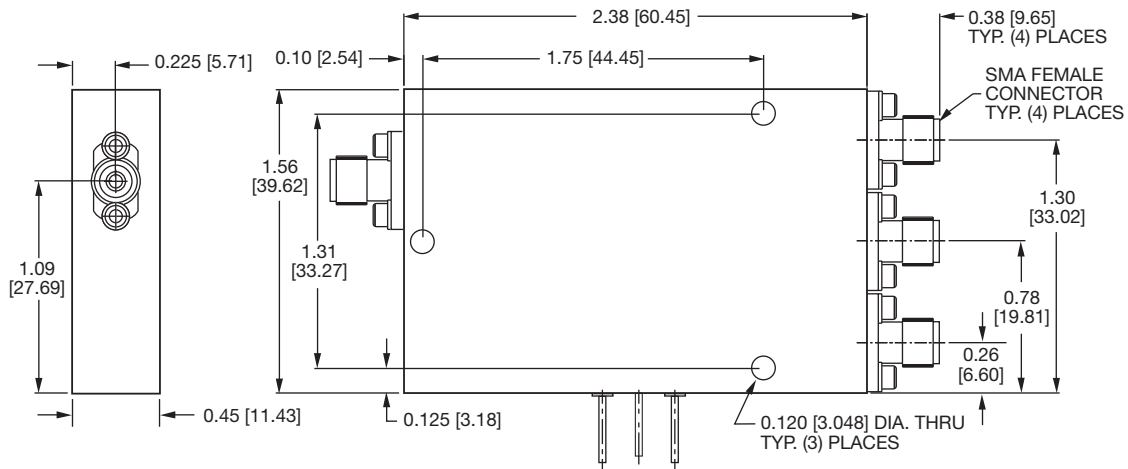
1. Dimensions shown in brackets [] are in millimeters.
2. Unless specified, all connectors are type SMA female field replaceable. SMA male also available, see ordering options.
3. Tolerance as follows: .xx = ±0.01 [.xx = ±0.25], .xxx = ±0.005 [.xxx = ±0.13]

OUTLINE DRAWINGS (CONT.)

195911



195912



GENERAL NOTES:

1. Dimensions shown in brackets [] are in millimeters.
2. Unless specified, all connectors are type SMA female field replaceable. SMA male also available, see ordering options.
3. Tolerance as follows: .xx = ± 0.01 [.xx = ± 0.25], .xxx = ± 0.005 [.xxx = ± 0.13]

ISO 9001:2008/AS9100 CERTIFIED

MITEQ attained its original ISO 9001 registration in June 1993, when fewer than 1500 companies were registered. ISO 9001 has since become a globally recognized standard for quality for commercial products. Nationally, it was accepted by an ever-increasing number of government agencies in place of long standing military quality and inspection criteria such as MIL-Q-9858 and MIL-I-45208. However, this is no longer true. AS9100 is now the Quality Management Standard being required for Aircraft, Space and Defense.



In May 2010 MITEQ achieved AS9100 registration, expanding our scope and commitment to include the Aircraft, Space and Defense Industry. MITEQ is now registered to AS9100 Rev B as well as ISO9001:2008 by National Quality Assurance USA (NQA), an accredited registrar of the ANSI-ASQ National Accreditation Board (ANAB). NQA performs Quality System audits at MITEQ every six months assuring continued compliance. Additionally, internal audits, management reviews and monthly quality reports assure the Quality Management System is continually improving at MITEQ.

GENERAL INFORMATION

PRICING AND TERMS

A quotation on any item in the catalog is available by contacting the factory. All quotations, unless otherwise noted, are valid for 60 days from the date of issue, F.O.B. (FCA) Hauppauge, NY 11788. Pricing does not include customer or government source inspection unless otherwise noted. On international orders, an irrevocable letter of credit may be required. MITEQ accepts these credit cards:



QUANTITY DISCOUNTS

A quantity discount is generally available on most catalog items. Due to the wide variety of devices in the catalog, it is not possible to provide a standard discount schedule. When quantities are involved, please contact MITEQ and the appropriate information will be provided.

SOURCE INSPECTION

Government / customer source inspection is available on any item upon receipt of the complete written confirmation of purchase order items, including the prime government contract number. Source inspection with respect to some products increases the unit price and extends delivery because of duplicate standard final inspection and testing. It is recommended wherever possible that a Certificate of Compliance be substituted for source inspection to minimize price and delivery delays.

SHIPPING INFORMATION

Unless instructed otherwise by the customer, we will ship UPS in the U.S. F.O.B. (FCA) Hauppauge. Air freight will be used as the primary international means of shipment. Please indicate at time of purchase what method of shipment you require.

RETURNED MATERIAL

When returning material for repair or replacement, please ensure that there is complete information included with the shipment, giving a detailed description of the reason for its return, the date and purchase order on which it was obtained, and the exact address to which the material is to be reshipped. All returns must arrive freight, postage, duties and handling prepaid.

