

# STANDARD PRODUCTS

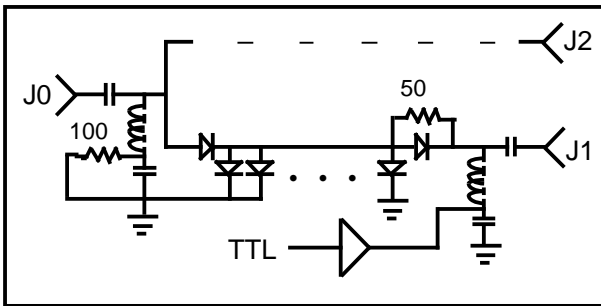
## DESCRIPTION

The SN20-31x series of non-reflective single-pole double-throw wide band (0.1-20.0GHz) PIN diode switches employ a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, and offered in medium (-312), high (-313), and extra-high (-314) isolation models.

## SP2T SWITCH

**SERIES SN20-31x**  
Non-Reflective Series/Shunt  
1  $\mu$ sec. Switching Speed

## SCHEMATIC



## ELECTRICAL SPECIFICATIONS

CHARACTERISTIC	WITH DRIVER		WITHOUT DRIVER	
	MAX.	TYP.	MAX.	TYP.
Switching Speed (1)	1.0 $\mu$ s	0.5 $\mu$ s	(2)	(2)
Transition Time (3)	0.5 $\mu$ s	0.1 $\mu$ s	(2)	(2)
Power Handling (CW or peak)	+30 dBm	+33 dBm	+30 dBm	+33 dBm
Positive Supply	5V $\pm$ 2% @ 60 mA max		30 mA (Iso.)	15 mA
Negative Supply (4)	(5) @ 90 mA max		-50 mA (Loss)	-35 mA
Control Impedance	TTL (2 unit loads max)		N/A	
Control Logic (4)	(5)		see Supply Requirements	

## R.F. PERFORMANCE

MODEL	CHARACTERISTIC	FREQUENCY (GHz) (See Note 6)								
		V	U	L	S	C	X	P	K	
		0.1-0.5	0.5-1.0	1.0-2.0	2.0-4.0	4.0-8.0	8.0-12.4	12.4-18.0	18.0-20.0	
SN20-312	INSERTION LOSS (dB max)	TYP.	1.1	0.8	0.9	1.1	1.6	1.8	2.3	3.0
		MAX.	1.5	1.1	1.3	1.5	1.9	2.2	2.7	3.5
	ISOLATION (dB min)	65	60	60	60	55	50	50	45	
SN20-313	INSERTION LOSS (dB max)	TYP.	1.3	0.9	1.1	1.3	1.8	2.2	2.5	3.2
		MAX.	1.8	1.3	1.5	1.7	2.2	2.6	2.9	3.7
	ISOLATION (dB min)	70	70	75	75	70	65	65	60	
SN20-314	INSERTION LOSS (dB max)	TYP.	1.5	1.1	1.3	1.5	2.0	2.4	2.7	3.5
		MAX.	2.0	1.5	1.7	1.9	2.4	2.8	3.1	4.0
	ISOLATION (dB min)	75	80	85	85	80	80	80	75	
ALL MODELS	VSWR {On/Off} (max)	1.5	1.5	1.5	1.5	1.5	1.75	2.0	2.3	

- (1) "Turn-On Time"/"Turn-Off Time" is the time between the 50% point of the control voltage and the 90% or the 10% point of the detected RF, respectively. "Switching Speed" is defined as the slower of the two times (usually the Turn-On Time).
- (2) Depends upon driver supplied by the user. See "Options" on back.
- (3) "Rise Time"/"Fall Time" is the time required for the detected RF to transition between the 10% and 90% points or the 90% and 10% points, respectively. "Transition Time" is defined as the slower of the two times (usually the Rise Time).
- (4) Setting more than one RF port at a time to the insertion loss state can cause excessive power dissipation in the common arm bias return network and may result in switch failure.
- (5) See "Options" on back of page.
- (6) Operating frequency range for narrower bandwidth unit(s) is specified by a two letter option code where the first letter designates the frequency band within which the lowest operating frequency is located and the second letter designates the frequency band within which the highest operating frequency is located. A frequency code is not required for the standard unit that covers 0.1 to 20.0 GHz ("VK").



## ENVIRONMENTAL RATINGS

Temperature: Operating.....55°C to +85°C  
 Non-operating.....65°C to +125°C

Humidity: MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

Vibration: MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

Altitude: MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

Temp Cycling: MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

Shock: MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

LOGIC:	OPTION CODE	LOGIC TYPE	CONTROL STATUS	PORT STATUS
	L4	TOGGLE	0	J2=LOSS
			1	J1=LOSS
	L3	INVERTING TOGGLE	0	J1=LOSS
			1	J2=LOSS
	L2 (4)	NON INVERTING	0	ISO.
			1	LOSS
	(STD) (4)	INVERTING	0	LOSS
			1	ISO.

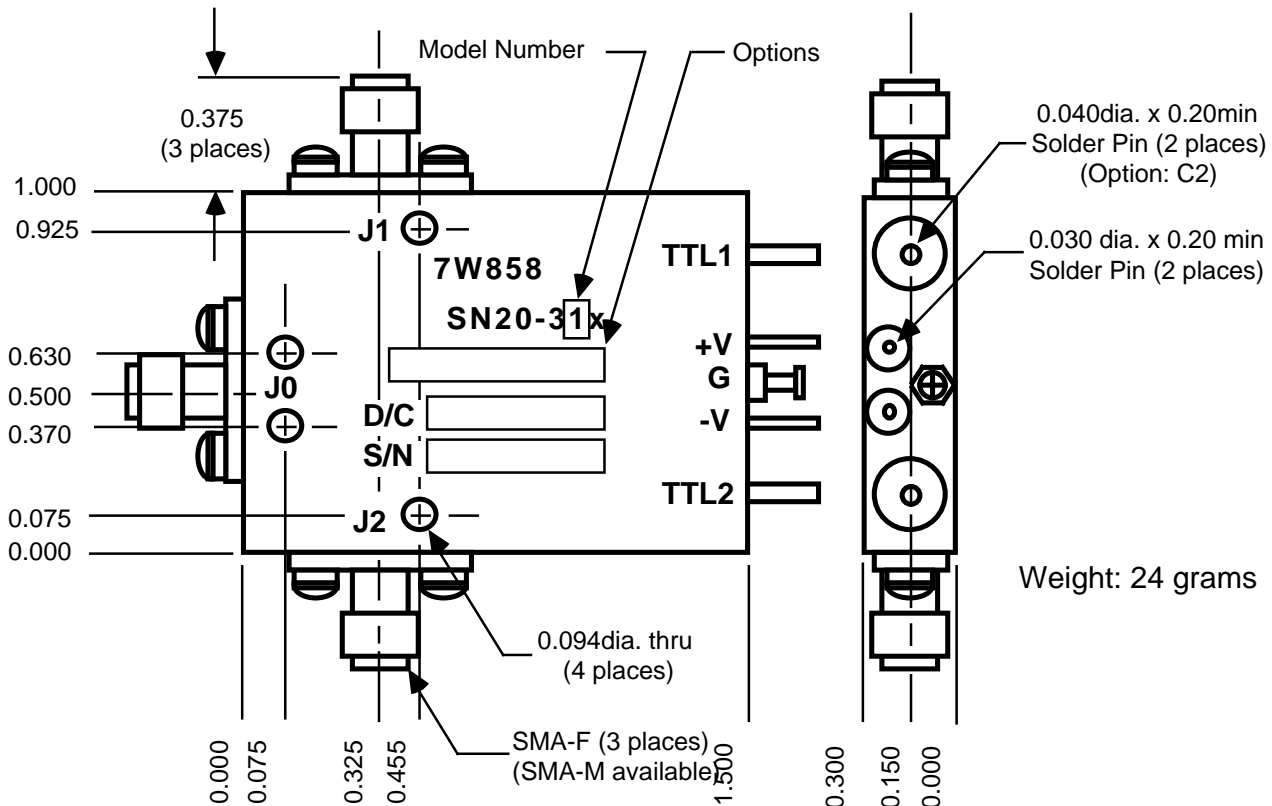
CONTROL CONNECTOR:  
 (STD).....Solder Pin  
 C2.....SMC-M

FREQUENCY:  
 (STD).....0.1 to 20.0 GHz  
 Two Letter Code. See note 6  
 for details.

DRIVER:  
 (STD).....With Driver  
 D2.....Without driver

NEGATIVE SUPPLY  
 (STD).....-12V  
 N2.....-15V

## OUTLINE



Custom Microwave Components, Inc.  
 44249 Old Warm Springs Blvd.  
 Fremont, California 94538  
 510-651-3434

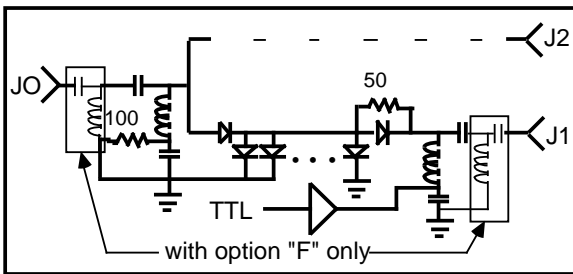


# STANDARD PRODUCTS

## DESCRIPTION

The SN20-33x series of high-speed non-reflective wide-band (2.0-18.0 GHz) single-pole double-throw PIN diode switches, employs a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, integral TTL compatible drivers, and offered in medium (-332), high (-333), and extra-high (-334) isolation models. Video transient filtering is optional.

## SCHEMATIC



## SP2T SWITCH

**SERIES SN20-33x**

Non-Reflective Series/Shunt

25 nsec. Switching Speed

## ELECTRICAL SPECIFICATIONS

CHARACTERISTIC	WITH DRIVER	
	MAX.	TYP.
Switching Speed (1)	25 ns (7)	20 ns
Transition Time (2)	20 ns (7)	10 ns
Power Handling (CW or peak)	+30 dBm	+33 dBm
Positive Supply	5V ± 2% @ 50 mA max	
Negative Supply (3)	(4) @ 85 mA max	
Control Impedance	TTL (2 unit loads max)	
Control Logic (3)	(4)	
Video Transients (5)	(4)	

## R.F. PERFORMANCE

MODEL	CHARACTERISTIC	FREQUENCY (GHz) (See Note 6)				
		S	C	X	P	
SN20-332	INSERTION LOSS (dB max)	TYP.	1.1	1.6	1.8	2.3
		MAX.	1.5	1.9	2.2	2.7
	ISOLATION (dB min)		60	55	50	50
SN20-333	INSERTION LOSS (dB max)	TYP.	1.3	1.8	2.2	2.5
		MAX.	1.7	2.2	2.6	2.9
	ISOLATION (dB min)		75	70	65	65
SN20-334	INSERTION LOSS (dB max)	TYP.	1.5	2.0	2.4	2.7
		MAX.	1.9	2.4	2.8	3.1
	ISOLATION (dB min)		85	80	80	80
ALL MODELS	VSWR {On/Off} (max)		1.5	1.5	1.75	2.0

- (1) "Turn-On Time"/"Turn-Off Time" is the time between the 50% point of the control voltage and the 90% or the 10% point of the detected RF, respectively. "Switching Speed" is defined as the slower of the two times (usually the Turn-On Time).
- (2) "Rise Time"/"Fall Time" is the time required for the detected RF to transition between the 10% and 90% points or the 90% and 10% points, respectively. "Transition Time" is defined as the slower of the two times (usually the Rise Time).
- (3) Setting more than one RF port at a time to the insertion loss state can cause excessive power dissipation in the common arm bias return network and may result in switch failure.
- (4) See "Options" on back of page.
- (5) Measured into a 50 ohms with a 150MHz B.W. oscilloscope. Typically 2V p-p max. unfiltered and 50mV p-p max. with filtering. Filtering will typically add 0.3dB insertion loss per filter in a transmission path.
- (6) Operating frequency range for narrower bandwidth unit(s) is specified by a two letter option code where the first letter designates the frequency range within which the lowest operating frequency is located and the second letter designates the frequency range within which the highest operating frequency is located. A frequency code is not required for the standard unit that covers 2.0 to 18.0 GHz ("SP").
- (7) Measured by switching a single port between the Insertion Loss and Isolation states. Toggling/Commutating Speed, likewise that for switches with decoded drivers, is measured by switching between two ports and is specified at 50 nsec. max.



## ENVIRONMENTAL RATINGS

### Temperature:

Operating.....-55°C to +85°C  
 Non-operating.....-65°C to +125°C

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

### LOGIC:

OPTION CODE	LOGIC TYPE	CONTROL STATUS	PORT STATUS
L4	TOGGLE	0	J2=LOSS
		1	J1=LOSS
L3	INVERTING TOGGLE	0	J1=LOSS
		1	J2=LOSS
L2 (4)	NON INVERTING	0	ISO.
		1	LOSS
<b>(STD) (4)</b>	<b>INVERTING</b>	<b>0</b>	<b>LOSS</b>
		<b>1</b>	<b>ISO.</b>

### CONTROL CONNECTOR:

(STD).....Solder Pin  
 C2.....SMC-M

### FREQUENCY:

(STD).....2.0 to 18.0 GHz  
 Two Letter Code, see note 5  
 for detail.

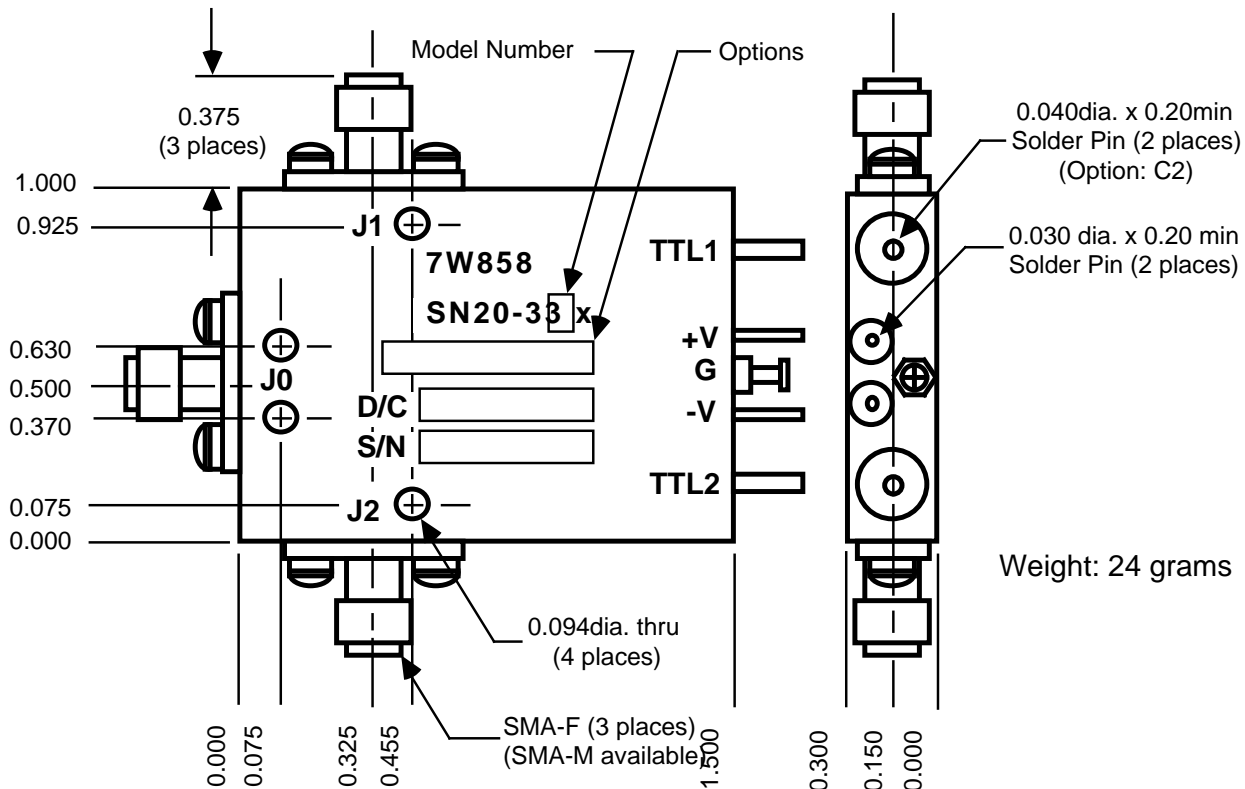
### VIDEO TRANSIENT:

(STD).....None  
 F2.....All Ports  
 F3.....Common Port Only  
 F4.....Non-Common  
 Ports Only

### NEGATIVE SUPPLY

(STD).....-12V  
 N2.....-15V

## OUTLINE



Custom Microwave Components, Inc.  
 44249 Old Warm Springs Blvd.  
 Fremont, California 94538  
 510-651-3434



# STANDARD PRODUCTS

## DESCRIPTION

The SR20-31x series single-pole double-throw wide band (0.1-20.0GHz) PIN diode switches employ a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, and offered in medium (-312), high (-313), and extra-high (-314) isolation models.

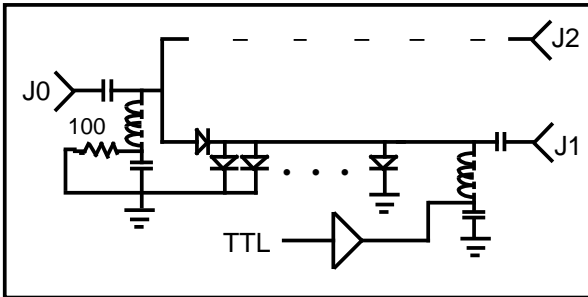
## SP2T SWITCH

**SERIES SR20-31x**

Reflective Series/Shunt

1 µsec. Switching Speed

## SCHEMATIC



## ELECTRICAL SPECIFICATIONS

CHARACTERISTIC	WITH DRIVER		WITHOUT DRIVER	
	MAX.	TYP.	MAX.	TYP.
Switching Speed (1)	1.0 µs	0.5 µs	(2)	(2)
Transition Time (3)	0.5 µs	0.1 µs	(2)	(2)
Power Handling (CW or peak)	+30 dBm	+33 dBm	+30 dBm	+33 dBm
Positive Supply	5V ± 2% @ 60 mA max		30 mA (Iso.)	10 mA
Negative Supply (4)	@ 60 mA max (5)		-30 mA (Loss)	-20 mA
Control Impedance	TTL (2 unit loads max)		N/A	
Control Logic (4)	(5)		see Supply Requirements	

## R.F. PERFORMANCE

MODEL	CHARACTERISTIC	FREQUENCY (GHz) (See Note 6)								
		V	U	L	S	C	X	P	K	
SR20-312	INSERTION LOSS (dB max)	TYP.	0.8	0.5	0.6	0.8	1.2	1.4	1.8	2.5
		MAX.	1.2	0.8	1.0	1.2	1.5	1.8	2.2	3.0
	ISOLATION (dB min)	65	60	60	60	55	50	50	45	
SR20-313	INSERTION LOSS (dB max)	TYP.	1.0	0.6	0.8	1.0	1.4	1.8	2.0	2.7
		MAX.	1.5	1.0	1.2	1.4	1.8	2.2	2.4	3.2
	ISOLATION (dB min)	70	70	75	75	70	65	65	60	
SR20-314	INSERTION LOSS (dB max)	TYP.	1.2	0.8	1.0	1.2	1.6	2.0	2.2	2.9
		MAX.	1.7	1.2	1.4	1.6	2.0	2.4	2.6	3.4
	ISOLATION (dB min)	75	80	85	85	80	80	80	75	
ALL MODELS	VSWR (max)	1.40	1.35	1.35	1.40	1.60	1.75	2.00	2.20	

- (1) "Turn-On Time"/"Turn-Off Time" is the time between the 50% point of the control voltage and the 90% or the 10% point of the detected RF, respectively. "Switching Speed" is defined as the slower of the two times (usually the Turn-On Time).
- (2) Depends upon driver supplied by the user. See "Options" on back.
- (3) "Rise Time"/"Fall Time" is the time required for the detected RF to transition between the 10% and 90% points or the 90% and 10% points, respectively. "Transition Time" is defined as the slower of the two times (usually the Rise Time).
- (4) Setting more than one RF port at a time to the insertion loss state can cause excessive power dissipation in the common arm bias return network and may result in switch failure.
- (5) See "Options" on back of page.
- (6) Operating frequency range for narrower bandwidth unit(s) is specified by a two letter option code where the first letter designates the frequency band within which the lowest operating frequency is located and the second letter designates the frequency band within which the highest operating frequency is located. A frequency code is not required for the standard unit that covers 0.1 to 20.0 GHz ("VK").



## ENVIRONMENTAL RATINGS

Temperature: Operating.....55°C to +85°C  
 Non-operating.....65°C to +125°C

Humidity: MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

Vibration: MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

Altitude: MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

Temp Cycling: MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

Shock: MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

LOGIC:

OPTION CODE	LOGIC TYPE	CONTROL STATUS	PORT STATUS
L4	TOGGLE	0	J2=LOSS
		1	J1=LOSS
L3	INVERTING TOGGLE	0	J1=LOSS
		1	J2=LOSS
L2 (4)	NON INVERTING	0	ISO.
		1	LOSS
<b>(STD)</b> (4)	<b>INVERTING</b>	<b>0</b>	<b>LOSS</b>
		<b>1</b>	<b>ISO.</b>

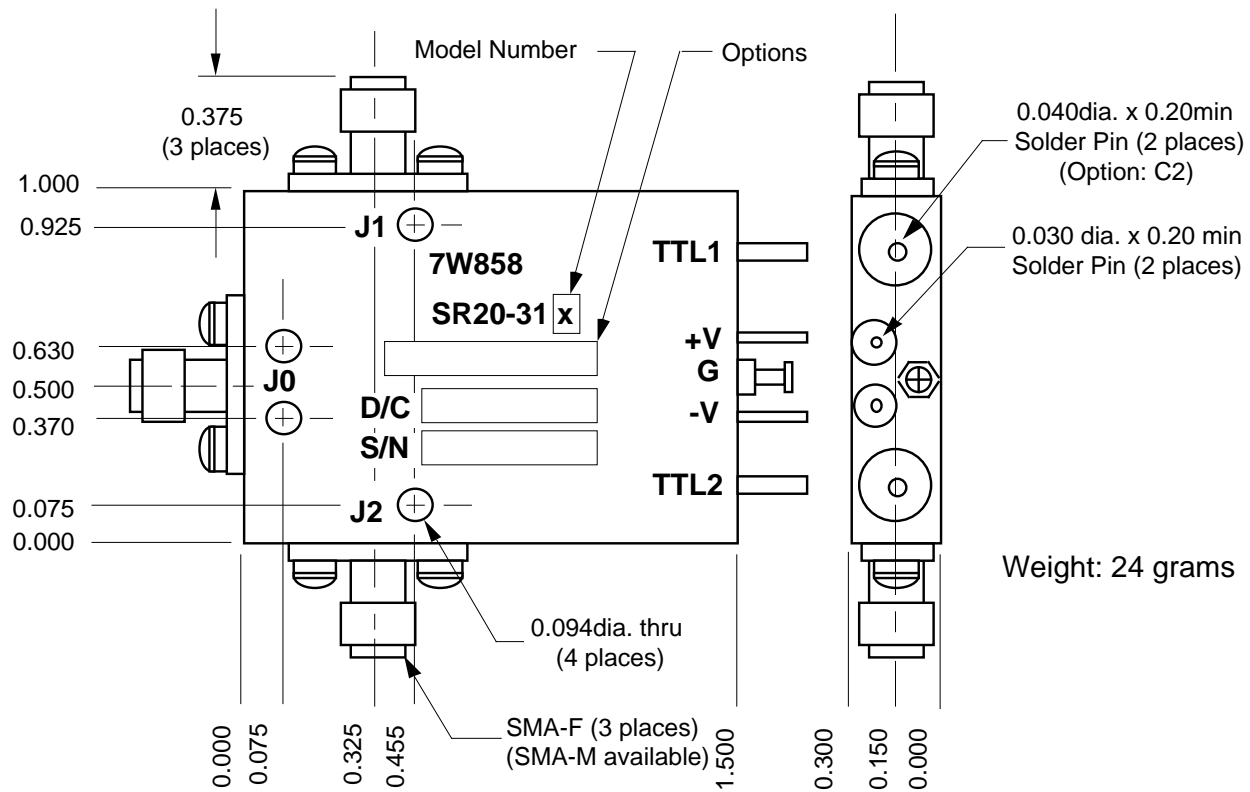
CONTROL CONNECTOR:  
 (STD).....Solder Pin  
 C2.....SMC-M

FREQUENCY:  
 (STD).....0.1 to 20.0 GHz  
 Two Letter Code. See note 6  
 for details.

DRIVER:  
 (STD).....With Driver  
 D2.....Without driver

NEGATIVE SUPPLY  
 (STD).....-12V  
 N2.....-15V

## OUTLINE



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 Fremont, California 94538  
 510-651-3434

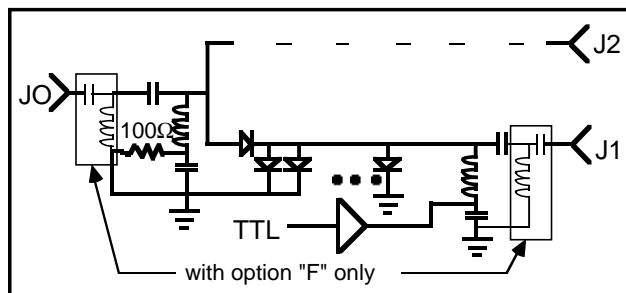


# STANDARD PRODUCTS

## DESCRIPTION

The SR20-33x series of high-speed wide-band (2.0-18.0GHz) single-pole double-throw PIN diode switches, employs a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, integral TTL compatible drivers, and offered in medium (-332), high (-333), and extra-high (-334) isolation models. Video transient filtering is optional.

## SCHEMATIC



## SP2T SWITCH

**SERIES SR20-33x**  
Reflective Series/Shunt  
25 nsec. Switching Speed

## ELECTRICAL SPECIFICATIONS

CHARACTERISTIC	WITH DRIVER	
	MAX.	TYP.
Switching Speed (1)	25 ns (7)	20 ns
Transition Time (2)	20 ns (7)	10 ns
Power Handling (CW or peak)	+30 dBm	+33 dBm
Positive Supply	5V ± 2% @ 45 mA max	
Negative Supply (3)	(4) @ 65 mA max	
Control Impedance	TTL (2 unit loads max)	
Control Logic (3)	(4)	
Video Transients (5)	(4)	

## R.F. PERFORMANCE

MODEL	CHARACTERISTIC	FREQUENCY (GHz) (See Note 6)				
		S	C	X	P	
SR20-332	INSERTION LOSS (dB max)	TYP.	0.8	1.2	1.4	1.8
		MAX.	1.2	1.5	1.8	2.2
	ISOLATION (dB min)	60	55	50	50	
SR20-333	INSERTION LOSS (dB max)	TYP.	1.0	1.4	1.8	2.0
		MAX.	1.4	1.8	2.2	2.4
	ISOLATION (dB min)	75	70	65	65	
SR20-334	INSERTION LOSS (dB max)	TYP.	1.2	1.6	2.0	2.2
		MAX.	1.6	2.0	2.4	2.6
	ISOLATION (dB min)	85	80	80	80	
ALL MODELS	VSWR (max)	1.40	1.60	1.75	2.00	

- (1) "Turn-On Time"/"Turn-Off Time" is the time between the 50% point of the control voltage and the 90% or the 10% point of the detected RF, respectively. "Switching Speed" is defined as the slower of the two times (usually the Turn-On Time).
- (2) "Rise Time"/"Fall Time" is the time required for the detected RF to transition between the 10% and 90% points or the 90% and 10% points, respectively. "Transition Time" is defined as the slower of the two times (usually the Rise Time).
- (3) Setting more than one RF port at a time to the insertion loss state can cause excessive power dissipation in the common arm bias return network and may result in switch failure.
- (4) See "Options" on back of page.
- (5) Measured into a 50 ohms with a 150MHz B.W. oscilloscope. Typically 2V p-p max. unfiltered and 50mV p-p max. with filtering. Filtering will typically add 0.3dB insertion loss per filter in a transmission path.
- (6) Operating frequency range for narrower bandwidth unit(s) is specified by a two letter option code where the first letter designates the frequency band within which the lowest operating frequency is located and the second letter designates the frequency band within which the highest operating frequency is located. A frequency code is not required for the standard unit that covers 2.0 to 18.0 GHz ("SP").
- (7) Measured by switching a single port between the Insertion Loss and Isolation states. Toggling/Commutating Speed, likewise that for switches with decoded drivers, is measured by switching between two ports and is specified at 50 nsec. max.



## ENVIRONMENTAL RATINGS

### Temperature:

Operating.....-55°C to +85°C  
 Non-operating.....-65°C to +125°C

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

### LOGIC:

OPTION CODE	LOGIC TYPE	CONTROL STATUS	PORT STATUS
L4	TOGGLE	0	J2=LOSS
		1	J1=LOSS
L3	INVERTING TOGGLE	0	J1=LOSS
		1	J2=LOSS
L2 (4)	NON INVERTING	0	ISO.
		1	LOSS
<b>(STD) (4)</b>	<b>INVERTING</b>	<b>0</b>	<b>LOSS</b>
		<b>1</b>	<b>ISO.</b>

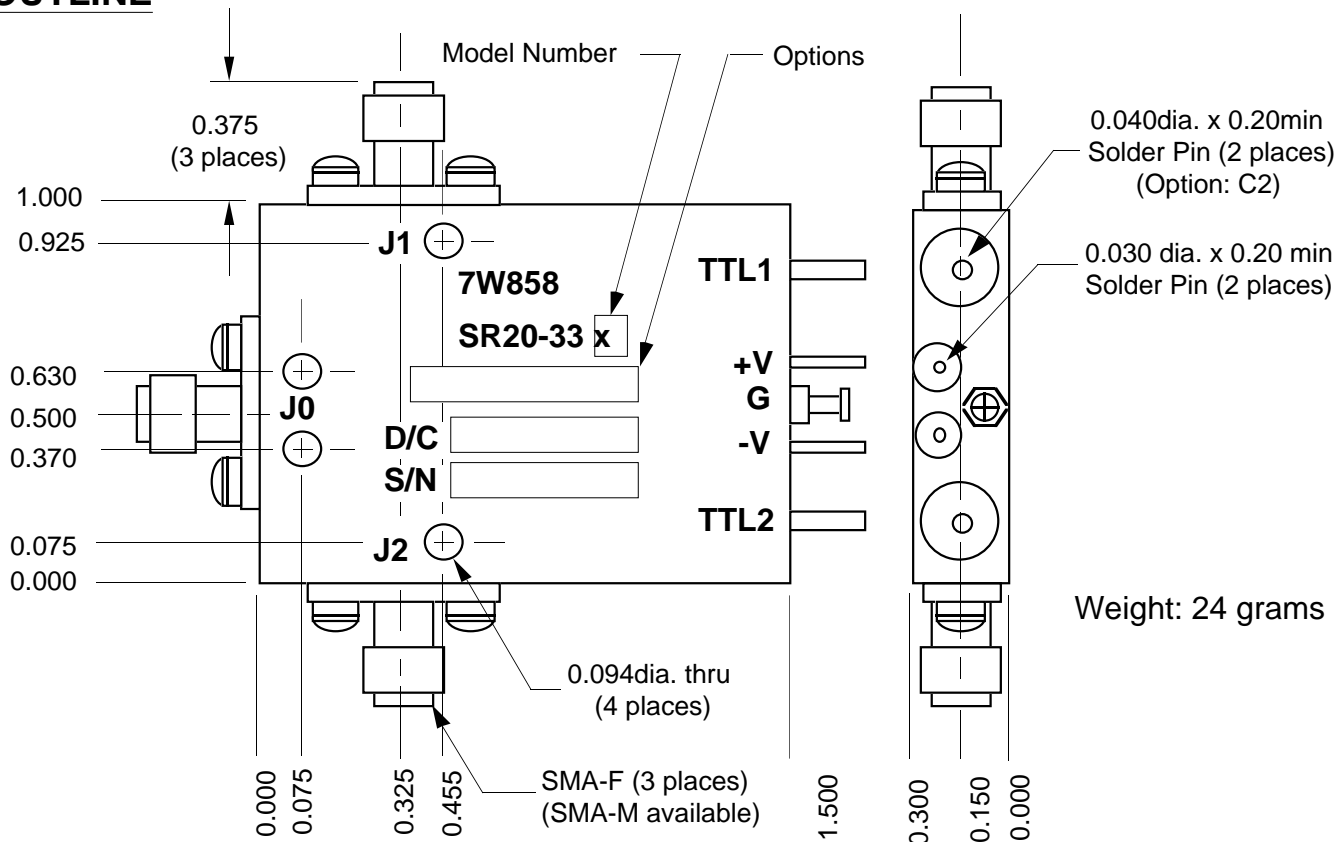
CONTROL CONNECTOR:  
 (STD).....Solder Pin  
 C2.....SMC-M

FREQUENCY:  
 (STD).....2.0 to 18.0 GHz  
 Two Letter Code, see note 5  
 for detail.

VIDEO TRANSIENT:  
 (STD).....None  
 F2.....All Ports  
 F3.....Common Port Only  
 F4.....Non-Common  
 Ports Only

NEGATIVE SUPPLY  
 (STD).....-12V  
 N2.....-15V

## OUTLINE



# STANDARD PRODUCTS

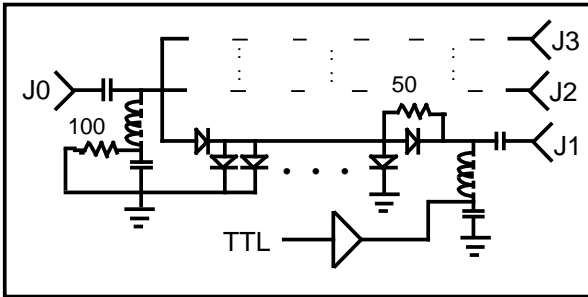
## DESCRIPTION

The SN30-31x series of non-reflective single-pole triple-throw wide band (0.1-20.0GHz) PIN diode switches employ a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, and offered in medium (-312), high (-313), and extra-high (-314) isolation models.

## SP3T SWITCH

**SERIES SN30-31x**  
Non-Reflective Series/Shunt  
1  $\mu$ sec. Switching Speed

## SCHEMATIC



## ELECTRICAL SPECIFICATIONS

CHARACTERISTIC	WITH DRIVER		WITHOUT DRIVER	
	MAX.	TYP.	MAX.	TYP.
Switching Speed (1)	1.0 $\mu$ s	0.5 $\mu$ s	(2)	(2)
Transition Time (3)	0.5 $\mu$ s	0.1 $\mu$ s	(2)	(2)
Power Handling (CW or peak)	+30 dBm	+33 dBm	+30 dBm	+33 dBm
Positive Supply	5V $\pm$ 2% @ 80 mA max		30 mA (Iso.)	15 mA
Negative Supply (4)	(5) @ 85 mA max		-50 mA (Loss)	-35 mA
Control Impedance	TTL (1 unit loads max)		N/A	
Control Logic (4)	(5)		see Supply Requirements	

## R.F. PERFORMANCE

MODEL	CHARACTERISTIC	FREQUENCY (GHz) (See Note 6)								
		V	U	L	S	C	X	P	K	
SN30-312	INSERTION LOSS (dB max)	TYP.	1.1	0.8	0.9	1.1	1.6	2.1	2.5	3.3
		MAX.	1.5	1.1	1.3	1.5	2.0	2.5	2.9	3.8
	ISOLATION (dB min)	65	60	60	60	55	50	50	45	
SN30-313	INSERTION LOSS (dB max)	TYP.	1.3	0.9	1.1	1.3	1.8	2.3	2.7	3.5
		MAX.	1.8	1.3	1.5	1.7	2.2	2.7	3.1	4.0
	ISOLATION (dB min)	70	70	75	75	70	65	65	60	
SN30-314	INSERTION LOSS (dB max)	TYP.	1.5	1.1	1.3	1.5	2.0	2.5	2.9	3.7
		MAX.	2.0	1.5	1.7	1.9	2.4	2.9	3.3	4.2
	ISOLATION (dB min)	75	80	85	85	80	80	80	75	
ALL MODELS	VSWR {On/Off} (max)	1.5	1.5	1.5	1.5	1.7	1.7	2.0	2.3	

- (1) "Turn-On Time"/"Turn-Off Time" is the time between the 50% point of the control voltage and the 90% or the 10% point of the detected RF, respectively. "Switching Speed" is defined as the slower of the two times (usually the Turn-On Time).
- (2) Depends upon driver supplied by the user. See "Options" on back.
- (3) "Rise Time"/"Fall Time" is the time required for the detected RF to transition between the 10% and 90% points or the 90% and 10% points, respectively. "Transition Time" is defined as the slower of the two times (usually the Rise Time).
- (4) Setting more than one RF port at a time to the insertion loss state can cause excessive power dissipation in the common arm bias return network and may result in switch failure.
- (5) See "Options" on back of page.
- (6) Operating frequency range for narrower bandwidth unit(s) is specified by a two letter option code where the first letter designates the frequency band within which the lowest operating frequency is located and the second letter designates the frequency band within which the highest operating frequency is located. A frequency code is not required for the standard unit that covers 0.1 to 20.0 GHz ("VK").



## ENVIRONMENTAL RATINGS

Temperature: Operating.....55°C to +85°C  
 Non-operating.....65°C to +125°C

Humidity: MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

Vibration: MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

Altitude: MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

Temp Cycling: MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

Shock: MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

LOGIC:	OPTION CODE	LOGIC TYPE	CONTROL STATUS			PORT STATUS
			E3	E2	E1	
L3		BINARY DECODED	x	0	0	ALL ISO.
			x	0	1	J1=LOSS
			x	1	0	J2=LOSS
			x	1	1	J3=LOSS
L2 (4)		NON INVERTING	0			ISO.
			1			LOSS
(STD) (4)		INVERTING	0			LOSS
			1			ISO.

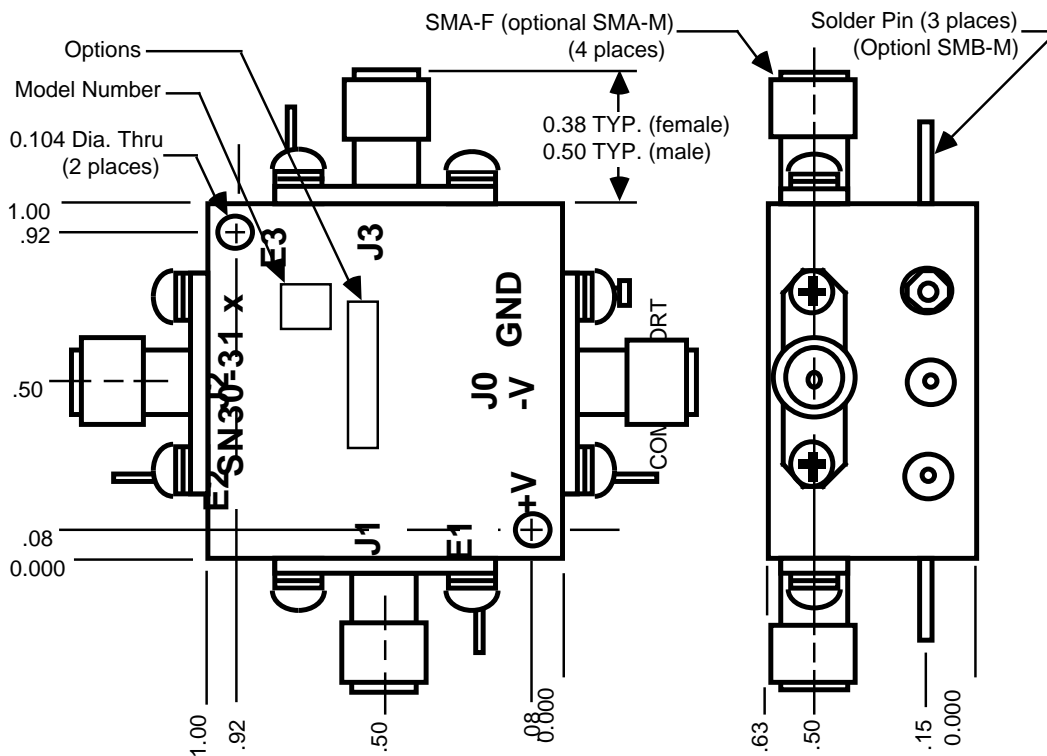
CONTROL CONNECTOR:  
 (STD).....Solder Pin  
 C2.....SMC-M

FREQUENCY:  
 (STD).....0.1 to 20.0 GHz  
 Two Letter Code. See note 6  
 for details.

DRIVER:  
 (STD).....With Driver  
 D2.....Without driver

NEGATIVE SUPPLY  
 (STD).....-12V  
 N2.....-15V

## OUTLINE

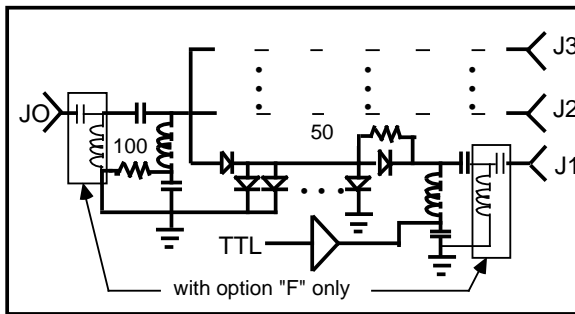


# STANDARD PRODUCTS

## DESCRIPTION

The SN30-33x series of high-speed wide-band (2.0-18.0 GHz) non-reflective single-pole triple-throw PIN diode switches, employs a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, integral TTL compatible drivers, and offered in medium (-332), high (-333), and extra-high (-334) isolation models. Video transient filtering is optional.

## SCHEMATIC



## SP3T SWITCH

**SERIES SN30-33x**

Non-Reflective Series/Shunt

25 nsec. Switching Speed

## ELECTRICAL SPECIFICATIONS

CHARACTERISTIC	WITH DRIVER	
	MAX.	TYP.
Switching Speed (1)	25 ns (7)	20 ns
Transition Time (2)	20 ns (7)	10 ns
Power Handling (CW or peak)	+30 dBm	+33 dBm
Positive Supply	5V ± 2% @ 80 mA max	
Negative Supply (3)	(4) @ 95 mA max	
Control Impedance	TTL (2 unit loads max)	
Control Logic (3)	(4)	
Video Transients (5)	(4)	

## R.F. PERFORMANCE

MODEL	CHARACTERISTIC	FREQUENCY (GHz) (See Note 6)				
		S	C	X	P	
SN30-332	INSERTION LOSS (dB max)	TYP.	1.1	1.6	2.1	2.5
		MAX.	1.5	2.0	2.5	2.9
	ISOLATION (dB min)	60	55	50	50	
SN30-333	INSERTION LOSS (dB max)	TYP.	1.3	1.8	2.3	2.7
		MAX.	1.7	2.2	2.7	3.1
	ISOLATION (dB min)	75	70	65	65	
SN30-334	INSERTION LOSS (dB max)	TYP.	1.5	2.0	2.5	2.9
		MAX.	1.9	2.4	2.9	3.3
	ISOLATION (dB min)	85	80	80	80	
ALL MODELS	VSWR {On/Off} (max)	1.50	1.70	1.70	2.00	

- "Turn-On Time"/"Turn-Off Time" is the time between the 50% point of the control voltage and the 90% or the 10% point of the detected RF, respectively. "Switching Speed" is defined as the slower of the two times (usually the Turn-On Time).
- "Rise Time"/"Fall Time" is the time required for the detected RF to transition between the 10% and 90% points or the 90% and 10% points, respectively. "Transition Time" is defined as the slower of the two times (usually the Rise Time).
- Setting more than one RF port at a time to the insertion loss state can cause excessive power dissipation in the common arm bias return network and may result in switch failure.
- See "Options" on back of page.
- Measured into a 50 ohms with a 150MHz B.W. oscilloscope. Typically 2V p-p max. unfiltered and 50mV p-p max. with filtering. Filtering will typically add 0.3dB insertion loss per filter in a transmission path.
- Operating frequency range for narrower bandwidth unit(s) is specified by a two letter option code where the first letter designates the frequency band within which the lowest operating frequency is located and the second letter designates the frequency band within which the highest operating frequency is located. A frequency code is not required for the standard unit that covers 2.0 to 18.0 GHz ("SP").
- Measured by switching a single port between the Insertion Loss and Isolation states. Toggling/Commutating Speed, likewise that for switches with decoded drivers, is measured by switching between two ports and is specified at 50 nsec. max.



## ENVIRONMENTAL RATINGS

### Temperature:

Operating.....-55°C to +85°C  
 Non-operating.....-65°C to +125°C

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

### LOGIC:

OPTION CODE	LOGIC TYPE	CONTROL STATUS			PORT STATUS
		E3	E2	E1	
L3	BINARY DECODED	x	0	0	ALL ISO.
		x	0	1	J1=LOSS
		x	1	0	J2=LOSS
		x	1	1	J3=LOSS
L2 (4)	NON INVERTING	0			ISO.
		1			LOSS
(STD) (4)	INVERTING	0			LOSS
		1			ISO.

### CONTROL CONNECTOR:

(STD).....Solder Pin  
 C2.....SMC-M

### FREQUENCY:

(STD).....2.0 to 18.0 GHz  
 Two Letter Code, see note 5  
 for detail.

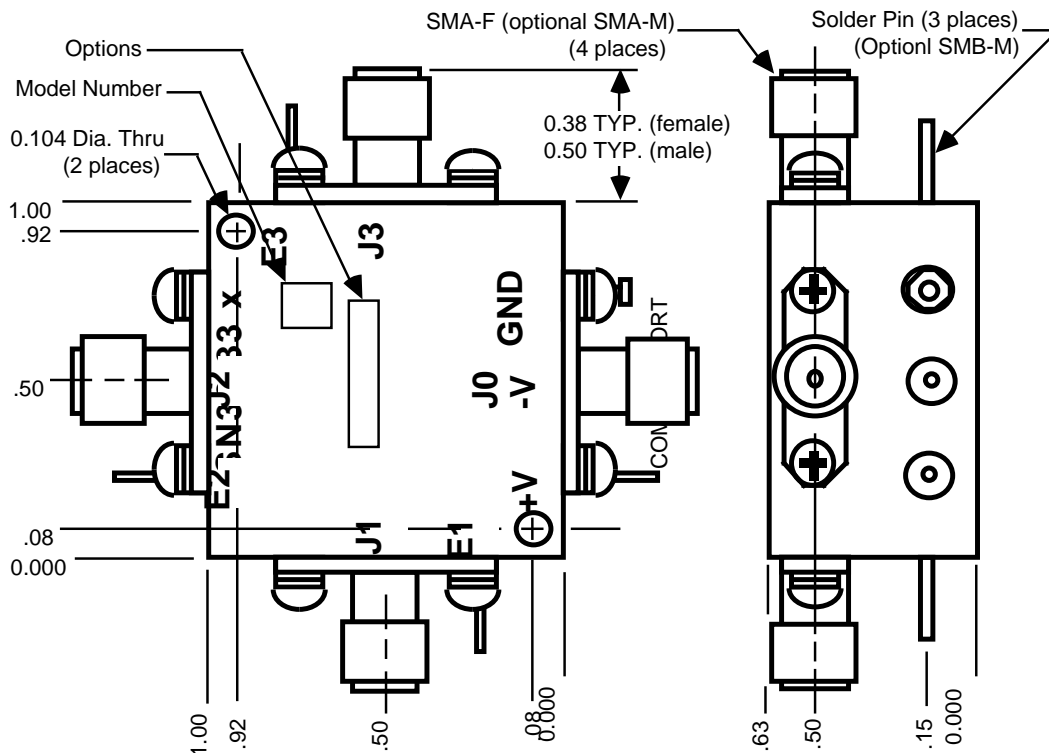
### VIDEO TRANSIENT:

(STD).....None  
 F2.....All Ports  
 F3.....Common Port Only  
 F4.....Non-Common  
 Ports Only

### NEGATIVE SUPPLY

(STD).....-12V  
 N2.....-15V

## OUTLINE



Custom Microwave Components, Inc.  
 44249 Old Warm Springs Blvd.  
 Fremont, California 94538  
 510-651-3434



# STANDARD PRODUCTS

## DESCRIPTION

The SR30-31x series single-pole triple-throw wide band (0.1-20.0GHz) PIN diode switches employ a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, and offered in medium (-312), high (-313), and extra-high (-314) isolation models.