REPAIR COSTS

Warranty repairs will be made at no cost to the customer. Units out of warranty, or those which have been mishandled, will require approval by the customer for the charges involved before the repairs can be accomplished. We will provide an estimate for the cost of the repair, which can be applied to the repair, if approval is granted. For those items that are deemed beyond repair, or where the customer may decide not to repair the unit, an evaluation fee and handling charge will be applicable.

APPLICATION ENGINEERING

We maintain a large support staff of engineers who are experts in specific areas of microwave technology. Each has an engineering background that combines both a formal engineering education with training and experience in product design. As further technical support, we make available the services of our engineering and scientific staff, who may be consulted on more advanced circuit designs or application problems.

DRAWINGS AND SPECIFICATIONS

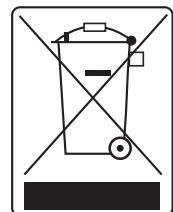
The material presented in this catalog was current at the time of publication. MITEQ Inc.'s continuing product improvement program makes it necessary to reserve the right to change our mechanical and electrical specifications without notice. If either of these parameters is critical, please contact the factory to verify that the information is current.



WARRANTY

1. MITEQ, Inc. warrants to the purchaser that each of its products, when shipped will be free from defects in material and workmanship and will perform in full accordance with applicable specifications. The limit of liability under this warranty is at MITEQ, Inc.'s option to repair or replace any product or part thereof which shall within: (a) three years of delivery for indoor equipment, (b) two years of delivery for outdoor equipment and (c) one year of delivery for integrated assemblies or equipment having RF output powers equal to or greater than +24 dBm, be returned by the purchaser to MITEQ, Inc., at 100 Davids Drive, Hauppauge, New York, 11788, and shall, as determined by examination by MITEQ, Inc., prove defective in material and/or workmanship. Warranty returns must first be authorized in writing by MITEQ, Inc. Disassembly of any MITEQ, Inc. product by anyone other than an authorized representative of MITEQ, Inc. voids this warranty in its entirety. MITEQ, Inc. reserves the right to make changes in any of its products without incurring any obligation to make the same changes on previously delivered products.
2. Components and subsystems having been repaired by MITEQ, Inc. shall be warranted for that repair for ninety (90) days. For products that are still within the original warranty period as described above, the original warranty (if longer) will take precedence. For all SATCOM products, that portion of the system that is repaired, will be warranted for one year.
3. As a condition to the warranties provided for herein, the Buyer will prepay the shipping charges for all products returned to MITEQ, Inc. for repair and MITEQ, Inc. will pay the return shipping with the exception of rack mountable hardware returned from outside the United States in which case the buyer will pay the shipping charges.
4. The buyer will pay the cost of inspecting and testing any goods returned under the warranty or otherwise which are found to meet the applicable specifications or which are not defective or not covered by the warranty.
5. Products sold by MITEQ, Inc. shall not be considered defective or non-conforming to the Buyers' order if they (a) satisfactorily fulfill the performance requirements that were (i) provided by the Buyer to MITEQ, Inc. or (ii) as published in the Sellers' product specification literature, or (b) or in accordance with any written or verbal agreement between the Buyer and MITEQ, Inc., or (c) are in accordance with samples approved by the Buyer. This warranty shall not apply to any products or parts thereof which have been subject to accident, negligence, alteration, abuse or misuse. MITEQ, Inc. makes no warranty whatsoever in respect to accessories or parts not supplied by it.
6. Limitations of Warranty, Damages and Liability
EXCEPT AS EXPRESSLY SET FORTH HEREIN, THERE ARE NO WARRANTIES, CONDITIONS, GUARANTEES OR REPRESENTATIONS AS TO MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHER WARRANTIES, CONDITIONS, GUARANTEES OR REPRESENTATIONS, WHETHER EXPRESSED OR IMPLIED, IN LAW OR IN FACT, ORAL OR IN WRITING.
MITEQ, INC.'S AGGREGATE LIABILITY IN DAMAGES OR OTHERWISE SHALL NOT EXCEED THE PAYMENT, IF ANY, RECEIVED BY MITEQ, INC. FOR THE UNIT OF PRODUCT OR SERVICE FURNISHED OR TO BE FURNISHED, AS THE CASE MAY BE, WHICH IS THE SUBJECT OF CLAIM OR DISPUTE. IN NO EVENT SHALL MITEQ, INC. BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL, OR SPECIAL DAMAGES, HOWSOEVER CAUSED.
7. All matters regarding this warranty shall be interpreted in accordance with the laws of the State of New York and any controversy that cannot be settled directly shall be settled by arbitration in New York, New York in accordance with the rules then prevailing of the American Arbitration Association, and judgement upon the award rendered may be entered in any court having jurisdiction thereof.
8. As required by Article 10(3) and Article 11(2) of Directive 2002/96/EC (WEEE Directive) of the European Parliament and the Council of the European Union, and in accordance with European Standard EN 50419, MITEQ Inc. labels its products with the following symbol:

This symbol indicates that the product cannot be thrown into the trash, and must be collected and treated in accordance with Directive 2002/96/EC and local regulations.





100 Davids Drive • Hauppauge, NY



320 Oser Avenue • Hauppauge, NY



380 Oser Avenue • Hauppauge, NY



330 Oser Avenue • Hauppauge, NY