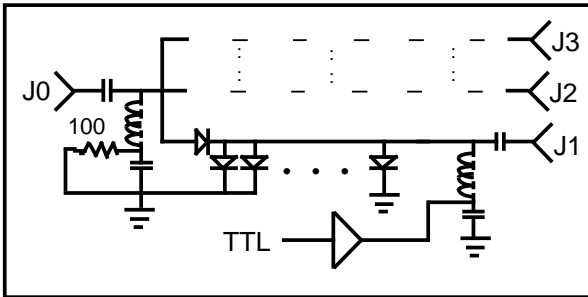
## SP3T SWITCH

**SERIES SR30-31x**

Reflective Series/Shunt

1  $\mu$ sec. Switching Speed

## SCHEMATIC



## ELECTRICAL SPECIFICATIONS

CHARACTERISTIC	WITH DRIVER		WITHOUT DRIVER	
	MAX.	TYP.	MAX.	TYP.
Switching Speed (1)	1.0 $\mu$ s	0.5 $\mu$ s	(2)	(2)
Transition Time (3)	0.5 $\mu$ s	0.1 $\mu$ s	(2)	(2)
Power Handling (CW or peak)	+30 dBm	+33 dBm	+30 dBm	+33 dBm
Positive Supply	5V $\pm$ 2% @ 70 mA max		30 mA (Iso.)	10 mA
Negative Supply (4)	(5) @ 65 mA max		-50 mA (Loss)	-20 mA
Control Impedance	TTL (1 unit loads max)		N/A	
Control Logic (4)	(5)		see Supply Requirements	

## R.F. PERFORMANCE

MODEL	CHARACTERISTIC	FREQUENCY (GHz) (See Note 6)								
		V	U	L	S	C	X	P	K	
SR30-312	INSERTION LOSS (dB max)	TYP.	0.8	0.5	0.6	0.8	1.2	1.7	2.0	2.8
		MAX.	1.2	0.8	1.0	1.2	1.6	2.1	2.4	3.3
	ISOLATION (dB min)	65	60	60	60	55	50	50	45	
SR30-313	INSERTION LOSS (dB max)	TYP.	1.0	0.6	0.8	1.0	1.4	1.9	2.2	3.0
		MAX.	1.5	1.0	1.2	1.4	1.8	2.3	2.6	3.5
	ISOLATION (dB min)	70	70	75	75	70	65	65	60	
SR30-314	INSERTION LOSS (dB max)	TYP.	1.2	0.8	1.0	1.2	1.6	2.1	2.4	3.2
		MAX.	1.7	1.2	1.4	1.6	2.0	2.5	2.8	3.7
	ISOLATION (dB min)	75	80	85	85	80	80	80	75	
ALL MODELS	VSWR (max)	1.40	1.35	1.35	1.40	1.60	1.75	2.00	2.20	

- (1) "Turn-On Time"/"Turn-Off Time" is the time between the 50% point of the control voltage and the 90% or the 10% point of the detected RF, respectively. "Switching Speed" is defined as the slower of the two times (usually the Turn-On Time).
- (2) Depends upon driver supplied by the user. See "Options" on back.
- (3) "Rise Time"/"Fall Time" is the time required for the detected RF to transition between the 10% and 90% points or the 90% and 10% points, respectively. "Transition Time" is defined as the slower of the two times (usually the Rise Time).
- (4) Setting more than one RF port at a time to the insertion loss state can cause excessive power dissipation in the common arm bias return network and may result in switch failure.
- (5) See "Options" on back of page.
- (6) Operating frequency range for narrower bandwidth unit(s) is specified by a two letter option code where the first letter designates the frequency band within which the lowest operating frequency is located and the second letter designates the frequency band within which the highest operating frequency is located. A frequency code is not required for the standard unit that covers 0.1 to 20.0 GHz ("VK").



## ENVIRONMENTAL RATINGS

Temperature: Operating.....55°C to +85°C  
 Non-operating.....65°C to +125°C

Humidity: MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

Vibration: MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

Altitude: MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

Temp Cycling: MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

Shock: MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

LOGIC:	OPTION CODE	LOGIC TYPE	CONTROL STATUS			PORT STATUS
			E3	E2	E1	
L3		BINARY DECODED	x	0	0	ALL ISO.
			x	0	1	J1=LOSS
			x	1	0	J2=LOSS
			x	1	1	J3=LOSS
L2 (4)		NON INVERTING	0			ISO.
			1			LOSS
(STD) (4)		INVERTING	0			LOSS
			1			ISO.

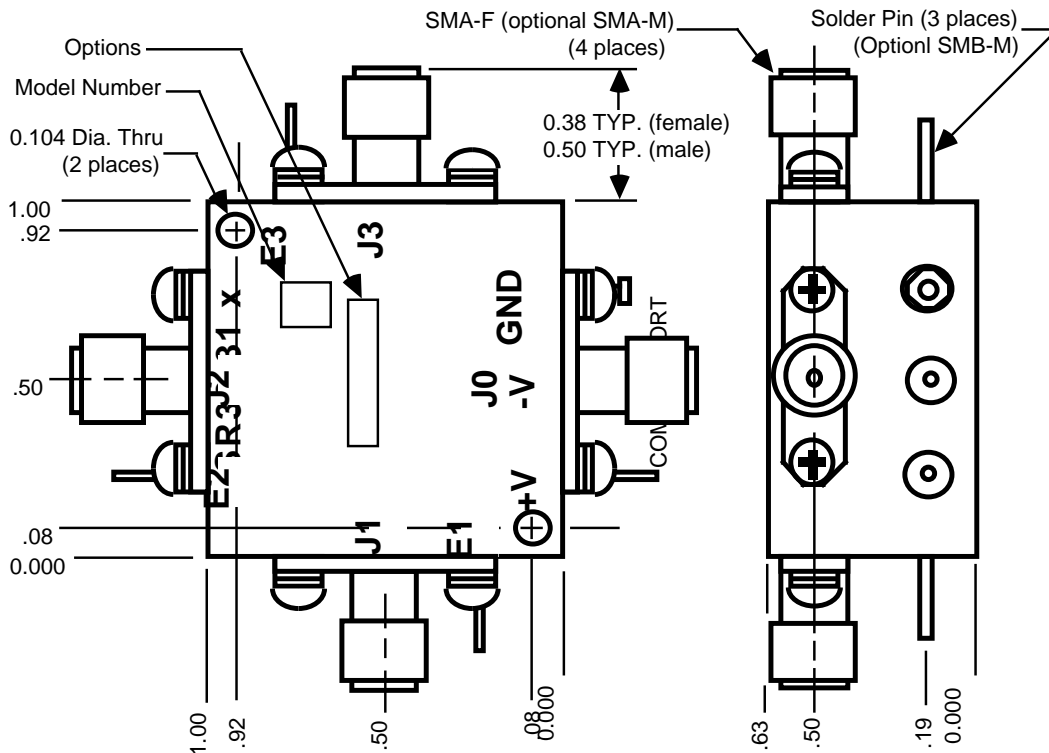
CONTROL CONNECTOR:  
 (STD).....Solder Pin  
 C2.....SMC-M

FREQUENCY:  
 (STD).....0.1 to 20.0 GHz  
 Two Letter Code. See note 6  
 for details.

DRIVER:  
 (STD).....With Driver  
 D2.....Without driver

NEGATIVE SUPPLY  
 (STD).....-12V  
 N2.....-15V

## OUTLINE

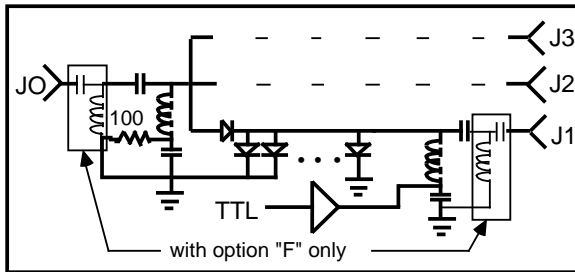


# STANDARD PRODUCTS

## DESCRIPTION

The SR30-33x series of high-speed wide-band (2.0-18.0 GHz) single-pole triple-throw PIN diode switches, employs a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, integral TTL compatible drivers, and offered in medium (-332), high (-333), and extra-high (-334) isolation models. Video transient filtering is optional.

## SCHEMATIC



## SP3T SWITCH

**SERIES SR30-33x**

Reflective Series/Shunt

25 nsec. Switching Speed

## ELECTRICAL SPECIFICATIONS

CHARACTERISTIC	WITH DRIVER	
	MAX.	TYP.
Switching Speed (1)	25 ns (7)	20 ns
Transition Time (2)	20 ns (7)	10 ns
Power Handling (CW or peak)	+30 dBm	+33 dBm
Positive Supply	5V ± 2% @ 70 mA max	
Negative Supply (3)	(4) @ 75 mA max	
Control Impedance	TTL (2 unit loads max)	
Control Logic (3)	(4)	
Video Transients (5)	(4)	

## R.F. PERFORMANCE

MODEL	CHARACTERISTIC	FREQUENCY (GHz) (See Note 6)				
		S	C	X	P	
SR30-332	INSERTION LOSS (dB max)	TYP.	0.8	1.2	1.4	1.8
		MAX.	1.2	1.5	1.8	2.2
	ISOLATION (dB min)	60	55	50	50	
SR30-333	INSERTION LOSS (dB max)	TYP.	1.0	1.4	1.8	2.0
		MAX.	1.4	1.8	2.2	2.4
	ISOLATION (dB min)	75	70	65	65	
SR30-334	INSERTION LOSS (dB max)	TYP.	1.2	1.6	2.0	2.2
		MAX.	1.6	2.0	2.4	2.6
	ISOLATION (dB min)	85	80	80	80	
ALL MODELS	VSWR (max)	1.40	1.60	1.75	2.00	

- "Turn-On Time"/"Turn-Off Time" is the time between the 50% point of the control voltage and the 90% or the 10% point of the detected RF, respectively. "Switching Speed" is defined as the slower of the two times (usually the Turn-On Time).
- "Rise Time"/"Fall Time" is the time required for the detected RF to transition between the 10% and 90% points or the 90% and 10% points, respectively. "Transition Time" is defined as the slower of the two times (usually the Rise Time).
- Setting more than one RF port at a time to the insertion loss state can cause excessive power dissipation in the common arm bias return network and may result in switch failure.
- See "Options" on back of page.
- Measured into a 50 ohms with a 150MHz B.W. oscilloscope. Typically 2V p-p max. unfiltered and 50mV p-p max. with filtering. Filtering will typically add 0.3dB insertion loss per filter in a transmission path.
- Operating frequency range for narrower bandwidth unit(s) is specified by a two letter option code where the first letter designates the frequency band within which the lowest operating frequency is located and the second letter designates the frequency band within which the highest operating frequency is located. A frequency code is not required for the standard unit that covers 2.0 to 18.0 GHz ("SP").
- Measured by switching a single port between the Insertion Loss and Isolation states. Toggling/Commutating Speed, likewise that for switches with decoded drivers, is measured by switching between two ports and is specified at 50 nsec. max.



## ENVIRONMENTAL RATINGS

### Temperature:

Operating.....-55°C to +85°C  
 Non-operating.....-65°C to +125°C

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

### LOGIC:

OPTION CODE	LOGIC TYPE	CONTROL STATUS			PORT STATUS
		E3	E2	E1	
L3	BINARY DECODED	x	0	0	ALL ISO.
		x	0	1	J1=LOSS
		x	1	0	J2=LOSS
		x	1	1	J3=LOSS
L2 (4)	NON INVERTING	0			ISO.
		1			LOSS
(STD) (4)	INVERTING	0			LOSS
		1			ISO.

### CONTROL CONNECTOR:

(STD).....Solder Pin  
 C2.....SMC-M

### FREQUENCY:

(STD).....2.0 to 18.0 GHz  
 Two Letter Code, see note 5  
 for detail.

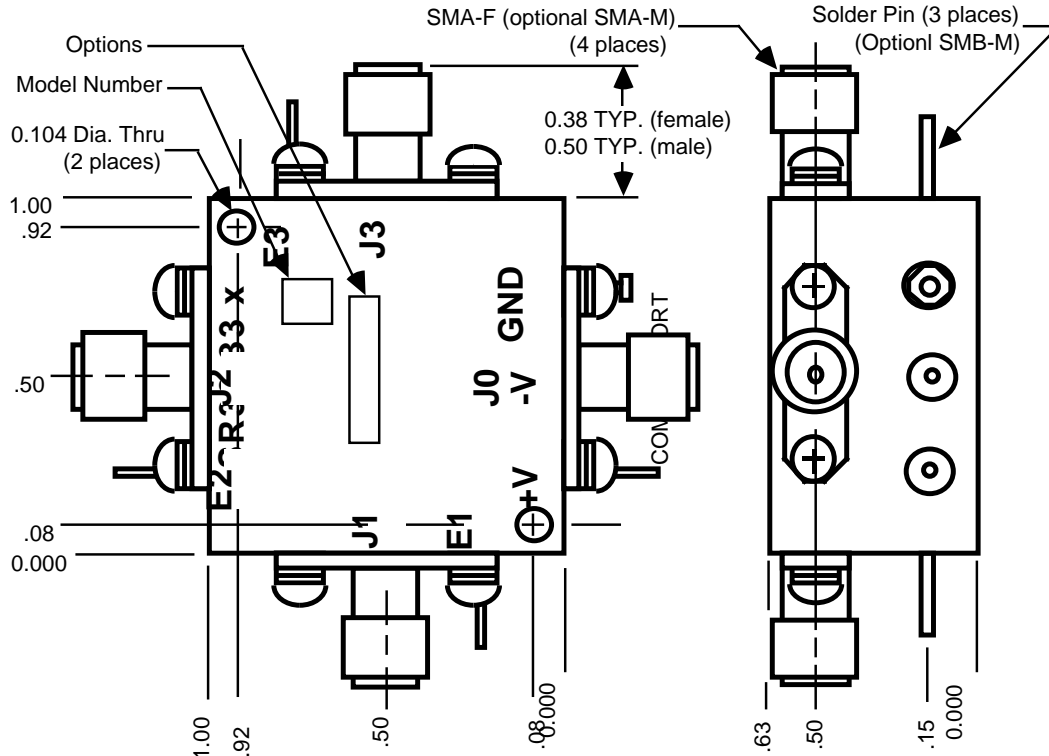
### VIDEO TRANSIENT:

(STD).....None  
 F2.....All Ports  
 F3.....Common Port Only  
 F4.....Non-Common  
 Ports Only

### NEGATIVE SUPPLY

(STD).....-12V  
 N2.....-15V

## OUTLINE



Custom Microwave Components, Inc.  
 44249 Old Warm Springs Blvd.  
 Fremont, California 94538  
 510-651-3434



# STANDARD PRODUCTS

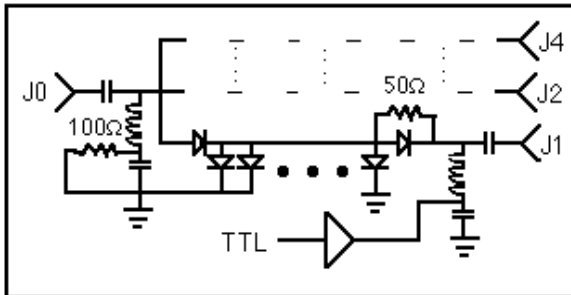
## DESCRIPTION

The SN40-31x series of non-reflective single-pole four-throw wide band (0.1-20.0GHz) PIN diode switches employ a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, and offered in medium (-312), high (-313), and extra-high (-314) isolation models.

## SP4T SWITCH

**SERIES SN40-31x**  
Non-Reflective Series/Shunt  
1  $\mu$ sec. Switching Speed

## SCHEMATIC



## ELECTRICAL SPECIFICATIONS

CHARACTERISTIC	WITH DRIVER		WITHOUT DRIVER	
	MAX.	TYP.	MAX.	TYP.
Switching Speed (1)	1.0 $\mu$ s	0.5 $\mu$ s	(2)	(2)
Transition Time (3)	0.5 $\mu$ s	0.1 $\mu$ s	(2)	(2)
Power Handling (CW or peak)	+30 dBm	+33 dBm	+30 dBm	+33 dBm
Positive Supply	5V $\pm$ 2% @ 100 mA max		30 mA (Iso.)	15 mA
Negative Supply (4)	(5) @ 85 mA max		-50 mA (Loss)	-35 mA
Control Impedance	TTL (1 unit load max)		N/A	
Control Logic (4)	(5)		see Supply Requirements	

## R.F. PERFORMANCE

MODEL	CHARACTERISTIC	FREQUENCY (GHz) (See Note 6)								
		V	U	L	S	C	X	P	K	
SN40-312	INSERTION LOSS (dB max)	TYP.	1.1	0.8	0.9	1.1	1.6	2.1	2.5	3.3
		MAX.	1.5	1.1	1.3	1.5	2.0	2.5	2.9	3.8
	ISOLATION (dB min)	65	60	60	60	55	50	50	45	
SN40-313	INSERTION LOSS (dB max)	TYP.	1.3	0.9	1.1	1.3	1.8	2.3	2.7	3.5
		MAX.	1.8	1.3	1.5	1.7	2.2	2.7	3.1	4.0
	ISOLATION (dB min)	70	70	75	75	70	65	65	60	
SN40-314	INSERTION LOSS (dB max)	TYP.	1.5	1.1	1.3	1.5	2.0	2.6	3.1	3.9
		MAX.	2.0	1.5	1.7	1.9	2.4	3.0	3.3	4.2
	ISOLATION (dB min)	75	80	85	85	80	80	80	75	
ALL MODELS	VSWR {On/Off} (max)	1.5	1.5	1.5	1.5	1.7	1.7	2.0	2.3	

- (1) "Turn-On Time"/"Turn-Off Time" is the time between the 50% point of the control voltage and the 90% or the 10% point of the detected RF, respectively. "Switching Speed" is defined as the slower of the two times (usually the Turn-On Time).
- (2) Depends upon driver supplied by the user. See "Options" on back.
- (3) "Rise Time"/"Fall Time" is the time required for the detected RF to transition between the 10% and 90% points or the 90% and 10% points, respectively. "Transition Time" is defined as the slower of the two times (usually the Rise Time).
- (4) Setting more than one RF port at a time to the insertion loss state can cause excessive power dissipation in the common arm bias return network and may result in switch failure.
- (5) See "Options" on back of page.
- (6) Operating frequency range for narrower bandwidth unit(s) is specified by a two letter option code where the first letter designates the frequency band within which the lowest operating frequency is located and the second letter designates the frequency band within which the highest operating frequency is located. A frequency code is not required for the standard unit that covers 0.1 to 20.0 GHz ("VK").



## ENVIRONMENTAL RATINGS

Temperature: Operating.....55°C to +85°C  
 Non-operating.....65°C to +125°C

Humidity: MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

Vibration: MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

Altitude: MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

Temp Cycling: MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

Shock: MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

LOGIC:

OPTION CODE	LOGIC TYPE	CONTROL STATUS			PORT STATUS
		E3	E2	E1	
L3	BINARY DECODED	0	0	0	ALL ISO.
		0	0	1	J1=LOSS
		0	1	0	J2=LOSS
		0	1	1	J3=LOSS
		1	0	0	J4=LOSS
L2 (4)	NON INVERTING	0			ISO.
		1			LOSS
(STD) (4)	INVERTING	0			LOSS
		1			ISO.

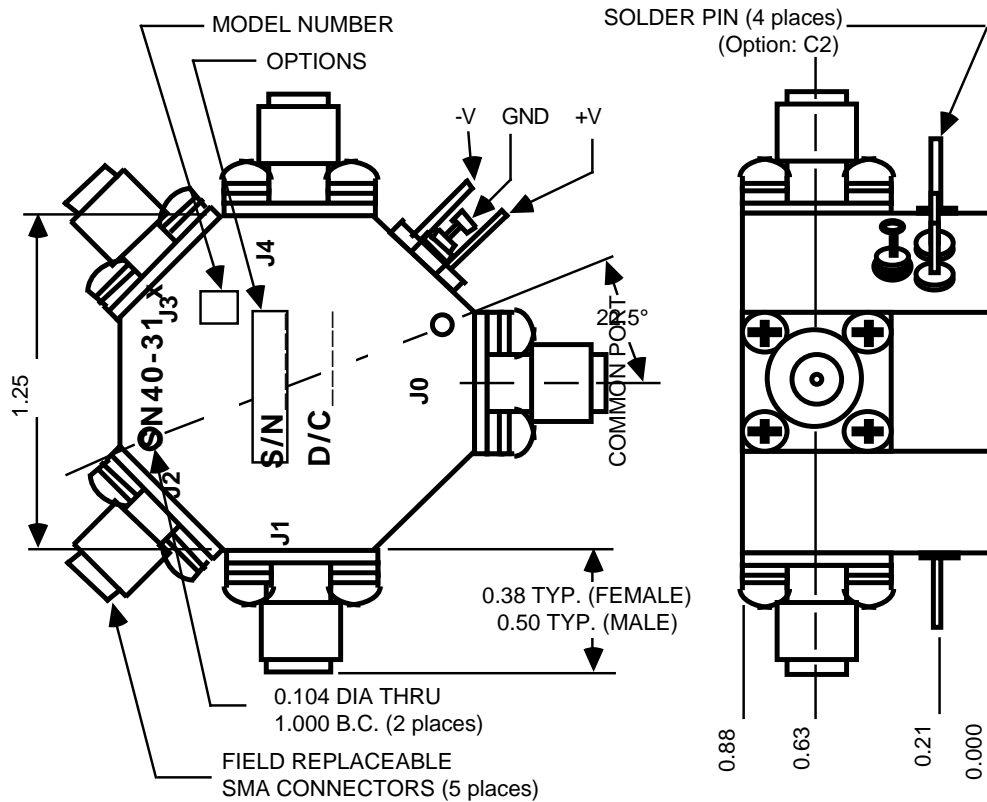
CONTROL CONNECTOR:  
 (STD).....Solder Pin  
 C2.....SMC-M

FREQUENCY:  
 (STD).....0.1 to 20.0 GHz  
 Two Letter Code. See note 6  
 for details.

DRIVER:  
 (STD).....With Driver  
 D2.....Without driver

NEGATIVE SUPPLY  
 (STD).....-12V  
 N2.....-15V

## OUTLINE



Custom Microwave Components, Inc.  
 44249 Old Warm Springs Blvd.  
 Fremont, California 94538  
 510-651-3434

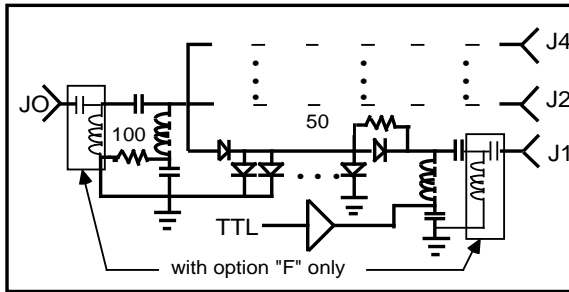


# STANDARD PRODUCTS

## DESCRIPTION

The SN40-33x series of high-speed wide-band (2.0-18.0 GHz) non-reflective single-pole four-throw PIN diode switches, employs a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, integral TTL compatible drivers, and offered in medium (-332), high (-333), and extra-high (-334) isolation models. Video transient filtering is optional.

## SCHEMATIC



## SP4T SWITCH

### SERIES SN40-33x

Non-Reflective Series/Shunt

25 nsec. Switching Speed

## ELECTRICAL SPECIFICATIONS

CHARACTERISTIC	WITH DRIVER	
	MAX.	TYP.
Switching Speed (1)	25 ns (7)	20 ns
Transition Time (2)	20 ns (7)	10 ns
Power Handling (CW or peak)	+30 dBm	+33 dBm
Positive Supply	5V ± 2% @ 90 mA max	
Negative Supply (3)	(4) @ 80 mA max	
Control Impedance	TTL (2 unit loads max)	
Control Logic (3)	(4)	
Video Transients (5)	(4)	

## R.F. PERFORMANCE

MODEL	CHARACTERISTIC	FREQUENCY (GHz) (See Note 6)				
		S	C	X	P	
SN40-332	INSERTION LOSS (dB max)	TYP.	1.1	1.6	2.1	2.5
		MAX.	1.5	2.0	2.5	2.9
	ISOLATION (dB min)	60	55	50	50	
SN40-333	INSERTION LOSS (dB max)	TYP.	1.3	1.8	2.3	2.7
		MAX.	1.7	2.2	2.7	3.1
	ISOLATION (dB min)	75	70	65	65	
SN40-334	INSERTION LOSS (dB max)	TYP.	1.5	2.0	2.6	3.1
		MAX.	1.9	2.4	3.0	3.3
	ISOLATION (dB min)	85	80	80	80	
ALL MODELS	VSWR {On/Off} (max)	1.50	1.70	1.70	2.00	

- (1) "Turn-On Time"/"Turn-Off Time" is the time between the 50% point of the control voltage and the 90% or the 10% point of the detected RF, respectively. "Switching Speed" is defined as the slower of the two times (usually the Turn-On Time).
- (2) "Rise Time"/"Fall Time" is the time required for the detected RF to transition between the 10% and 90% points or the 90% and 10% points, respectively. "Transition Time" is defined as the slower of the two times (usually the Rise Time).
- (3) Setting more than one RF port at a time to the insertion loss state can cause excessive power dissipation in the common arm bias return network and may result in switch failure.
- (4) See "Options" on back of page.
- (5) Measured into a 50 ohms with a 150MHz B.W. oscilloscope. Typically 2V p-p max. unfiltered and 50mV p-p max. with filtering. Filtering will typically add 0.3dB insertion loss per filter in a transmission path.
- (6) Operating frequency range for narrower bandwidth unit(s) is specified by a two letter option code where the first letter designates the frequency band within which the lowest operating frequency is located and the second letter designates the frequency band within which the highest operating frequency is located. A frequency code is not required for the standard unit that covers 2.0 to 18.0 GHz ("SP").
- (7) Measured by switching a single port between the Insertion Loss and Isolation states. Toggling/Commutating Speed, likewise that for switches with decoded drivers, is measured by switching between two ports and is specified at 50 nsec. max.



## ENVIRONMENTAL RATINGS

### Temperature:

Operating.....-55°C to +85°C  
 Non-operating.....-65°C to +125°C

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

### LOGIC:

OPTION CODE	LOGIC TYPE	CONTROL STATUS			PORT STATUS
		E3	E2	E1	
L3	BINARY DECODED	0	0	0	ALL ISO.
		0	0	1	J1=LOSS
		0	1	0	J2=LOSS
		0	1	1	J3=LOSS
		1	0	0	J4=LOSS
L2 (4)	NON INVERTING	0			ISO.
		1			LOSS
<b>(STD)</b> (4)	<b>INVERTING</b>	0			<b>LOSS</b>
		1			<b>ISO.</b>

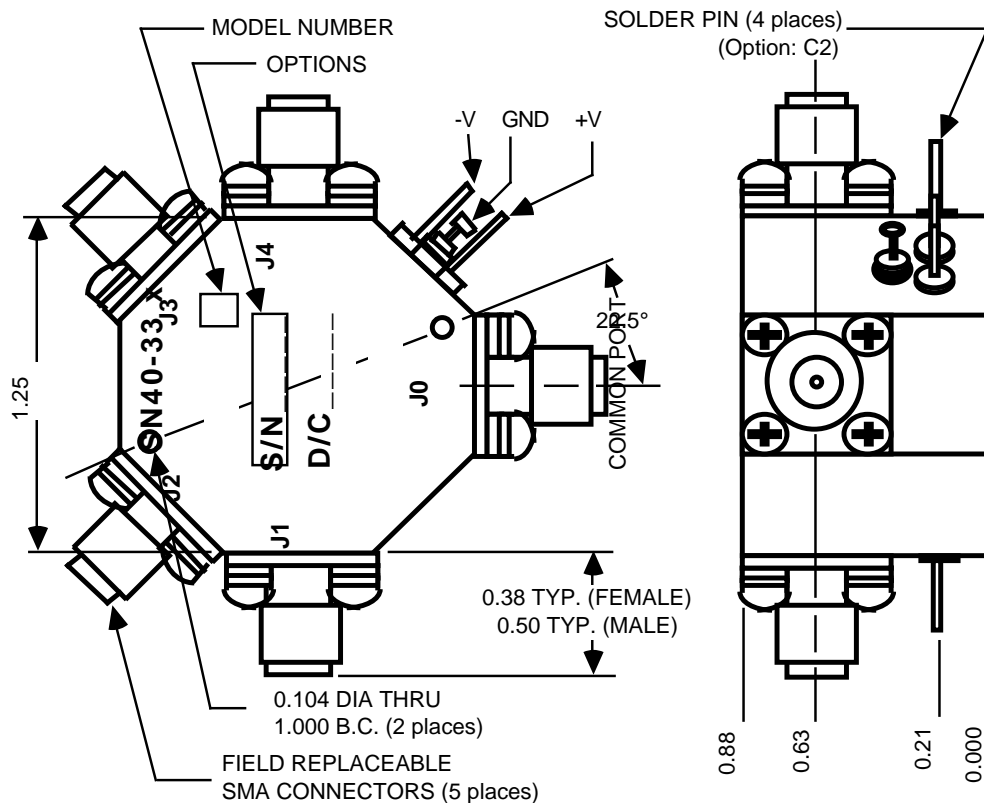
CONTROL CONNECTOR:  
 (STD).....Solder Pin  
 C2.....SMC-M

FREQUENCY:  
 (STD).....2.0 to 18.0 GHz  
 Two Letter Code, see note 5  
 for detail.

VIDEO TRANSIENT:  
 (STD).....None  
 F2.....All Ports  
 F3.....Common Port Only  
 F4.....Non-Common  
 Ports Only

NEGATIVE SUPPLY  
 (STD).....-12V  
 N2.....-15V

## OUTLINE



Custom Microwave Components, Inc.  
 44249 Old Warm Springs Blvd.  
 Fremont, California 94538  
 510-651-3434



# STANDARD PRODUCTS

## DESCRIPTION

The SR40-31x series of reflective single-pole four-throw wide band (0.1-20.0GHz) PIN diode switches employ a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, and offered in medium (-312), high (-313), and extra-high (-314) isolation models.

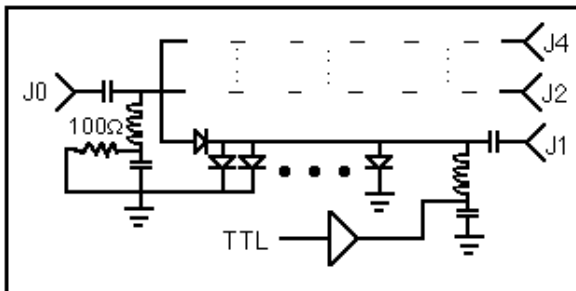
## SP4T SWITCH

**SERIES SR40-31x**

Reflective Series/Shunt

1  $\mu$ sec. Switching Speed

## SCHEMATIC



## ELECTRICAL SPECIFICATIONS

CHARACTERISTIC	WITH DRIVER		WITHOUT DRIVER	
	MAX.	TYP.	MAX.	TYP.
Switching Speed (1)	1.0 $\mu$ s	0.5 $\mu$ s	(2)	(2)
Transition Time (3)	0.5 $\mu$ s	0.1 $\mu$ s	(2)	(2)
Power Handling (CW or peak)	+30 dBm	+33 dBm	+30 dBm	+33 dBm
Positive Supply	5V $\pm$ 2% @ 85 mA max		30 mA (Iso.)	10 mA
Negative Supply (4)	(5) @ 65 mA max		-30 mA (Loss)	-20 mA
Control Impedance	TTL (1 unit load max)		N/A	
Control Logic (4)	(5)		see Supply Requirements	

## R.F. PERFORMANCE

MODEL	CHARACTERISTIC	FREQUENCY (GHz) (See Note 6)								
		V	U	L	S	C	X	P	K	
SR40-312	INSERTION LOSS (dB max)	TYP.	0.8	0.5	0.6	0.8	1.2	1.6	1.9	2.6
		MAX.	1.2	0.8	1.0	1.2	1.6	2.0	2.3	3.1
	ISOLATION (dB min)	65	60	60	60	55	50	50	45	
SR40-313	INSERTION LOSS (dB max)	TYP.	1.0	0.6	0.8	1.0	1.4	1.8	2.1	2.8
		MAX.	1.5	1.0	1.2	1.4	1.8	2.3	2.5	3.3
	ISOLATION (dB min)	70	70	75	75	70	65	65	60	
SR40-314	INSERTION LOSS (dB max)	TYP.	1.2	0.8	1.0	1.2	1.6	2.0	2.3	3.0
		MAX.	2.0	1.2	1.4	1.6	2.0	2.4	2.7	3.5
	ISOLATION (dB min)	75	80	85	85	80	80	80	75	
ALL MODELS	VSWR {On/Off} (max)	1.40	1.35	1.35	1.40	1.60	1.75	2.00	2.20	

- (1) "Turn-On Time"/"Turn-Off Time" is the time between the 50% point of the control voltage and the 90% or the 10% point of the detected RF, respectively. "Switching Speed" is defined as the slower of the two times (usually the Turn-On Time).
- (2) Depends upon driver supplied by the user. See "Options" on back.
- (3) "Rise Time"/"Fall Time" is the time required for the detected RF to transition between the 10% and 90% points or the 90% and 10% points, respectively. "Transition Time" is defined as the slower of the two times (usually the Rise Time).
- (4) Setting more than one RF port at a time to the insertion loss state can cause excessive power dissipation in the common arm bias return network and may result in switch failure.
- (5) See "Options" on back of page.
- (6) Operating frequency range for narrower bandwidth unit(s) is specified by a two letter option code where the first letter designates the frequency band within which the lowest operating frequency is located and the second letter designates the frequency band within which the highest operating frequency is located. A frequency code is not required for the standard unit that covers 0.1 to 20.0 GHz ("VK").



## ENVIRONMENTAL RATINGS

Temperature: Operating.....55°C to +85°C  
 Non-operating.....65°C to +125°C

Humidity: MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

Vibration: MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

Altitude: MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

Temp Cycling: MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

Shock: MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

LOGIC:

OPTION CODE	LOGIC TYPE	CONTROL STATUS			PORT STATUS
		E3	E2	E1	
L3	BINARY DECODED	0	0	0	ALL ISO.
		0	0	1	J1=LOSS
		0	1	0	J2=LOSS
		0	1	1	J3=LOSS
		1	0	0	J4=LOSS
L2 (4)	NON INVERTING	0			ISO.
		1			LOSS
(STD) (4)	INVERTING	0			LOSS
		1			ISO.

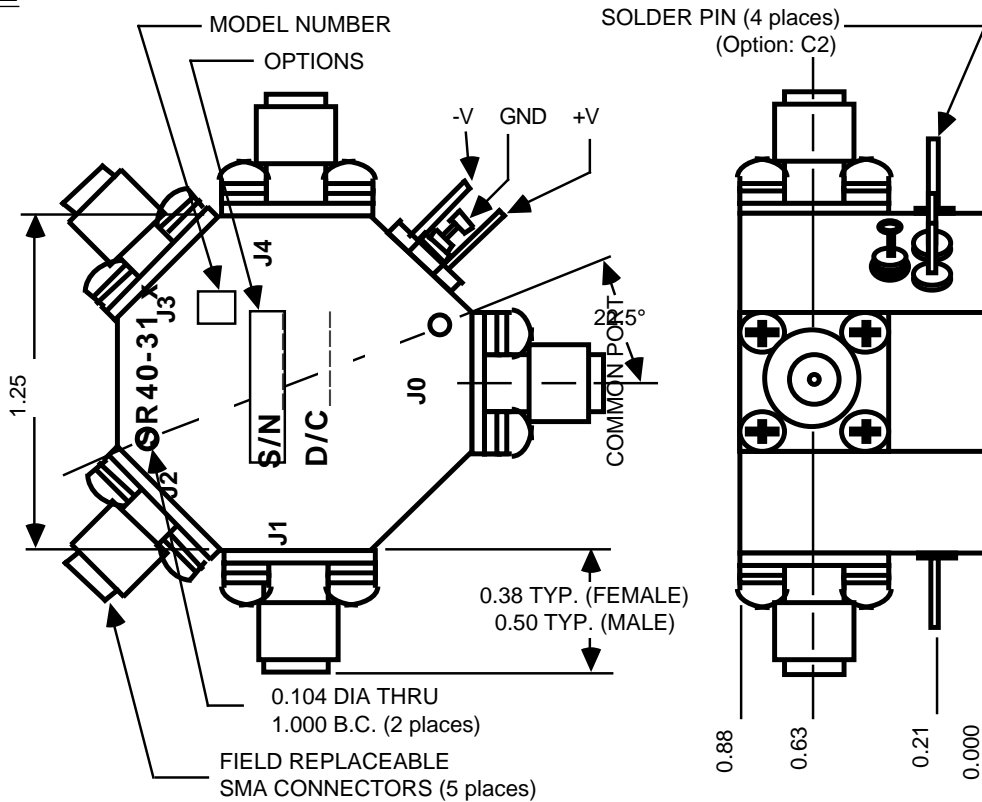
CONTROL CONNECTOR:  
 (STD).....Solder Pin  
 C2.....SMC-M

FREQUENCY:  
 (STD).....0.1 to 20.0 GHz  
 Two Letter Code. See note 6  
 for details.

DRIVER:  
 (STD).....With Driver  
 D2.....Without driver

NEGATIVE SUPPLY  
 (STD).....-12V  
 N2.....-15V

## OUTLINE



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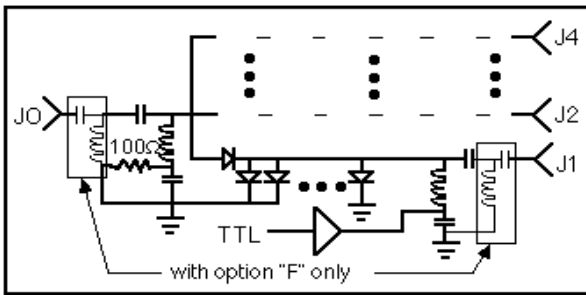


# STANDARD PRODUCTS

## DESCRIPTION

The SR40-33x series of high-speed wide-band (2.0-18.0 GHz) single-pole four-throw PIN diode switches, employs a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, integral TTL compatible drivers, and offered in medium (-332), high (-333), and extra-high (-334) isolation models. Video transient filtering is optional.

## SCHEMATIC



## SP4T SWITCH

### SERIES SR40-33x

Reflective Series/Shunt

25 nsec. Switching Speed

## ELECTRICAL SPECIFICATIONS

CHARACTERISTIC	WITH DRIVER	
	MAX.	TYP.
Switching Speed (1)	25 ns (7)	20 ns
Transition Time (2)	20 ns (7)	10 ns
Power Handling (CW or peak)	+30 dBm	+33 dBm
Positive Supply	5V ± 2% @ 90 mA max	
Negative Supply (3)	(4) @ 80 mA max	
Control Impedance	TTL (2 unit loads max)	
Control Logic (3)	(4)	
Video Transients (5)	(4)	

## R.F. PERFORMANCE

MODEL	CHARACTERISTIC	FREQUENCY (GHz) (See Note 6)				
		S	C	X	P	
		2.0-4.0	4.0-8.0	8.0-12.4	12.4-18.0	
SR40-332	INSERTION LOSS (dB max)	TYP.	0.8	1.2	1.6	1.9
		MAX.	1.2	1.6	2.0	2.3
	ISOLATION (dB min)	60	55	50	50	
SR40-333	INSERTION LOSS (dB max)	TYP.	1.0	1.4	1.8	2.1
		MAX.	1.4	1.8	2.3	2.5
	ISOLATION (dB min)	75	70	65	65	
SR40-334	INSERTION LOSS (dB max)	TYP.	1.2	1.6	2.0	2.3
		MAX.	1.6	2.0	2.4	2.7
	ISOLATION (dB min)	85	80	80	80	
ALL MODELS	VSWR (max)	1.40	1.60	1.75	2.00	

- "Turn-On Time"/"Turn-Off Time" is the time between the 50% point of the control voltage and the 90% or the 10% point of the detected RF, respectively. "Switching Speed" is defined as the slower of the two times (usually the Turn-On Time).
- "Rise Time"/"Fall Time" is the time required for the detected RF to transition between the 10% and 90% points or the 90% and 10% points, respectively. "Transition Time" is defined as the slower of the two times (usually the Rise Time).
- Setting more than one RF port at a time to the insertion loss state can cause excessive power dissipation in the common arm bias return network and may result in switch failure.
- See "Options" on back of page.
- Measured into a 50 ohms with a 150MHz B.W. oscilloscope. Typically 2V p-p max. unfiltered and 50mV p-p max. with filtering. Filtering will typically add 0.3dB insertion loss per filter in a transmission path.
- Operating frequency range for narrower bandwidth unit(s) is specified by a two letter option code where the first letter designates the frequency band within which the lowest operating frequency is located and the second letter designates the frequency band within which the highest operating frequency is located. A frequency code is not required for the standard unit that covers 2.0 to 18.0 GHz ("SP").
- Measured by switching a single port between the Insertion Loss and Isolation states. Toggling/Commutating Speed, likewise that for switches with decoded drivers, is measured by switching between two ports and is specified at 50 nsec. max.



## ENVIRONMENTAL RATINGS

### Temperature:

Operating.....-55°C to +85°C  
 Non-operating.....-65°C to +125°C

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

### LOGIC:

OPTION CODE	LOGIC TYPE	CONTROL STATUS			PORT STATUS
		E3	E2	E1	
L3	BINARY DECODED	0	0	0	ALL ISO.
		0	0	1	J1=LOSS
		0	1	0	J2=LOSS
		0	1	1	J3=LOSS
		1	0	0	J4=LOSS
L2 (4)	NON INVERTING	0			ISO.
		1			LOSS
(STD) (4)	INVERTING	0			LOSS
		1			ISO.

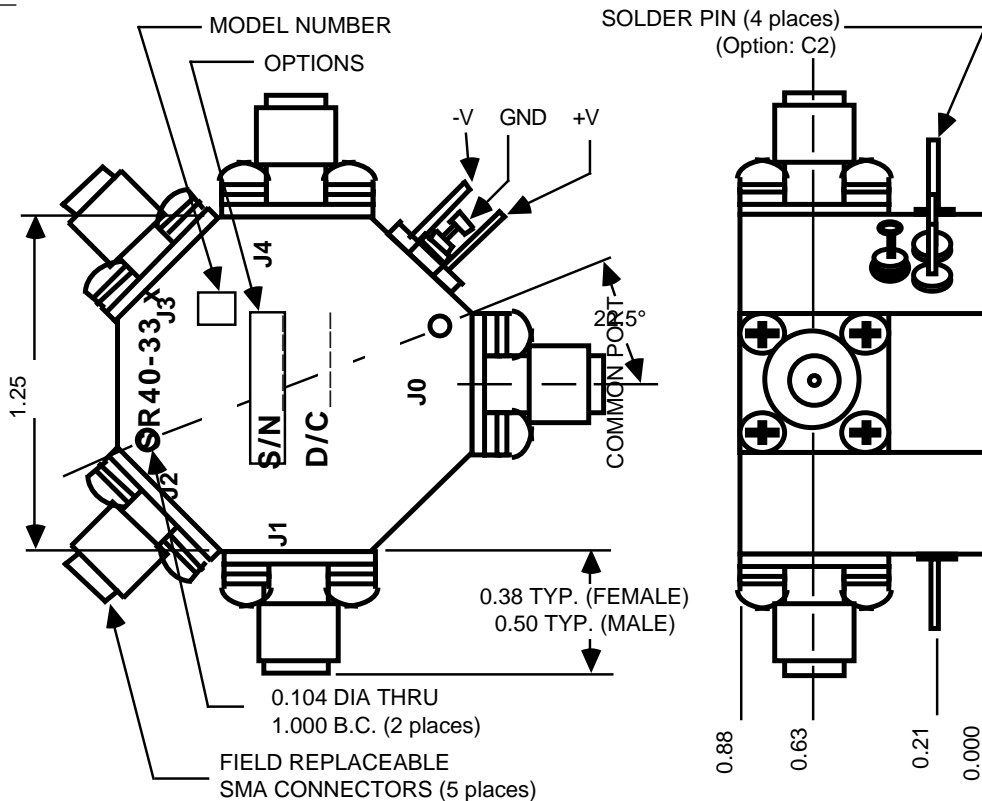
CONTROL CONNECTOR:  
 (STD).....Solder Pin  
 C2.....SMC-M

FREQUENCY:  
 (STD).....2.0 to 18.0 GHz  
 Two Letter Code, see note 5  
 for detail.

VIDEO TRANSIENT:  
 (STD).....None  
 F2.....All Ports  
 F3.....Common Port Only  
 F4.....Non-Common  
 Ports Only

NEGATIVE SUPPLY  
 (STD).....-12V  
 N2.....-15V

## OUTLINE



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# STANDARD PRODUCTS

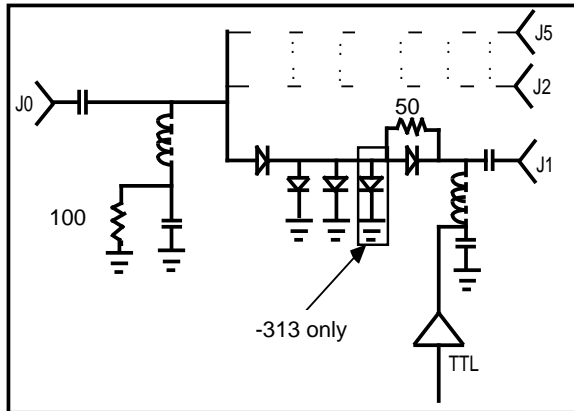
## DESCRIPTION

The SN50-31x series of non-reflective single-pole quintuple-throw wide band (0.1-20.0GHz) PIN diode switches employ a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, and offered in medium (-312) and high (-313) isolation models.

## SP5T SWITCH

**SERIES SN50-31x**  
Non-Reflective Series/Shunt  
1  $\mu$ sec. Switching Speed

## SCHEMATIC



## ELECTRICAL PERFORMANCE

CHARACTERISTIC	WITH DRIVER		WITHOUT DRIVER	
	MAX.	TYP.	MAX.	TYP.
Switching Speed (1)	1.0 $\mu$ s	0.5 $\mu$ s	(2)	(2)
Transition Time (3)	0.5 $\mu$ s	0.1 $\mu$ s	(2)	(2)
Power Handling (CW or peak)	+30 dBm	+33 dBm	+30 dBm	+33 dBm
Positive Supply	5V $\pm$ 2% 130 mA max		30 mA (Iso.)	15 mA
Negative Supply (4)	-12V to -15V 90 mA max		-50 mA (Loss)	-35 mA
Control Impedance	TTL (1 unit loads max)		N/A	
Control Logic (4)	see Options on back		see Supply requirements	

MODEL	CHARACTERISTIC	See Note (5)	FREQUENCY (GHz)							
			V	U	L	S	C	X	P	K
SN50-312	INSERTION LOSS (dB max)	TYP.	1.1	0.8	0.9	1.1	1.7	2.2	2.6	3.5
		MAX.	1.5	1.1	1.3	1.5	2.1	2.6	3.0	3.9
	VSWR (On/Off) (max)		1.5	1.5	1.5	1.5	1.8	2.0	2.2	2.5
	ISOLATION (dB min)		65	60	60	60	55	50	50	45
SN50-313	INSERTION LOSS (dB max)	TYP.	1.3	0.9	1.1	1.3	1.9	2.3	2.8	3.7
		MAX.	1.8	1.3	1.5	1.7	2.3	2.7	3.2	4.1
	VSWR (On/Off) (max)		1.5	1.5	1.5	1.5	1.8	2.0	2.2	2.5
	ISOLATION (dB min)		70	70	75	75	70	65	65	60

- (1) Turn on time is the time interval between 50% of the control voltage and 90% of the detected RF. Turn off time is the time interval between 50% of the control voltage and 10% of the detected RF. Switching Speed is defined as the slower of the two times (usually the turn on time).
- (2) Depends upon driver supplied by the user.
- (3) Rise time is the time required for the detected RF to transition between 10% and 90% of its final value. Fall time is the time required for the detected RF to transition between 90% and 10% of its initial value. Transition time is defined as the slower of the two times (usually the Rise time).
- (4) Setting more than one RF port at a time to the loss state causes excessive current in the common arm bias return.
- (5) Operating frequency range for narrower bandwidth unit(s) is specified by an option code that is composed of two letters. The first letter designates the starting frequency band and the second one designates the ending frequency band. Frequency code is not required for standard unit that covers 0.1 to 20.0 GHz ("VK").



## ENVIRONMENTAL RATINGS

### Temperature:

Operating.....55°C to +85°C  
 Non-operating.....65°C to +125°C

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

### LOGIC:

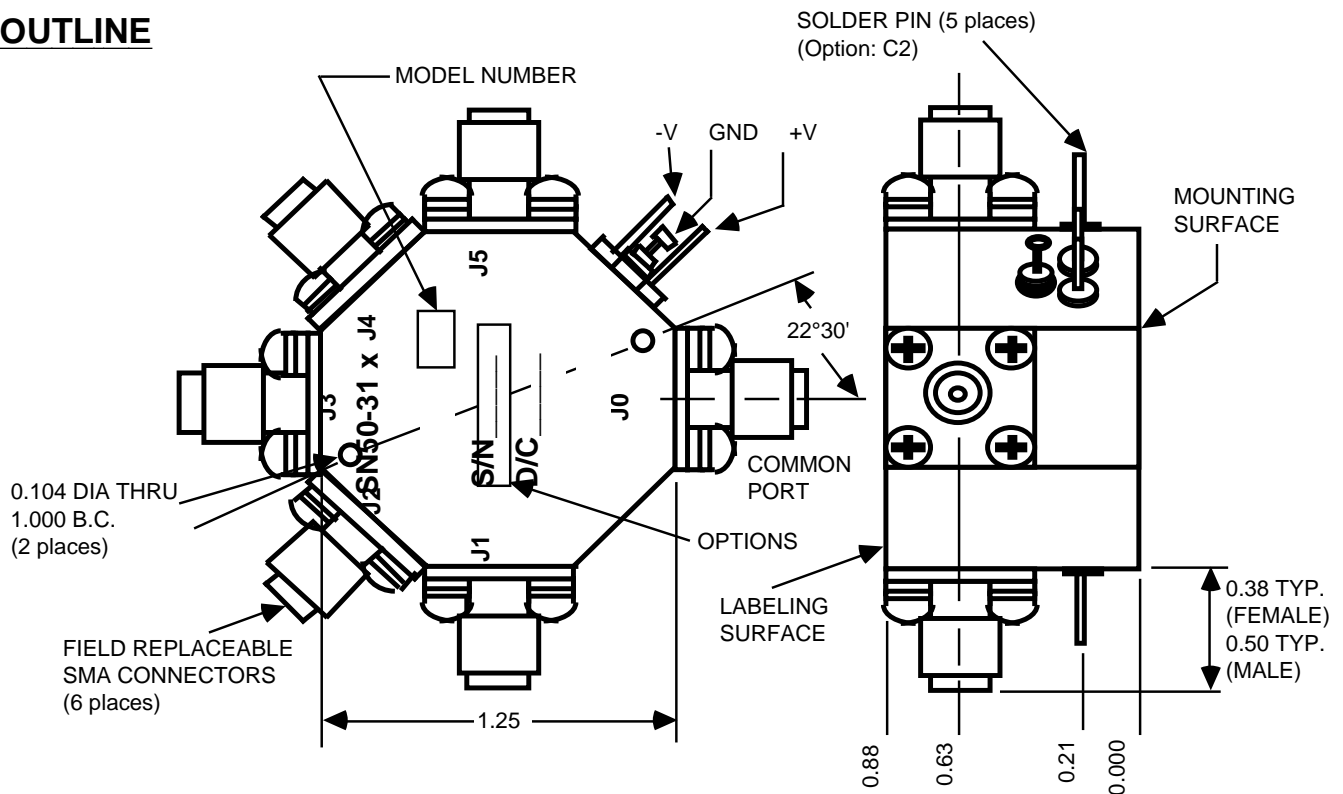
OPTION NUMBER	LOGIC DESCRIPTION	INDIVIDUAL PORT CONTROL		DECODED			PORT CONDITION
		1	0	E3	E2	E1	
(STD) (4)	INVERTING	ISO.	LOSS	X			
L2 (4)	NON INVERTING	LOSS	ISO.				
L3	BINARY DECODED	X		0	0	0	ALL ISO.
				0	0	1	J1=LOSS
				⋮	⋮	⋮	⋮
				1	0	1	J5=LOSS

CONTROL CONNECTOR:  
 (STD).....Solder Pin  
 C2.....SMC-M

FREQUENCY:  
 (STD).....0.1 to 20.0 GHz  
 Two Letter Code, see note 5  
 for detail

DRIVER:  
 (STD).....With Driver  
 D2.....Without driver

## OUTLINE



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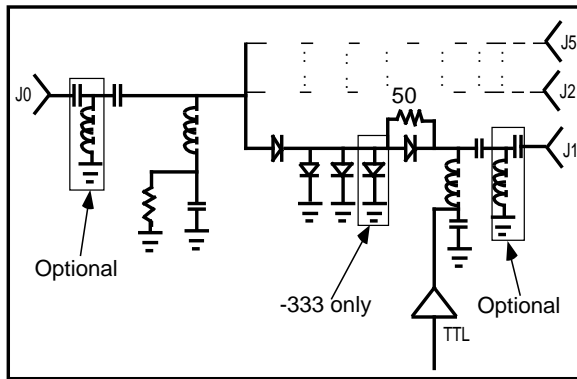


# STANDARD PRODUCTS

## DESCRIPTION

The SN50-33x series of non-reflective single-pole quintuple-throw (2.0-18.0 GHz) PIN diode switches employ a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, integral TTL compatible drivers, and offered in medium (-332) and high (-333) isolation models. They are also available with video transient filtering.

## SCHEMATIC



## SP5T SWITCH

### SERIES SN50-33x

Non-Reflective Series/Shunt

25 nsec. Switching Speed

## ELECTRICAL PERFORMANCE

CHARACTERISTIC	WITH DRIVER	
	MAX.	TYP.
Switching Speed (1)	25ns	20ns
Transition Time (2)	20ns	10ns
Power Handling (CW or peak)	+30 dBm	+33 dBm
Positive Supply	5V± 2% 140 mA max	
Negative Supply (3)	See Option 110 mA max	
Control Impedance	TTL (1 unit loads max)	
Control Logic (3)	see Options on back	
Video Transients (4)	see Options on back	

MODEL	CHARACTERISTIC		FREQUENCY (GHz)			
			S	C	X	P
		See Note (5)	2.0-4.0	4.0-8.0	8.0-12.4	12.4-18.0
SN50-332	INSERTION LOSS (dB max)	TYP.	1.1	1.7	2.2	2.6
		MAX.	1.5	2.1	2.6	3.0
	VSWR {On/Off} (max)		1.5	1.8	2.0	2.2
	ISOLATION (dB min)		60	55	50	50
SN50-333	INSERTION LOSS (dB max)	TYP.	1.3	1.9	2.3	2.8
		MAX.	1.7	2.3	2.7	3.2
	VSWR {On/Off} (max)		1.5	1.8	2.0	2.2
	ISOLATION (dB min)		75	70	65	65

- (1) Turn on time is the time interval between 50% of the control voltage and 90% of the detected RF. Turn off time is the time interval between 50% of the control voltage and 10% of the detected RF. Switching Speed is defined as the slower of the two times (usually the turn on time).
- (2) Rise time is the time required for the detected RF to transition between 10% and 90% of its final value. Fall time is the time required for the detected RF to transition between 90% and 10% of its initial value. Transition time is defined as the slower of the two times (usually the Rise time).
- (3) Setting more than one RF port at a time to the loss state causes excessive current in the common arm bias return.
- (4) Measured into a 50 ohms with a 150mHz B.W. oscilloscope. Typically 2V p-p max. unfiltered and 50mV p-p max. with filtering. Filtering will typically add 0.3dB insertion loss per filter in a transmission path.
- (5) Operating frequency range for narrower bandwidth unit(s) is specified by an option code that is composed of two letters. The first letter designates the starting frequency band and the second one designates the ending frequency band. Frequency code is not required for standard unit that covers 2.0 to 18.0 GHz ("SP").



## ENVIRONMENTAL RATINGS

### Temperature:

Operating.....-55°C to +85°C  
 Non-operating.....-65°C to +125°C

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

### LOGIC:

OPTION NUMBER	LOGIC DESCRIPTION	1	0
(STD) (3)	<b>INVERTING</b>	<b>ISO.</b>	<b>LOSS</b>
L2 (3)	NON INVERTING	LOSS	ISO.

### CONTROL CONNECTOR:

(STD).....Solder Pin  
 C2.....SMC-M  
 for detail.

### FREQUENCY:

(STD).....2.0 to 18.0 GHz  
 Two Letter Code, see note 5

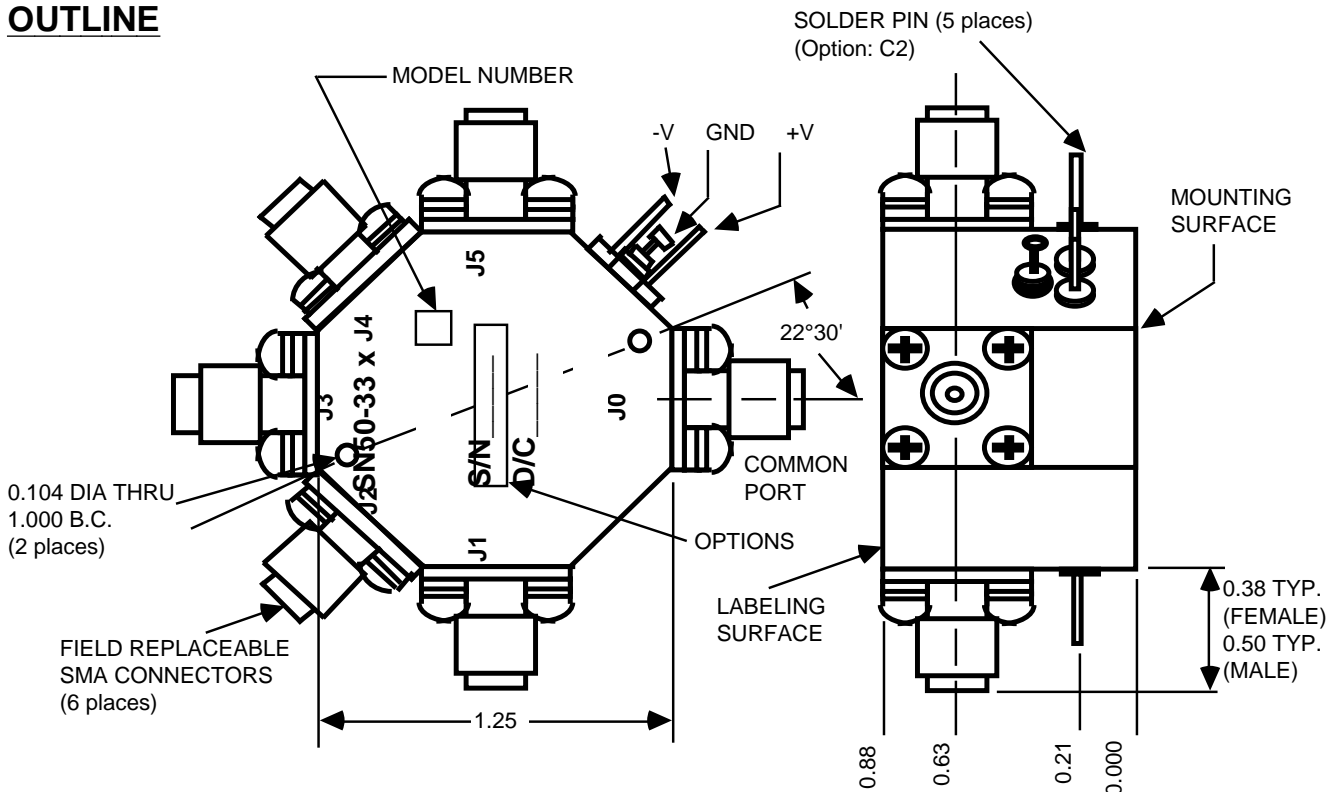
### VIDEO TRANSIENT:

(STD).....None  
 F2.....All Ports  
 F3.....Common Port  
 Only  
 F4.....Non-Common Ports  
 Only

### NEGATIVE SUPPLY

(STD).....-12V  
 N2.....-15V

## OUTLINE



Custom Microwave Components, Inc.



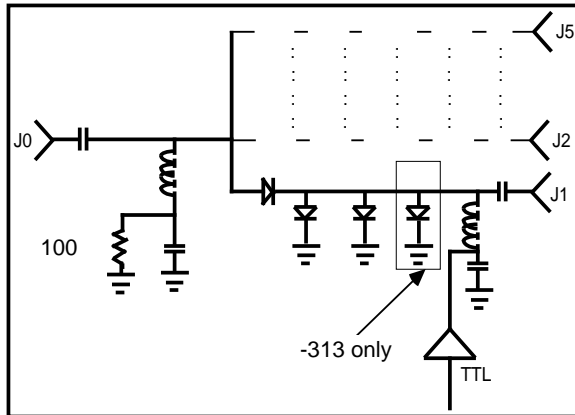
44249 Old Warm Springs Blvd.  
 Fremont, California 94538  
 510-651-3434

# STANDARD PRODUCTS

## DESCRIPTION

The SR50-31x series of single-pole quintuple-throw wide band (0.1-20.0GHz) PIN diode switches employ a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, and offered in medium (-312) and high (-313) isolation models.

## SCHEMATIC



## SP5T SWITCH

**SERIES SR50-31x**

Reflective Series/Shunt

1 μsec. Switching Speed

## ELECTRICAL PERFORMANCE

CHARACTERISTIC	WITH DRIVER		WITHOUT DRIVER	
	MAX.	TYP.	MAX.	TYP.
Switching Speed (1)	1.0μs	0.5μs	(2)	(2)
Transition Time (3)	0.5μs	0.1μs	(2)	(2)
Power Handling (CW or peak)	+30 dBm	+33 dBm	+30 dBm	+33 dBm
Positive Supply	5V± 2% 110 mA max		30 mA (Iso.)	10 mA
Negative Supply (4)	-12V to -15V 70 mA max		-30 mA (Loss)	-20 mA
Control Impedance	TTL (1 unit loads max)		N/A	
Control Logic (4)	see Options on back		see Supply requirements	

MODEL	CHARACTERISTIC	See Note (5)	FREQUENCY (GHz)							
			V	U	L	S	C	X	P	K
SR50-312	INSERTION LOSS (dB max)	TYP.	0.1-0.5	0.5-1.0	1.0-2.0	2.0-4.0	4.0-8.0	8.0-12.4	12.4-18.0	18.0-20.0
		MAX.	0.8	0.5	0.6	0.8	1.3	1.8	2.1	3.0
	VSWR (max)		1.2	0.8	1.0	1.2	1.7	2.2	2.5	3.4
	ISOLATION (dB min)		1.40	1.35	1.35	1.40	1.60	1.75	2.0	2.2
SR50-313	INSERTION LOSS (dB max)	TYP.	65	60	60	60	55	50	50	45
		MAX.	1.0	0.6	0.8	1.0	1.5	1.9	2.3	3.2
	VSWR (max)		1.5	1.0	1.2	1.4	1.9	2.3	2.7	3.6
	ISOLATION (dB min)		1.40	1.35	1.35	1.4	1.6	1.75	2.0	2.2
			70	70	75	75	70	65	65	60

- (1) Turn on time is the time interval between 50% of the control voltage and 90% of the detected RF. Turn off time is the time interval between 50% of the control voltage and 10% of the detected RF. Switching Speed is defined as the slower of the two times (usually the turn on time).
- (2) Depends upon driver supplied by the user.
- (3) Rise time is the time required for the detected RF to transition between 10% and 90% of its final value. Fall time is the time required for the detected RF to transition between 90% and 10% of its initial value. Transition time is defined as the slower of the two times (usually the Rise time).
- (4) Setting more than one RF port at a time to the loss state causes excessive current in the common arm bias return.
- (5) Operating frequency range for narrower bandwidth unit(s) is specified by an option code that is composed of two letters. The first letter designates the starting frequency band and the second one designates the ending frequency band. Frequency code is not required for standard unit that covers 0.1 to 20.0 GHz ("VK").



## ENVIRONMENTAL RATINGS

### Temperature:

Operating.....55°C to +85°C  
 Non-operating.....65°C to +125°C

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

### LOGIC:

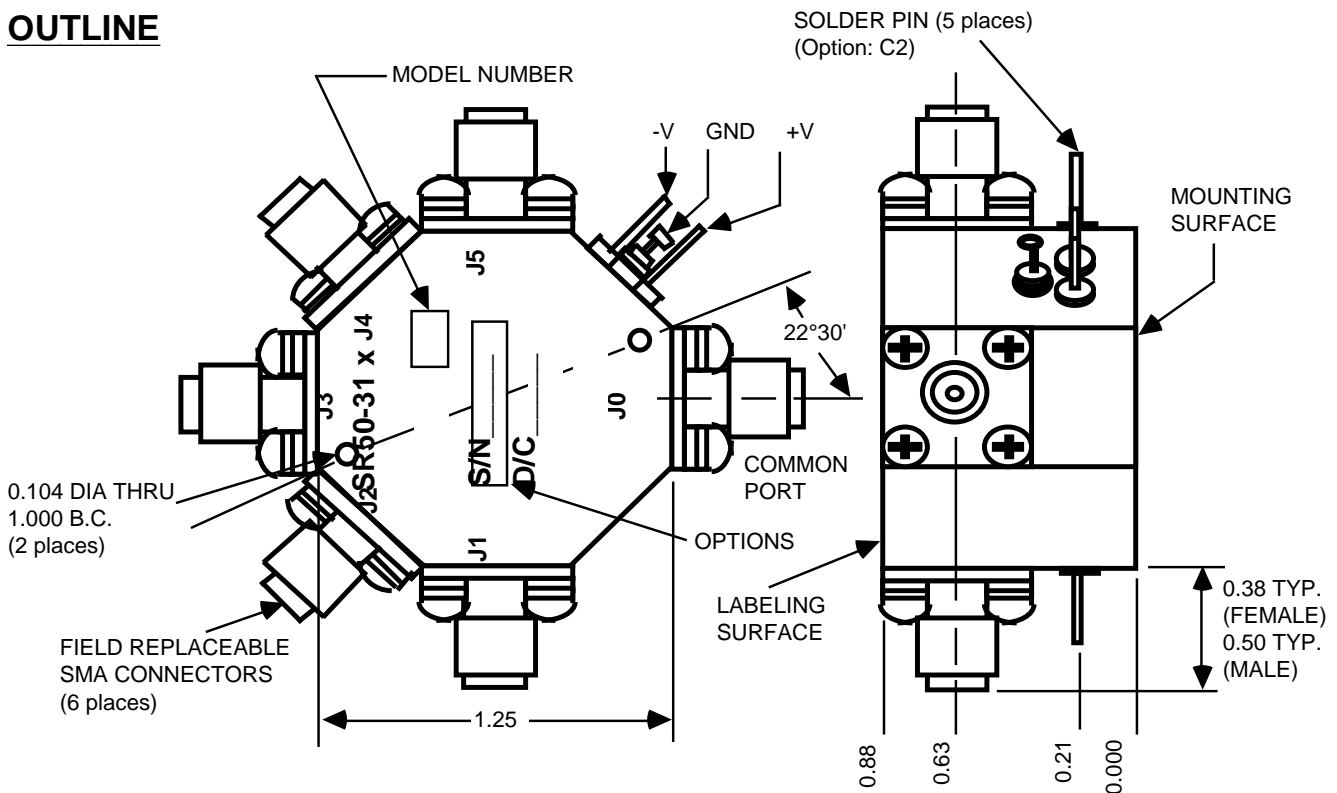
OPTION NUMBER	LOGIC DESCRIPTION	INDIVIDUAL PORT CONTROL		DECODED			PORT CONDITION
		1	0	E3	E2	E1	
(STD) (4)	INVERTING	ISO.	LOSS	X			
L2 (4)	NON INVERTING	LOSS	ISO.				
L3	BINARY DECODED	X		0	0	0	ALL ISO.
				0	0	1	J1=LOSS
				⋮	⋮	⋮	⋮
				1	0	1	J5=LOSS

CONTROL CONNECTOR:  
 (STD).....Solder Pin  
 C2.....SMC-M

FREQUENCY:  
 (STD).....0.1 to 20.0 GHz  
 Two Letter Code, see note 5  
 for detail

DRIVER:  
 (STD).....With Driver  
 D2.....Without driver

## OUTLINE



Custom Microwave Components, Inc.  
 44249 Old Warm Springs Blvd.  
 Fremont, California 94538  
 510-651-3434



# STANDARD PRODUCTS

## DESCRIPTION

The SR50-33x series of reflective single-pole double-throw (2.0-18.0 GHz) PIN diode switches employ a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, integral TTL compatible drivers, and offered in medium (-332) and high (-333) isolation models. They are also available with video transient filtering.

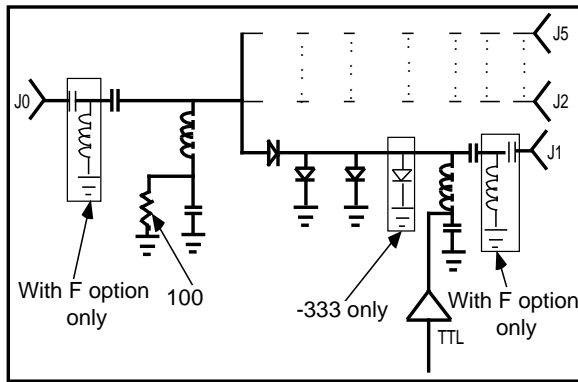
## SP5T SWITCH

**SERIES SR50-33x**

Reflective Series/Shunt

25 nsec. Switching Speed

## SCHEMATIC



## ELECTRICAL PERFORMANCE

CHARACTERISTIC	WITH DRIVER	
	MAX.	TYP.
Switching Speed (1)	25ns	20ns
Transition Time (2)	20ns	10ns
Power Handling (CW or peak)	+30 dBm	+33 dBm
Positive Supply	5V± 2% 120 mA max	
Negative Supply (3)	See Option 90 mA max	
Control Impedance	TTL (1 unit loads max)	
Control Logic (3)	see Options on back	
Video Transients (4)	see Options on back	

MODEL	CHARACTERISTIC		FREQUENCY (GHz)			
			S	C	X	P
		See Note (5)	2.0-4.0	4.0-8.0	8.0-12.4	12.4-18.0
SR50-332	INSERTION LOSS (dB max)	TYP.	0.8	1.3	1.8	2.1
		MAX	1.2	1.7	2.2	2.5
	VSWR (max)		1.40	1.60	1.75	2.0
	ISOLATION (dB min)		60	55	50	50
SR50-333	INSERTION LOSS (dB max)	TYP.	1.0	1.5	1.9	2.3
		MAX	1.4	1.9	2.3	2.7
	VSWR (max)		1.4	1.6	1.75	2.0
	ISOLATION (dB min)		75	70	65	65

- (1) Turn on time is the time interval between 50% of the control voltage and 90% of the detected RF. Turn off time is the time interval between 50% of the control voltage and 10% of the detected RF. Switching Speed is defined as the slower of the two times (usually the turn on time).
- (2) Rise time is the time required for the detected RF to transition between 10% and 90% of its final value. Fall time is the time required for the detected RF to transition between 90% and 10% of its initial value. Transition time is defined as the slower of the two times (usually the Rise time).
- (3) Setting more than one RF port at a time to the loss state causes excessive current in the common arm bias return.
- (4) Measured into a 50 ohms with a 150mHz B.W. oscilloscope. Typically 2V p-p max. unfiltered and 50mV p-p max. with filtering. Filtering will typically add 0.3dB insertion loss per filter in a transmission path.
- (5) Operating frequency range for narrower bandwidth unit(s) is specified by an option code that is composed of two letters. The first letter designates the starting frequency band and the second one designates the ending frequency band. Frequency code is not required for standard unit that covers 2.0 to 18.0 GHz ("SP").



## ENVIRONMENTAL RATINGS

### Temperature:

Operating.....-55°C to +85°C  
 Non-operating.....-65°C to +125°C

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

### LOGIC:

OPTION NUMBER	LOGIC DESCRIPTION	1	0
(STD) (3)	<b>INVERTING</b>	<b>ISO.</b>	<b>LOSS</b>
L2 (3)	NON INVERTING	LOSS	ISO.

### CONTROL CONNECTOR:

(STD).....Solder Pin  
 C2.....SMC-M  
 for detail.

### FREQUENCY:

(STD).....2.0 to 18.0 GHz  
 Two Letter Code, see note 5

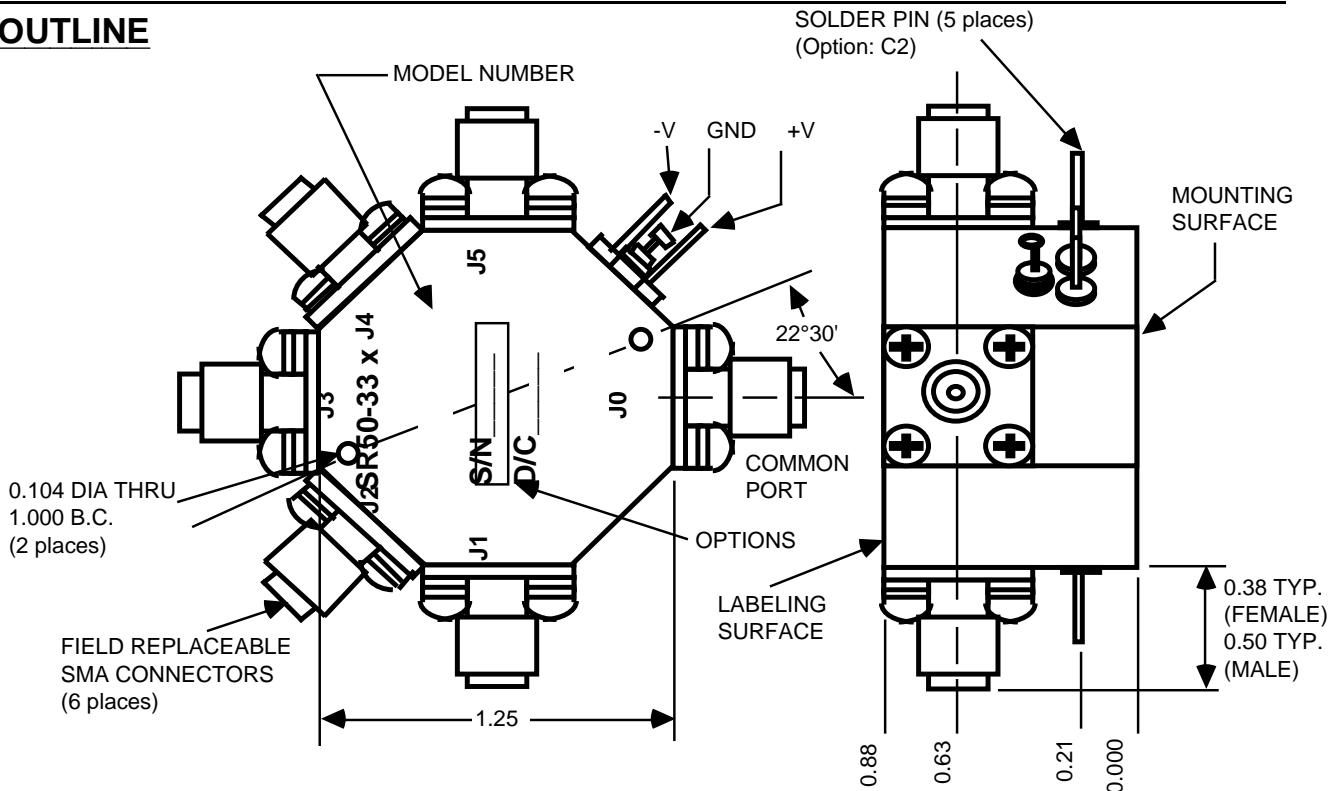
### VIDEO TRANSIENT:

(STD).....None  
 F2.....All Ports  
 F3.....Common Port  
 Only  
 F4.....Non-Common Ports  
 Only

### NEGATIVE SUPPLY

(STD).....-12V  
 N2.....-15V

## OUTLINE



Custom Microwave Components, Inc.



44249 Old Warm Springs Blvd.  
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 510-651-3434

# STANDARD PRODUCTS

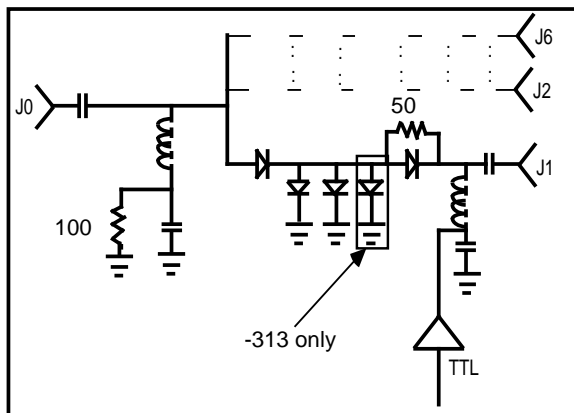
## DESCRIPTION

The SN60-31x series of non-reflective single-pole sextuple-throw wide band (0.1-20.0GHz) PIN diode switches employ a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, and offered in medium (-312) and high (-313) isolation models.

## SP6T SWITCH

**SERIES SN60-31x**  
Non-Reflective Series/Shunt  
1 µsec. Switching Speed

## SCHEMATIC



## ELECTRICAL PERFORMANCE

CHARACTERISTIC	WITH DRIVER		WITHOUT DRIVER	
	MAX.	TYP.	MAX.	TYP.
Switching Speed (1)	1.0µs	0.5µs	(2)	(2)
Transition Time (3)	0.5µs	0.1µs	(2)	(2)
Power Handling (CW or peak)	+30 dBm	+33 dBm	+30 dBm	+33 dBm
Positive Supply	5V± 2% 150 mA max		30 mA (Iso.)	15 mA
Negative Supply (4)	-12V to -15V 90 mA max		-50 mA (Loss)	-35 mA
Control Impedance	TTL (1 unit loads max)		N/A	
Control Logic (4)	see Options on back		see Supply requirements	

MODEL	CHARACTERISTIC		FREQUENCY (GHz)							
			V	U	L	S	C	X	P	K
		See Note (5)	0.1-0.5	0.5-1.0	1.0-2.0	2.0-4.0	4.0-8.0	8.0-12.4	12.4-18.0	18.0-20.0
SN60-312	INSERTION LOSS (dB max)	TYP.	1.2	0.9	1.0	1.2	1.8	2.3	2.9	3.7
		MAX.	1.6	1.2	1.4	1.6	2.2	2.7	3.3	4.1
	VSWR (On/Off) (max)		1.6	1.6	1.6	1.6	2.0	2.2	2.3	2.6
	ISOLATION (dB min)		65	60	60	60	55	50	50	45
SN60-313	INSERTION LOSS (dB max)	TYP.	1.4	1.0	1.2	1.4	1.9	2.5	3.2	3.9
		MAX.	1.9	1.4	1.6	1.8	2.3	2.9	3.6	4.1
	VSWR (On/Off) (max)		1.6	1.6	1.6	1.6	2.0	2.2	2.3	2.6
	ISOLATION (dB min)		70	70	75	75	70	65	65	60

- (1) Turn on time is the time interval between 50% of the control voltage and 90% of the detected RF. Turn off time is the time interval between 50% of the control voltage and 10% of the detected RF. Switching Speed is defined as the slower of the two times (usually the turn on time).
- (2) Depends upon driver supplied by the user.
- (3) Rise time is the time required for the detected RF to transition between 10% and 90% of its final value. Fall time is the time required for the detected RF to transition between 90% and 10% of its initial value. Transition time is defined as the slower of the two times (usually the Rise time).
- (4) Setting more than one RF port at a time to the loss state causes excessive current in the common arm bias return.
- (5) Operating frequency range for narrower bandwidth unit(s) is specified by an option code that is composed of two letters. The first letter designates the starting frequency band and the second one designates the ending frequency band. Frequency code is not required for standard unit that covers 0.1 to 20.0 GHz ("VK").



## ENVIRONMENTAL RATINGS

### Temperature:

Operating.....55°C to +85°C  
 Non-operating.....65°C to +125°C

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

### LOGIC:

OPTION NUMBER	LOGIC DESCRIPTION	INDIVIDUAL PORT CONTROL		DECODED			PORT CONDITION
		1	0	E3	E2	E1	
(STD) (4)	INVERTING	ISO.	LOSS	X			X
L2 (4)	NON INVERTING	LOSS	ISO.				
L3	BINARY DECODED	X		0	0	0	ALL ISO.
				0	0	1	J1=LOSS
				:	:	:	:
				1	1	0	J6=LOSS

### CONTROL CONNECTOR:

(STD).....Solder Pin  
 C2.....SMC-M

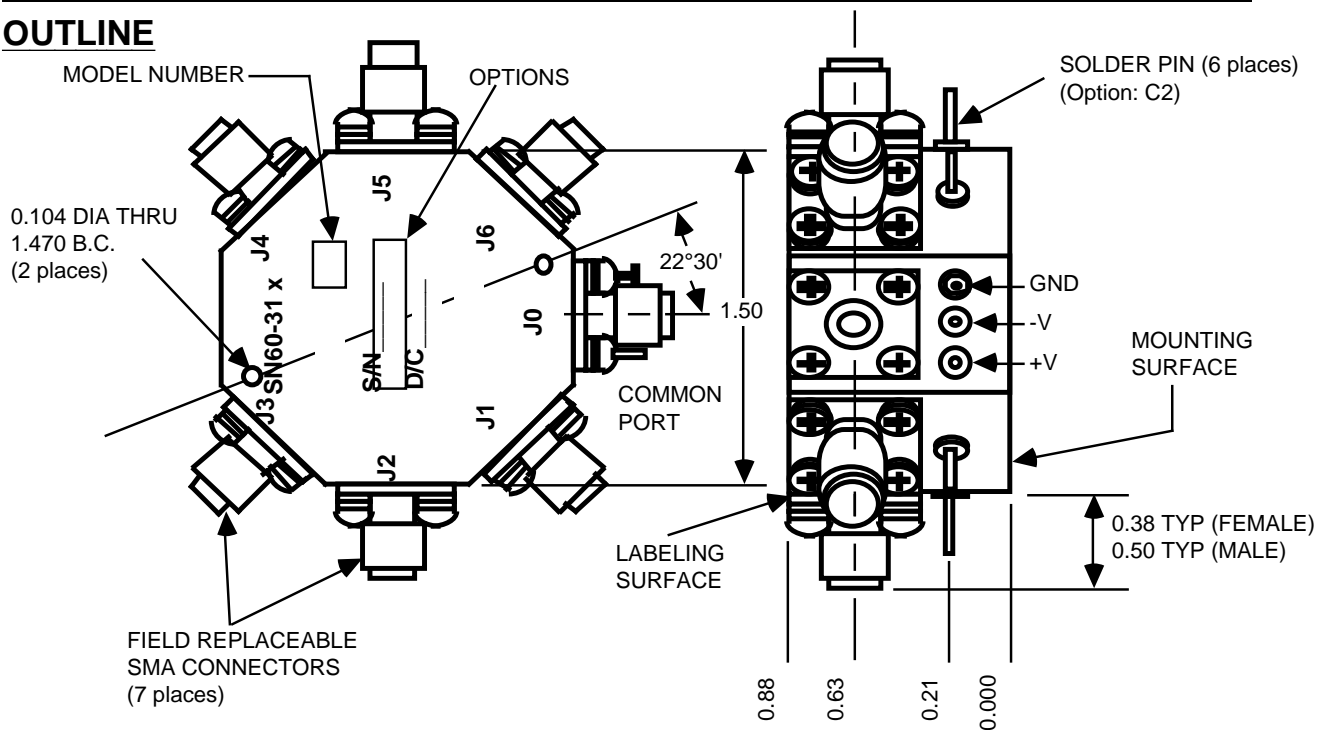
### FREQUENCY:

(STD).....0.1 to 20.0 GHz  
 Two Letter Code, see note 5  
 for detail

### DRIVER:

(STD).....With Driver  
 D2.....Without driver

## OUTLINE



Custom Microwave Components, Inc.



44249 Old Warm Springs Blvd.  
 Fremont, California 94538  
 510-651-3434

# STANDARD PRODUCTS

## DESCRIPTION

The SN60-33x series of non-reflective single-pole sextuple-throw (2.0-18.0 GHz) PIN diode switches employ a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, integral TTL compatible drivers, and offered in medium (-332) and high (-333) isolation models. They are also available with video transient filtering.

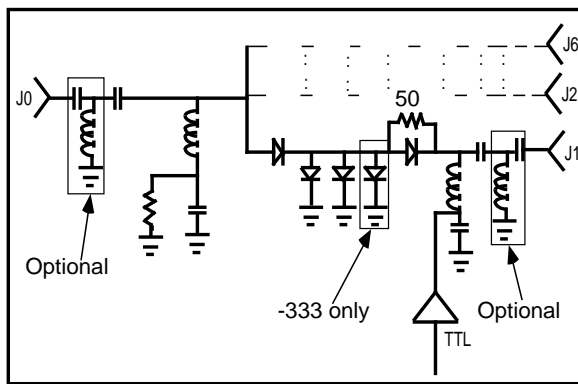
## SP6T SWITCH

### SERIES SN60-33x

Non-Reflective Series/Shunt

25 nsec. Switching Speed

## SCHEMATIC



## ELECTRICAL PERFORMANCE

CHARACTERISTIC	WITH DRIVER	
	MAX.	TYP.
Switching Speed (1)	25ns	20ns
Transition Time (2)	20ns	10ns
Power Handling (CW or peak)	+30 dBm	+33 dBm
Positive Supply	5V± 2% 165 mA max	
Negative Supply (3)	See Option 120 mA max	
Control Impedance	TTL (1 unit loads max)	
Control Logic (3)	see Options on back	
Video Transients (4)	see Options on back	

MODEL	CHARACTERISTIC		FREQUENCY (GHz)			
			S	C	X	P
		See Note (5)				
			2.0-4.0	4.0-8.0	8.0-12.4	12.4-18.0
SN60-332	INSERTION LOSS (dB max)	TYP.	1.2	1.8	2.3	2.9
		MAX.	1.6	2.2	2.7	3.3
	VSWR {On/Off} (max)		1.6	2.0	2.2	2.3
	ISOLATION (dB min)		60	55	50	50
SN60-333	INSERTION LOSS (dB max)	TYP.	1.4	1.9	2.5	3.2
		MAX.	1.8	2.3	2.9	3.6
	VSWR {On/Off} (max)		1.6	2.0	2.2	2.3
	ISOLATION (dB min)		75	70	65	65

- (1) Turn on time is the time interval between 50% of the control voltage and 90% of the detected RF. Turn off time is the time interval between 50% of the control voltage and 10% of the detected RF. Switching Speed is defined as the slower of the two times (usually the turn on time).
- (2) Rise time is the time required for the detected RF to transition between 10% and 90% of its final value. Fall time is the time required for the detected RF to transition between 90% and 10% of its initial value. Transition time is defined as the slower of the two times (usually the Rise time).
- (3) Setting more than one RF port at a time to the loss state causes excessive current in the common arm bias return.
- (4) Measured into a 50 ohms with a 150mHz B.W. oscilloscope. Typically 2V p-p max. unfiltered and 50mV p-p max. with filtering. Filtering will typically add 0.3dB insertion loss per filter in a transmission path.
- (5) Operating frequency range for narrower bandwidth unit(s) is specified by an option code that is composed of two letters. The first letter designates the starting frequency band and the second one designates the ending frequency band. Frequency code is not required for standard unit that covers 2.0 to 18.0 GHz ("SP").



## ENVIRONMENTAL RATINGS

### Temperature:

Operating.....-55°C to +85°C  
 Non-operating.....-65°C to +125°C

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

### LOGIC:

OPTION NUMBER	LOGIC DESCRIPTION	1	0
(STD) (3)	<b>INVERTING</b>	<b>ISO.</b>	<b>LOSS</b>
L2 (3)	NON INVERTING	LOSS	ISO.

### CONTROL CONNECTOR:

(STD).....Solder Pin  
 C2.....SMC-M  
 for detail.

### FREQUENCY:

(STD).....2.0 to 18.0 GHz  
 Two Letter Code, see note 5

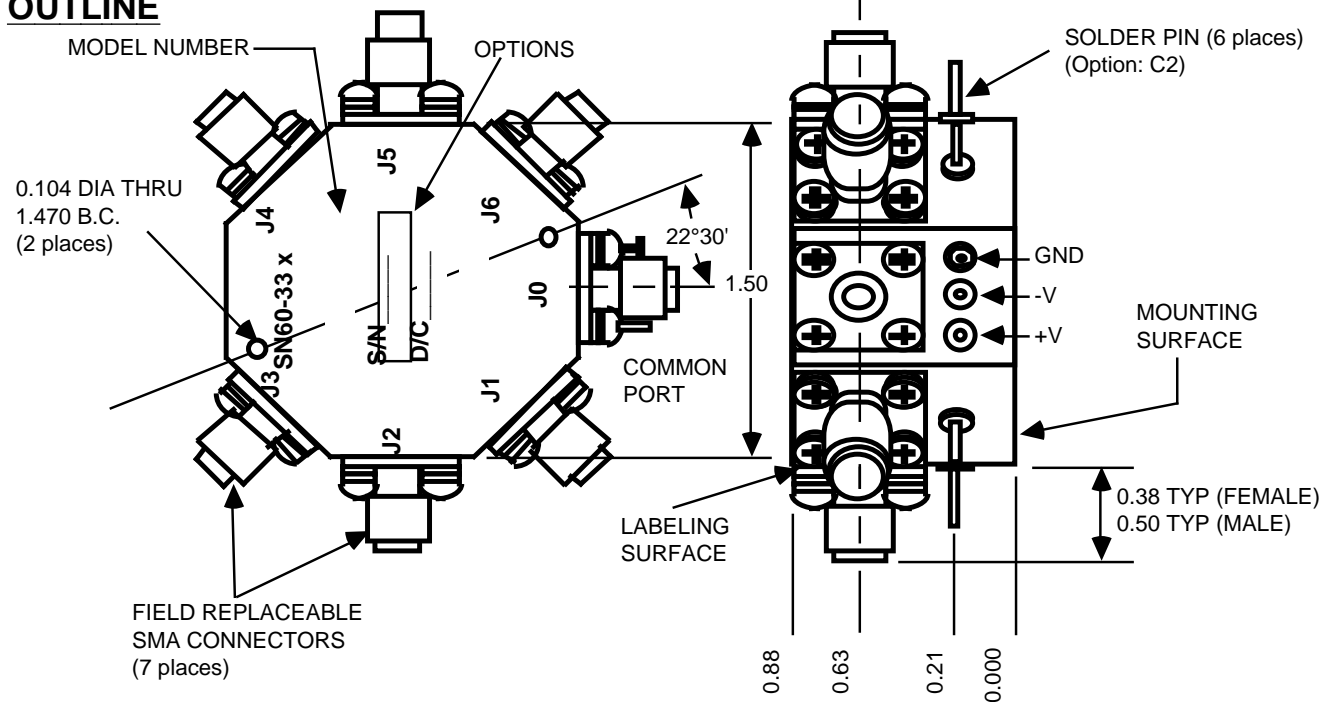
### VIDEO TRANSIENT:

(STD).....None  
 F2.....All Ports  
 F3.....Common Port  
 Only  
 F4.....Non-Common Ports  
 Only

### NEGATIVE SUPPLY

(STD).....-12V  
 N2.....-15V

## OUTLINE



Custom Microwave Components, Inc.



44249 Old Warm Springs Blvd.  
 Fremont, California 94538  
 510-651-3434

# STANDARD PRODUCTS

## DESCRIPTION

The SR60-31x series of single-pole sextuple-throw wide band (0.1-20.0GHz) PIN diode switches employ a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, and offered in medium (-312) and high (-313) isolation models.

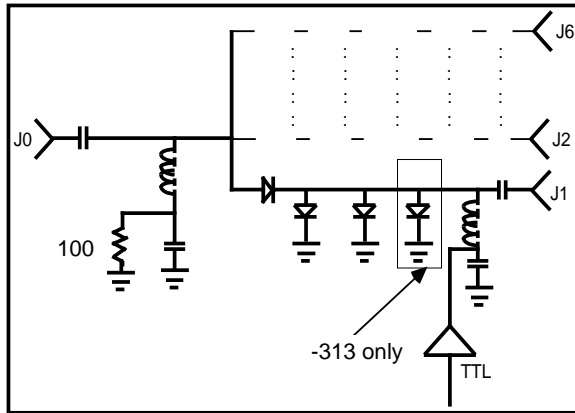
## SP6T SWITCH

**SERIES SR60-31x**

Reflective Series/Shunt

1 μsec. Switching Speed

## SCHEMATIC



## ELECTRICAL PERFORMANCE

CHARACTERISTIC	WITH DRIVER		WITHOUT DRIVER	
	MAX.	TYP.	MAX.	TYP.
Switching Speed (1)	1.0μs	0.5μs	(2)	(2)
Transition Time (3)	0.5μs	0.1μs	(2)	(2)
Power Handling (CW or peak)	+30 dBm	+33 dBm	+30 dBm	+33 dBm
Positive Supply	5V± 2% 125 mA max		30 mA (Iso.)	10 mA
Negative Supply (4)	-12V to -15V 70 mA max		-30 mA (Loss)	-20 mA
Control Impedance	TTL (1 unit loads max)		N/A	
Control Logic (4)	see Options on back		see Supply requirements	

MODEL	CHARACTERISTIC	See Note (5)	FREQUENCY (GHz)							
			V	U	L	S	C	X	P	K
SR60-312	INSERTION LOSS (dB max)	TYP.	0.1-0.5	0.5-1.0	1.0-2.0	2.0-4.0	4.0-8.0	8.0-12.4	12.4-18.0	18.0-20.0
		MAX.	0.9	0.6	0.7	0.9	1.4	1.9	2.4	3.2
	VSWR (max)	1.40	1.35	1.35	1.40	1.60	1.75	2.0	2.2	
	ISOLATION (dB min)	65	60	60	60	55	50	50	45	
SR60-313	INSERTION LOSS (dB max)	TYP.	0.9	0.6	0.7	0.9	1.4	1.9	2.4	3.2
		MAX.	1.1	0.7	0.9	1.1	1.5	2.1	2.7	3.4
	VSWR (max)	1.40	1.35	1.35	1.4	1.6	1.75	2.0	2.2	
	ISOLATION (dB min)	70	70	75	75	70	65	65	60	

- (1) Turn on time is the time interval between 50% of the control voltage and 90% of the detected RF. Turn off time is the time interval between 50% of the control voltage and 10% of the detected RF. Switching Speed is defined as the slower of the two times (usually the turn on time).
- (2) Depends upon driver supplied by the user.
- (3) Rise time is the time required for the detected RF to transition between 10% and 90% of its final value. Fall time is the time required for the detected RF to transition between 90% and 10% of its initial value. Transition time is defined as the slower of the two times (usually the Rise time).
- (4) Setting more than one RF port at a time to the loss state causes excessive current in the common arm bias return.
- (5) Operating frequency range for narrower bandwidth unit(s) is specified by an option code that is composed of two letters. The first letter designates the starting frequency band and the second one designates the ending frequency band. Frequency code is not required for standard unit that covers 0.1 to 20.0 GHz ("VK").



## ENVIRONMENTAL RATINGS

### Temperature:

Operating.....55°C to +85°C  
 Non-operating.....65°C to +125°C

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

### LOGIC:

OPTION NUMBER	LOGIC DESCRIPTION	INDIVIDUAL PORT CONTROL		DECODED			PORT CONDITION
		1	0	E3	E2	E1	
(STD) (4)	INVERTING	ISO.	LOSS	X			
L2 (4)	NON INVERTING	LOSS	ISO.				
L3	BINARY DECODED	X		0	0	0	ALL ISO.
				0	0	1	J1=LOSS
				:	:	:	:
				1	1	0	J6=LOSS

### CONTROL CONNECTOR:

(STD).....Solder Pin  
 C2.....SMC-M

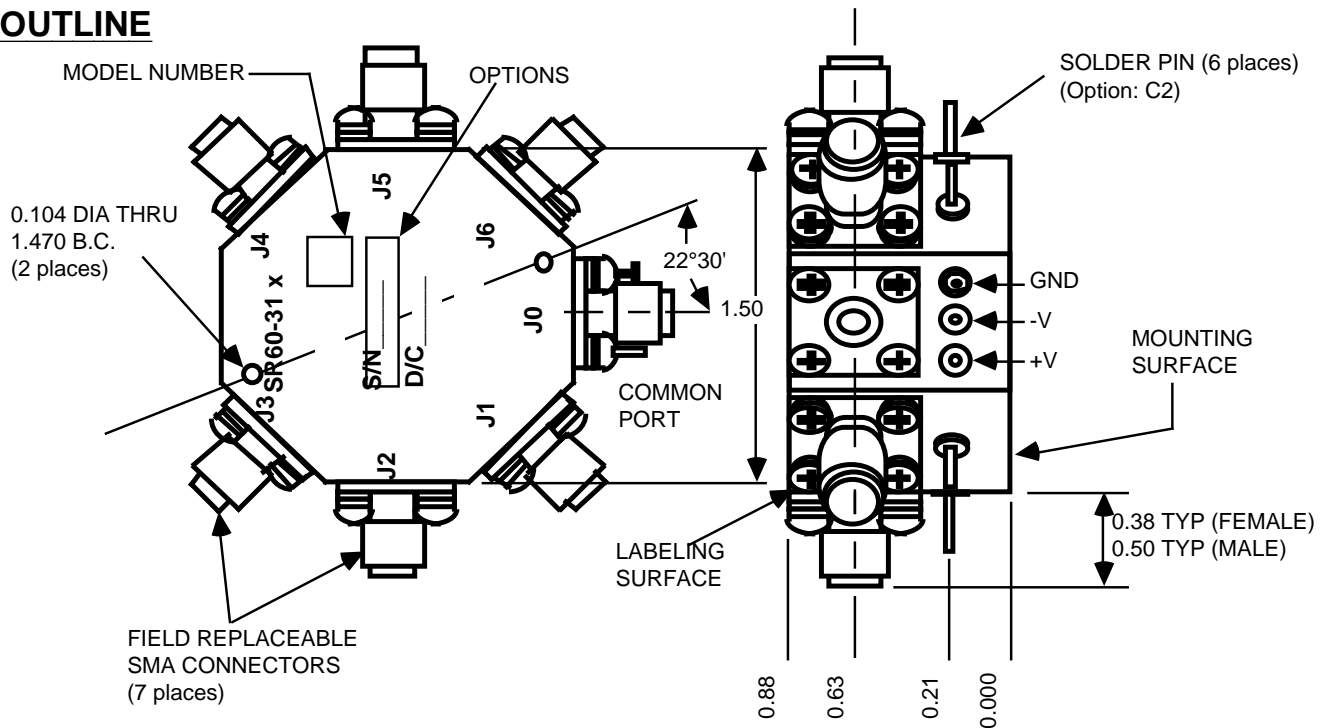
### FREQUENCY:

(STD).....0.1 to 20.0 GHz  
 Two Letter Code, see note 5  
 for detail

### DRIVER:

(STD).....With Driver  
 D2.....Without driver

## OUTLINE



Custom Microwave Components, Inc.



44249 Old Warm Springs Blvd.  
 Fremont, California 94538  
 510-651-3434

# STANDARD PRODUCTS

## DESCRIPTION

The SR60-33x series of reflective single-pole sextuple-throw PIN diode switches employ a series/shunt microstrip transmission line configuration controlled by an integral TTL compatible driver. They are compact in size, light weight, featured with field replaceable connectors, and offered in medium (-332) and high (-333) isolation models. Video transient filtering is optional.

## SP6T SWITCH

**SERIES SR60-33x**

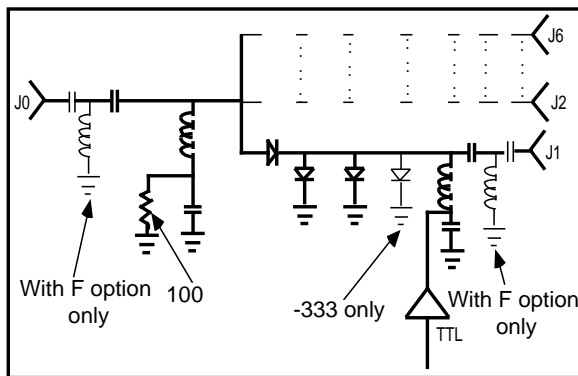
Reflective Series/Shunt

25 nsec. Switching Speed

## ELECTRICAL PERFORMANCE

CHARACTERISTIC	WITH DRIVER	
	MAX.	TYP.
Switching Speed (1)	25ns	20ns
Transition Time (2)	20ns	10ns
Power Handling (CW or peak)	+30 dBm	+33 dBm
Positive Supply	5V ± 2% 140 mA max	
Negative Supply (3)	See Option 100 mA max	
Control Impedance	TTL (1 unit loads max)	
Control Logic (3)	see Options on back	
Video Transients (4)	see Options on back	

## SCHEMATIC



MODEL	CHARACTERISTIC		FREQUENCY (GHz)			
			S	C	X	P
		See Note (5)				
			2.0-4.0	4.0-8.0	8.0-12.4	12.4-18.0
SR60-332	INSERTION LOSS (dB max)	TYP.	0.9	1.4	1.9	2.4
		MAX	1.3	1.8	2.3	2.8
	VSWR (max)		1.40	1.60	1.75	2.0
	ISOLATION (dB min)		60	55	50	50
SR60-333	INSERTION LOSS (dB max)	TYP.	1.1	1.5	2.1	2.7
		MAX	1.5	1.9	2.5	3.1
	VSWR (max)		1.4	1.6	1.75	2.0
	ISOLATION (dB min)		75	70	65	65

- (1) Turn on time is the time interval between 50% of the control voltage and 90% of the detected RF. Turn off time is the time interval between 50% of the control voltage and 10% of the detected RF. Switching Speed is defined as the slower of the two times (usually the turn on time).
- (2) Rise time is the time required for the detected RF to transition between 10% and 90% of its final value. Fall time is the time required for the detected RF to transition between 90% and 10% of its initial value. Transition time is defined as the slower of the two times (usually the Rise time).
- (3) Setting more than one RF port at a time to the loss state causes excessive current in the common arm bias return.
- (4) Measured into a 50 ohms with a 150mHz B.W. oscilloscope. Typically 2V p-p max. unfiltered and 50mV p-p max. with filtering. Filtering will typically add 0.3dB insertion loss per filter in a transmission path.
- (5) Operating frequency range for narrower bandwidth unit(s) is specified by an option code that is composed of two letters. The first letter designates the starting frequency band and the second one designates the ending frequency band. Frequency code is not required for standard unit that covers 2.0 to 18.0 GHz ("SP").





# STANDARD PRODUCTS

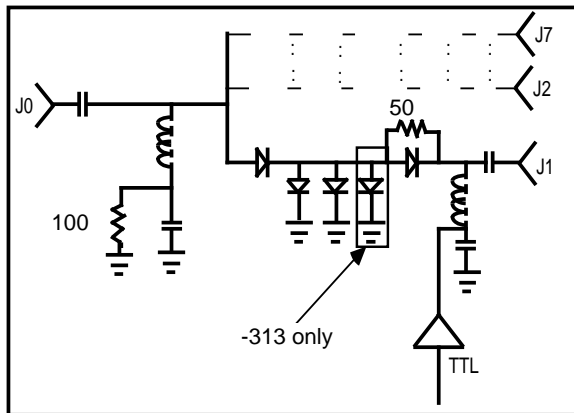
## DESCRIPTION

The SN70-31x series of non-reflective single-pole septuple-throw wide band (0.1-20.0GHz) PIN diode switches employ a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, and offered in medium (-312) and high (-313) isolation models.

## SP7T SWITCH

**SERIES SN70-31x**  
Non-Reflective Series/Shunt  
1 μsec. Switching Speed

## SCHEMATIC



## ELECTRICAL PERFORMANCE

CHARACTERISTIC	WITH DRIVER		WITHOUT DRIVER	
	MAX.	TYP.	MAX.	TYP.
Switching Speed (1)	1.0μs	0.5μs	(2)	(2)
Transition Time (3)	0.5μs	0.1μs	(2)	(2)
Power Handling (CW or peak)	+30 dBm	+33 dBm	+30 dBm	+33 dBm
Positive Supply	5V± 2% 170 mA max		30 mA (Iso.)	15 mA
Negative Supply (4)	-12V to -15V 90 mA max		-50 mA (Loss)	-35 mA
Control Impedance	TTL (1 unit loads max)		N/A	
Control Logic (4)	see Options on back		see Supply requirements	

MODEL	CHARACTERISTIC	See Note (5)	FREQUENCY (GHz)							
			V	U	L	S	C	X	P	K
			0.1-0.5	0.5-1.0	1.0-2.0	2.0-4.0	4.0-8.0	8.0-12.4	12.4-18.0	18.0-20.0
SN70-312	INSERTION LOSS (dB max)	TYP.	1.2	0.9	1.0	1.3	1.9	2.5	3.7	4.9
		MAX.	1.6	1.2	1.4	1.7	2.3	2.9	4.1	5.3
	VSWR (On/Off) (max)		1.7	1.7	1.7	1.7	2.2	2.2	2.4	2.7
	ISOLATION (dB min)		65	60	60	60	55	50	50	45
SN70-313	INSERTION LOSS (dB max)	TYP.	1.4	1.0	1.2	1.5	2.0	2.7	3.9	5.1
		MAX.	1.9	1.4	1.6	1.9	2.4	3.1	4.3	5.5
	VSWR (On/Off) (max)		1.7	1.7	1.7	1.7	2.2	2.2	2.4	2.7
	ISOLATION (dB min)		70	70	75	75	70	65	65	60

- (1) Turn on time is the time interval between 50% of the control voltage and 90% of the detected RF. Turn off time is the time interval between 50% of the control voltage and 10% of the detected RF. Switching Speed is defined as the slower of the two times (usually the turn on time).
- (2) Depends upon driver supplied by the user.
- (3) Rise time is the time required for the detected RF to transition between 10% and 90% of its final value. Fall time is the time required for the detected RF to transition between 90% and 10% of its initial value. Transition time is defined as the slower of the two times (usually the Rise time).
- (4) Setting more than one RF port at a time to the loss state causes excessive current in the common arm bias return.
- (5) Operating frequency range for narrower bandwidth unit(s) is specified by an option code that is composed of two letters. The first letter designates the starting frequency band and the second one designates the ending frequency band. Frequency code is not required for standard unit that covers 0.1 to 20.0 GHz ("VK").



## ENVIRONMENTAL RATINGS

### Temperature:

Operating.....55°C to +85°C  
 Non-operating.....65°C to +125°C

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

### LOGIC:

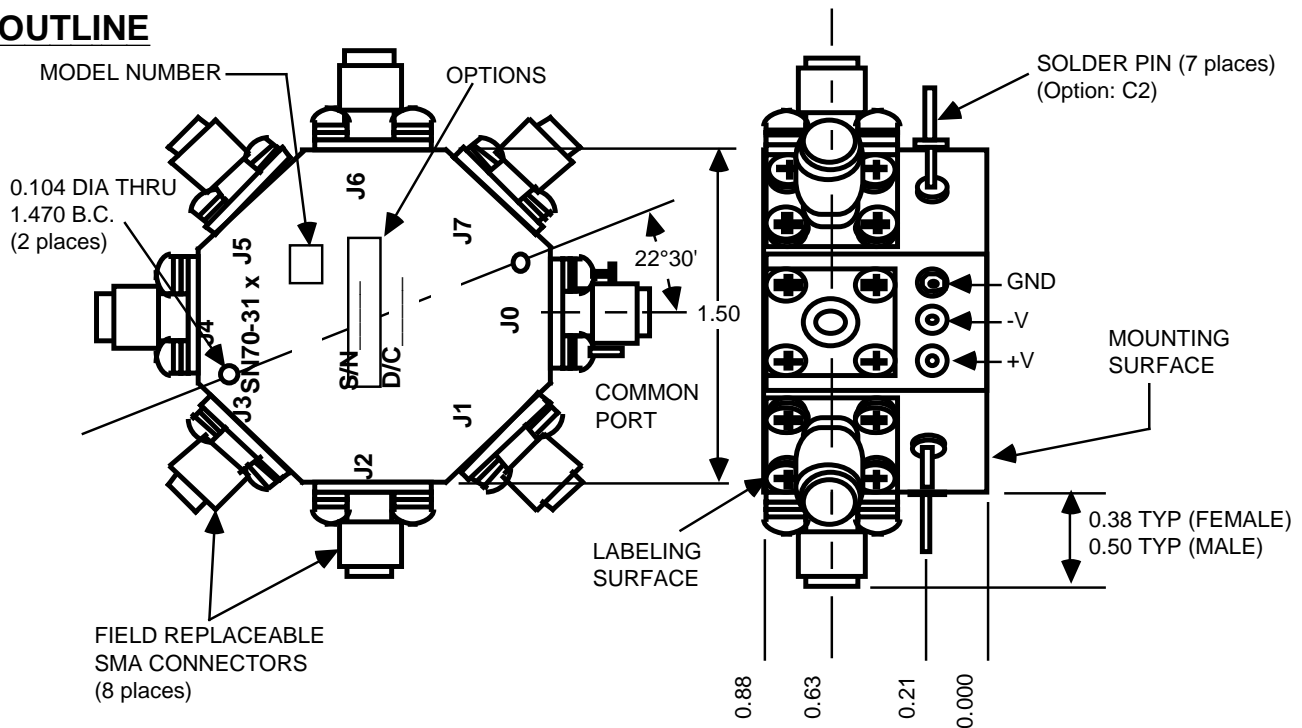
OPTION NUMBER	LOGIC DESCRIPTION	INDIVIDUAL PORT CONTROL		DECODED			
		1	0	E3	E2	E1	PORT CONDITION
(STD) (4)	INVERTING	ISO.	LOSS	X			
L2 (4)	NON INVERTING	LOSS	ISO.				
L3	BINARY DECODED	X		0	0	0	ALL ISO.
				0	0	1	J1=LOSS
				⋮	⋮	⋮	⋮
				1	1	1	J7=LOSS

CONTROL CONNECTOR:  
 (STD).....Solder Pin  
 C2.....SMC-M

FREQUENCY:  
 (STD).....0.1 to 20.0 GHz  
 Two Letter Code, see note 5  
 for detail

DRIVER:  
 (STD).....With Driver  
 D2.....Without driver

## OUTLINE



Custom Microwave Components, Inc.  
 44249 Old Warm Springs Blvd.  
 Fremont, California 94538  
 510-651-3434



# STANDARD PRODUCTS

## DESCRIPTION

The SN70-33x series of non-reflective single-pole septuple-throw (2.0-18.0 GHz) PIN diode switches employ a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, integral TTL compatible drivers, and offered in medium (-332) and high (-333) isolation models. They are also available with video transient filtering.

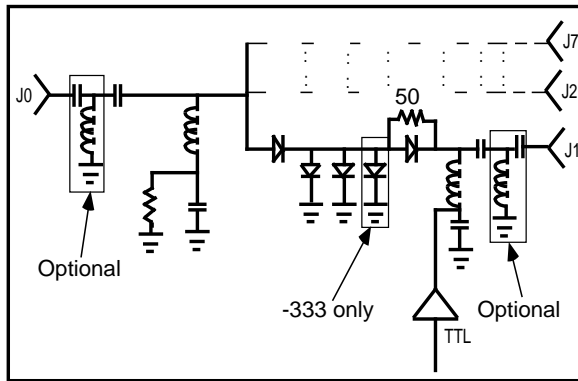
## SP7T SWITCH

### SERIES SN70-33x

Non-Reflective Series/Shunt

25 nsec. Switching Speed

## SCHEMATIC



## ELECTRICAL PERFORMANCE

CHARACTERISTIC	WITH DRIVER	
	MAX.	TYP.
Switching Speed (1)	25ns	20ns
Transition Time (2)	20ns	10ns
Power Handling (CW or peak)	+30 dBm	+33 dBm
Positive Supply	5V ± 2% 210 mA max	
Negative Supply (3)	See Option 140 mA max	
Control Impedance	TTL (1 unit loads max)	
Control Logic (3)	see Options on back	
Video Transients (4)	see Options on back	

MODEL	CHARACTERISTIC		FREQUENCY (GHz)			
			S	C	X	P
		See Note (5)	2.0-4.0	4.0-8.0	8.0-12.4	12.4-18.0
SN70-332	INSERTION LOSS (dB max)	TYP.	1.3	1.9	2.5	3.7
		MAX	1.7	2.3	2.9	4.1
	VSWR {On/Off} (max)		1.7	2.2	2.2	2.4
	ISOLATION (dB min)		60	55	50	50
SN70-333	INSERTION LOSS (dB max)	TYP.	1.5	2.0	2.7	3.9
		MAX	1.9	2.4	3.1	4.3
	VSWR {On/Off} (max)		1.7	2.2	2.2	2.4
	ISOLATION (dB min)		75	70	65	65

- (1) Turn on time is the time interval between 50% of the control voltage and 90% of the detected RF. Turn off time is the time interval between 50% of the control voltage and 10% of the detected RF. Switching Speed is defined as the slower of the two times (usually the turn on time).
- (2) Rise time is the time required for the detected RF to transition between 10% and 90% of its final value. Fall time is the time required for the detected RF to transition between 90% and 10% of its initial value. Transition time is defined as the slower of the two times (usually the Rise time).
- (3) Setting more than one RF port at a time to the loss state causes excessive current in the common arm bias return.
- (4) Measured into a 50 ohms with a 150MHz B.W. oscilloscope. Typically 2V p-p max. unfiltered and 50mV p-p max. with filtering. Filtering will typically add 0.3dB insertion loss per filter in a transmission path.
- (5) Operating frequency range for narrower bandwidth unit(s) is specified by an option code that is composed of two letters. The first letter designates the starting frequency band and the second one designates the ending frequency band. Frequency code is not required for standard unit that covers 2.0 to 18.0 GHz ("SP").



## ENVIRONMENTAL RATINGS

### Temperature:

Operating.....-55°C to +85°C  
 Non-operating.....-65°C to +125°C

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

### LOGIC:

OPTION NUMBER	LOGIC DESCRIPTION	1	0
(STD) (3)	<b>INVERTING</b>	<b>ISO.</b>	<b>LOSS</b>
L2 (3)	NON INVERTING	LOSS	ISO.

### CONTROL CONNECTOR:

(STD).....Solder Pin  
 C2.....SMC-M  
 for detail.

### FREQUENCY:

(STD).....2.0 to 18.0 GHz  
 Two Letter Code, see note 5

### VIDEO TRANSIENT:

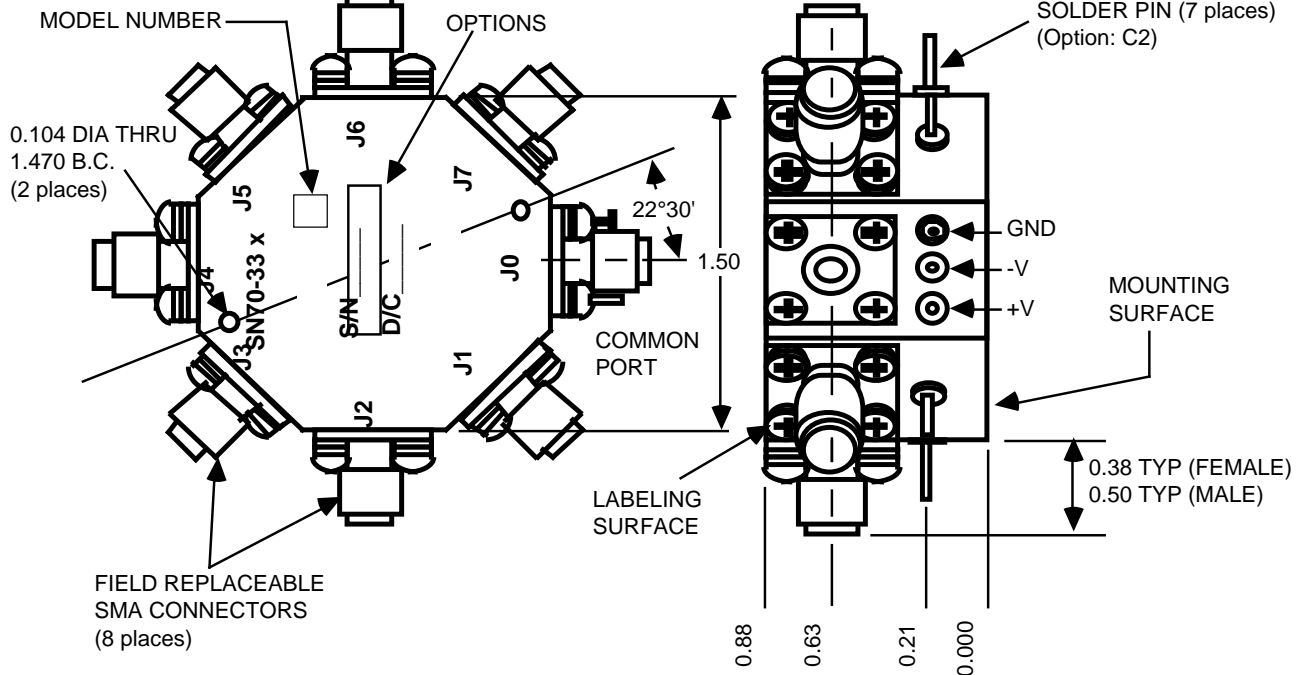
(STD).....None  
 F2.....All Ports  
 F3.....Common Port  
 Only

### NEGATIVE SUPPLY

(STD).....-12V  
 N2.....-15V

F4.....Non-Common Ports  
 Only

## OUTLINE



Custom Microwave Components, Inc.

44249 Old Warm Springs Blvd.

Fremont, California 94538

510-651-3434



# STANDARD PRODUCTS

## DESCRIPTION

The SR70-31x series of single-pole septuple-throw wide band (0.1-20.0GHz) PIN diode switches employ a series/shunt configuration in a microstrip transmission line circuit. They are compact in size, light weight, featured with field replaceable connectors, and offered in medium (-312) and high (-313) isolation models.

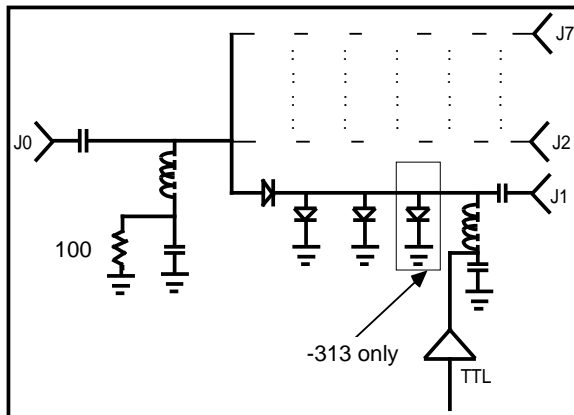
## SP7T SWITCH

**SERIES SR70-31x**

Reflective Series/Shunt

1  $\mu$ sec. Switching Speed

## SCHEMATIC



## ELECTRICAL PERFORMANCE

CHARACTERISTIC	WITH DRIVER		WITHOUT DRIVER	
	MAX.	TYP.	MAX.	TYP.
Switching Speed (1)	1.0 $\mu$ s	0.5 $\mu$ s	(2)	(2)
Transition Time (3)	0.5 $\mu$ s	0.1 $\mu$ s	(2)	(2)
Power Handling (CW or peak)	+30 dBm	+33 dBm	+30 dBm	+33 dBm
Positive Supply	5V $\pm$ 2% 140 mA max		30 mA (Iso.)	10 mA
Negative Supply (4)	-12V to -15V 70 mA max		-30 mA (Loss)	-20 mA
Control Impedance	TTL (1 unit loads max)		N/A	
Control Logic (4)	see Options on back		see Supply requirements	

MODEL	CHARACTERISTIC	See Note (5)	FREQUENCY (GHz)							
			V	U	L	S	C	X	P	K
			0.1-0.5	0.5-1.0	1.0-2.0	2.0-4.0	4.0-8.0	8.0-12.4	12.4-18.0	18.0-20.0
SR70-312	INSERTION LOSS (dB max)	TYP.	0.9	0.6	0.7	1.0	1.5	2.1	3.2	4.4
		MAX.	1.3	0.9	1.1	1.4	1.9	2.5	3.6	4.8
	VSWR (max)		1.40	1.35	1.35	1.40	1.60	1.75	2.0	2.2
	ISOLATION (dB min)		65	60	60	60	55	50	50	45
SR70-313	INSERTION LOSS (dB max)	TYP.	1.1	0.7	0.9	1.2	1.6	2.3	3.4	4.6
		MAX.	1.6	1.1	1.3	1.6	2.0	2.7	3.8	5.0
	VSWR (max)		1.40	1.35	1.35	1.4	1.6	1.75	2.0	2.2
	ISOLATION (dB min)		70	70	75	75	70	65	65	60

- (1) Turn on time is the time interval between 50% of the control voltage and 90% of the detected RF. Turn off time is the time interval between 50% of the control voltage and 10% of the detected RF. Switching Speed is defined as the slower of the two times (usually the turn on time).
- (2) Depends upon driver supplied by the user.
- (3) Rise time is the time required for the detected RF to transition between 10% and 90% of its final value. Fall time is the time required for the detected RF to transition between 90% and 10% of its initial value. Transition time is defined as the slower of the two times (usually the Rise time).
- (4) Setting more than one RF port at a time to the loss state causes excessive current in the common arm bias return.
- (5) Operating frequency range for narrower bandwidth unit(s) is specified by an option code that is composed of two letters. The first letter designates the starting frequency band and the second one designates the ending frequency band. Frequency code is not required for standard unit that covers 0.1 to 20.0 GHz ("VK").



## ENVIRONMENTAL RATINGS

### Temperature:

Operating.....55°C to +85°C  
 Non-operating.....65°C to +125°C

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

### LOGIC:

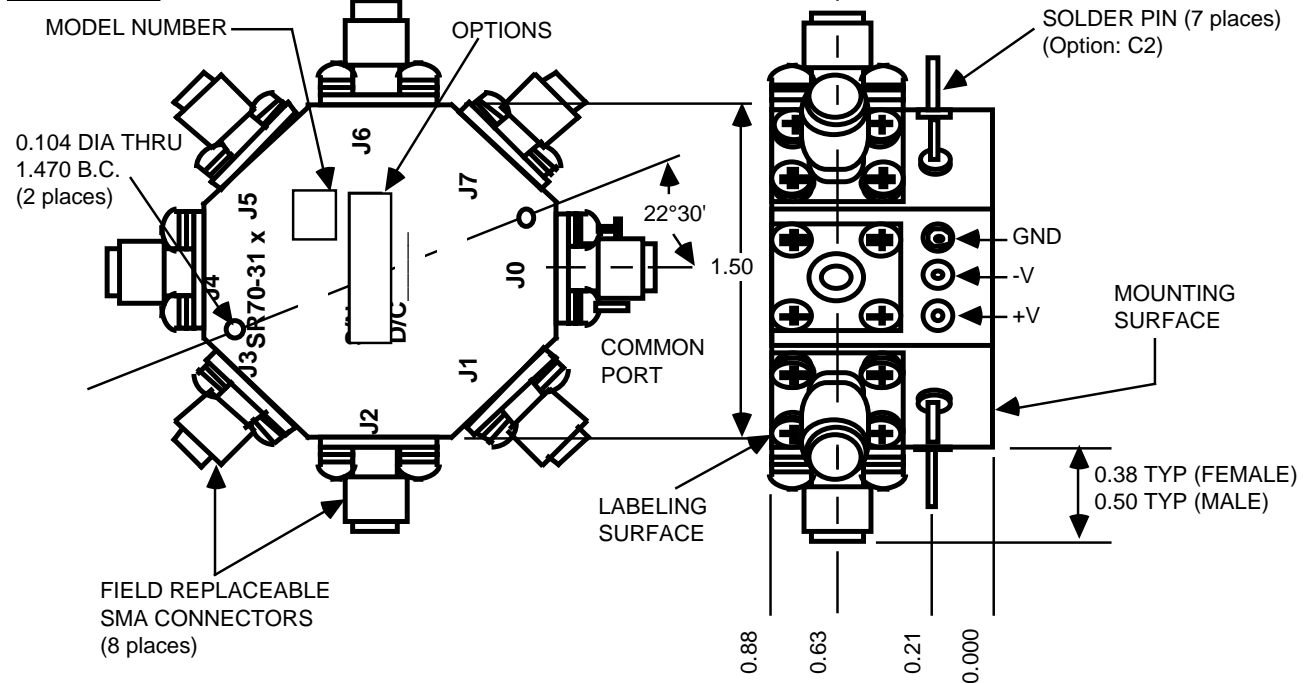
OPTION NUMBER	LOGIC DESCRIPTION	INDIVIDUAL PORT CONTROL		DECODED			
		1	0	E3	E2	E1	PORT CONDITION
(STD) (4)	INVERTING	ISO.	LOSS	X			
L2 (4)	NON INVERTING	LOSS	ISO.				
L3	BINARY DECODED	X		0	0	0	ALL ISO.
				0	0	1	J1=LOSS
				⋮	⋮	⋮	⋮
				1	1	1	J7=LOSS

CONTROL CONNECTOR:  
 (STD).....Solder Pin  
 C2.....SMC-M

FREQUENCY:  
 (STD).....0.1 to 20.0 GHz  
 Two Letter Code, see note 5  
 for detail

DRIVER:  
 (STD).....With Driver  
 D2.....Without driver

## OUTLINE



Custom Microwave Components, Inc.



44249 Old Warm Springs Blvd.  
 Fremont, California 94538  
 510-651-3434

# STANDARD PRODUCTS

## DESCRIPTION

The SR70-33x series of reflective single-pole septuple-throw PIN diode switches employ a series/shunt microstrip transmission line configuration controlled by an integral TTL compatible driver. They are compact in size, light weight, featured with field replaceable connectors, and offered in medium (-332) and high (-333) isolation models. Video transient filtering is optional.

## SP7T SWITCH

**SERIES SR70-33x**

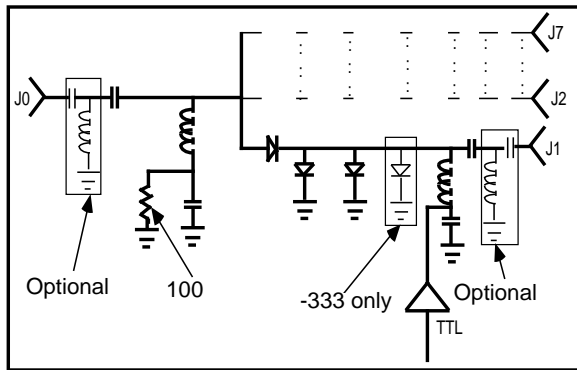
Reflective Series/Shunt

25 nsec. Switching Speed

## ELECTRICAL PERFORMANCE

CHARACTERISTIC	WITH DRIVER	
	MAX.	TYP.
Switching Speed (1)	25ns	20ns
Transition Time (2)	20ns	10ns
Power Handling (CW or peak)	+30 dBm	+33 dBm
Positive Supply	5V ± 2% 180 mA max	
Negative Supply (3)	See Option 120 mA max	
Control Impedance	TTL (1 unit loads max)	
Control Logic (3)	see Options on back	
Video Transients (4)	see Options on back	

## SCHEMATIC



MODEL	CHARACTERISTIC		FREQUENCY (GHz)			
			S	C	X	P
		See Note (5)	S	C	X	P
			2.0-4.0	4.0-8.0	8.0-12.4	12.4-18.0
SR70-332	INSERTION LOSS (dB max)	TYP.	1.0	1.5	2.1	3.2
		MAX	1.4	1.9	2.5	3.6
	VSWR (max)		1.40	1.60	1.75	2.0
	ISOLATION (dB min)		60	55	50	50
SR70-333	INSERTION LOSS (dB max)	TYP.	1.2	1.6	2.3	3.4
		MAX	1.6	2.0	2.7	3.8
	VSWR (max)		1.4	1.6	1.75	2.0
	ISOLATION (dB min)		75	70	65	65

- (1) Turn on time is the time interval between 50% of the control voltage and 90% of the detected RF. Turn off time is the time interval between 50% of the control voltage and 10% of the detected RF. Switching Speed is defined as the slower of the two times (usually the turn on time).
- (2) Rise time is the time required for the detected RF to transition between 10% and 90% of its final value. Fall time is the time required for the detected RF to transition between 90% and 10% of its initial value. Transition time is defined as the slower of the two times (usually the Rise time).
- (3) Setting more than one RF port at a time to the loss state causes excessive current in the common arm bias return.
- (4) Measured into a 50 ohms with a 150mHz B.W. oscilloscope. Typically 2V p-p max. unfiltered and 50mV p-p max. with filtering. Filtering will typically add 0.3dB insertion loss per filter in a transmission path.
- (5) Operating frequency range for narrower bandwidth unit(s) is specified by an option code that is composed of two letters. The first letter designates the starting frequency band and the second one designates the ending frequency band. Frequency code is not required for standard unit that covers 2.0 to 18.0 GHz ("SP").



## ENVIRONMENTAL RATINGS

### Temperature:

Operating.....-55°C to +85°C  
 Non-operating.....-65°C to +125°C

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OPTIONS

### LOGIC:

OPTION NUMBER	LOGIC DESCRIPTION	1	0
(STD) (3)	<b>INVERTING</b>	<b>ISO.</b>	<b>LOSS</b>
L2 (3)	NON INVERTING	LOSS	ISO.

### CONTROL CONNECTOR:

(STD).....Solder Pin  
 C2.....SMC-M

### FREQUENCY:

(STD).....2.0 to 18.0 GHz  
 Two Letter Code, see note 5  
 for detail.

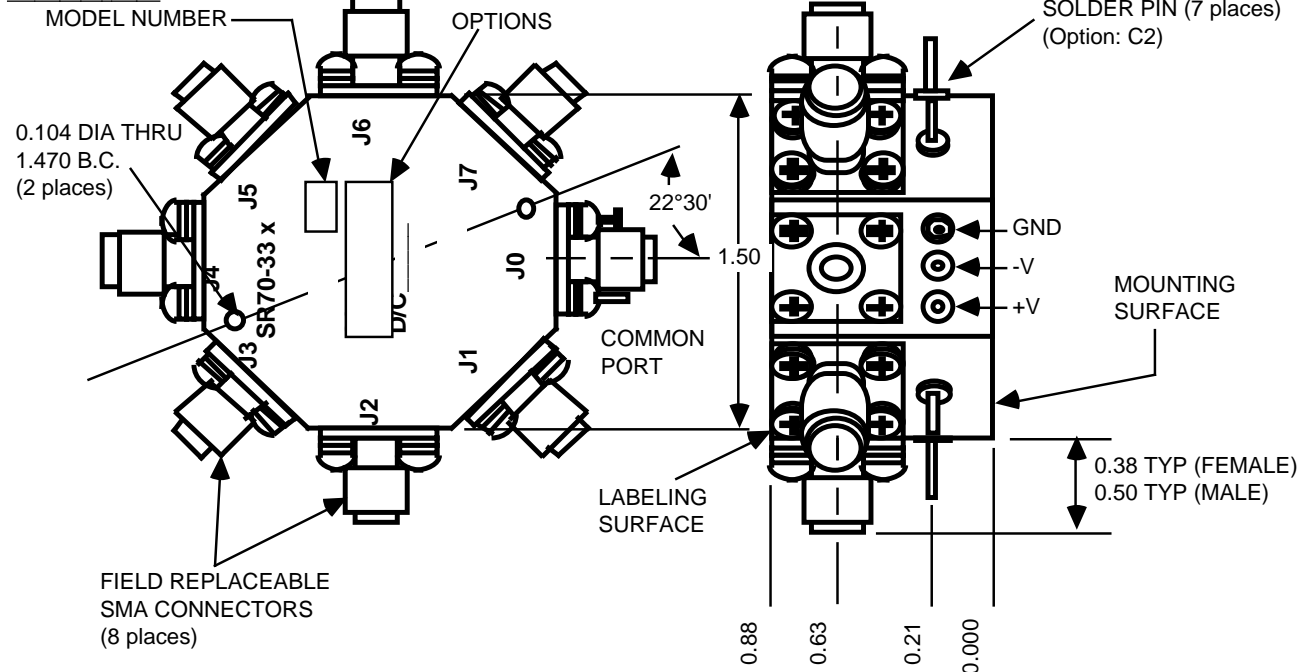
### VIDEO TRANSIENT:

(STD).....None  
 F2.....All Ports  
 F3.....Common Port  
 Only  
 F4.....Non-Common Ports  
 Only

### NEGATIVE SUPPLY

(STD).....-12V  
 N2.....-15V

## OUTLINE



Custom Microwave Components, Inc.



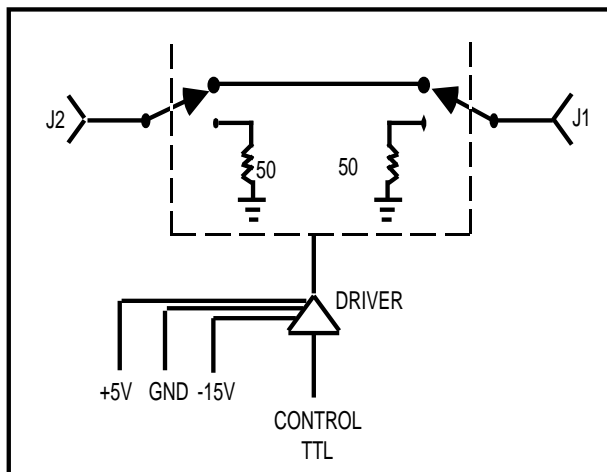
44249 Old Warm Springs Blvd.  
 Fremont, California 94538  
 510-651-3434

## DESCRIPTION

This ultra-fast non-reflective single-pole single-throw switch with integral TTL compatible driver incorporates GaAs MMIC technology to obtain extremely low self-generated R.F. (Video Leakage).

- Wide-band
- High isolation
- Ultra-fast switching
- Low self-generated R.F. (Video Leakage)
- Field replaceable connectors
- Drop-in package

## SCHEMATIC



## HIGH-SPEED GaAs SWITCH CMCS0463

10 nsec. Switching Speed  
-70 dBm Self-generated R.F. (Video Leakage)

## ELECTRICAL PERFORMANCE

CHARACTERISTIC	MAX.	TYP.
Switching Speed (1)	10 ns	8 ns
Transition Time (2)	4 ns	2 ns
Power Handling (CW or peak)	+20 dBm	+22 dBm
Positive Supply	5V ± 2% @ 40 mA max	
Negative Supply	-15V ± 2% @ 35 mA max	
Control Impedance	TTL (2 unit loads max)	
Control Logic	1 = isolation 0 = low loss	
Video Transients (3) (peak to peak)	20 mV	15 mV
Self-Generated R.F. Energy	-70 dBm	-75 dBm

CHARACTERISTIC	FREQUENCY (GHz)		
	0.5-2.0	2.0-4.0	4.0-6.0
INSERTION LOSS (dB max)	2.5	3.0	3.3
VSWR {On} (max)	1.5:1	1.4:1	1.3:1
VSWR {Off} (max)	1.3:1	1.5:1	2.0:1
ISOLATION (dB min)	80	70	60

- (1) Turn on time is the time interval between 50% of the control voltage and 90% of the detected RF. Turn off time is the time interval between 50% of the control voltage and 10% of the detected RF. Switching Speed is defined as the slower of the two times (usually the turn on time).
- (2) Rise time is the time required for the detected RF to transition between 10% and 90% of its final value. Fall time is the time required for the detected RF to transition between 90% and 10% of its initial value. Transition time is defined as the slower of the two times (usually the Rise time).
- (3) Measured into a 50 ohms with a 300MHz B.W. oscilloscope.



## ENVIRONMENTAL RATINGS

### Temperature:

Operating ——— -55°C to +85°C  
 Non-operating — -65°C to +125°C

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

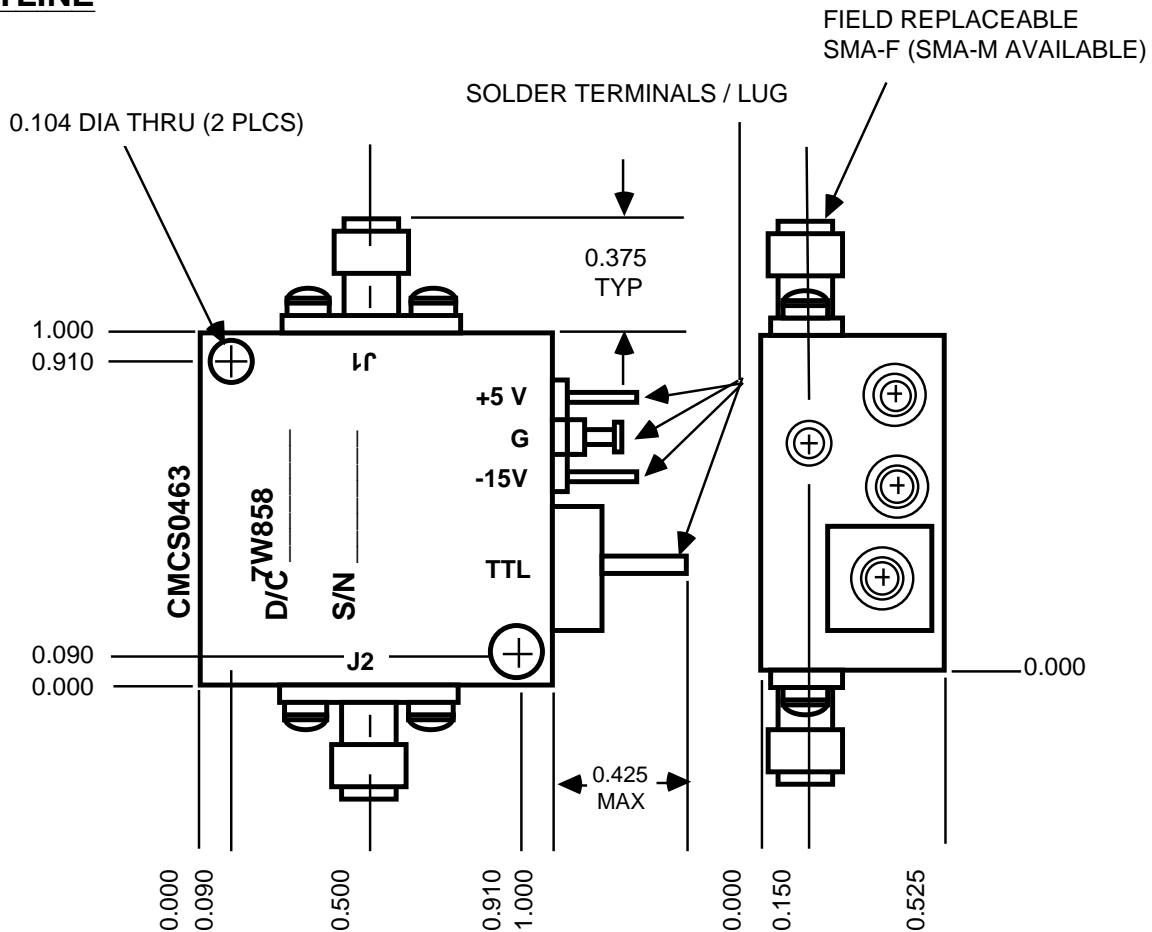
### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OUTLINE



Custom Microwave Components, Inc.  
 44249 Old Warm Springs Blvd.  
 Fremont, California 94538  
 510-651-3434



## DESCRIPTION

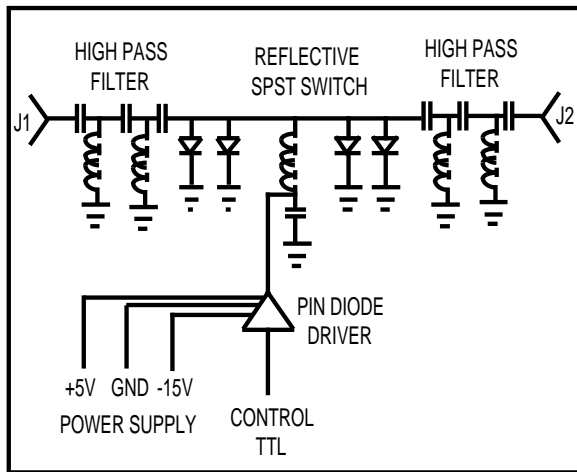
This high-speed, wide-band, high-isolation, medium power, reflective single-pole single-throw PIN diode switch with integral TTL compatible driver incorporates high pass filters at the R.F. ports to suppress video transients.

## HIGH-SPEED SPST SWITCH CMCS0337

12 nsec. Switching Speed with  
Internal Video Transient Filtering

## ELECTRICAL PERFORMANCE

## SCHEMATIC



CHARACTERISTIC	WITH DRIVER	
	MAX.	TYP.
Switching Speed (1)	12ns	8ns
Transition Time (2)	4ns	2ns
Power Handling (CW or peak)	+33 dBm	+36 dBm
Positive Supply	5V±2% 50 mA max	
Negative Supply	-15V±2% -15 mA max	
Control Impedance	TTL (1 unit loads max)	
Control Logic	1 = isolation 0 = low loss	
Video Transients (3)	10 mV	3 mV

CHARACTERISTIC	FREQUENCY (GHz)			
	2.0-4.0	4.0-8.0	8.0-12.4	12.4-18.0
INSERTION LOSS (dB max)	1.5	1.5	1.7	2.2
VSWR {On/Off} (max)	1.7	1.7	1.7	1.9
ISOLATION (dB min)	50	60	60	60

- (1) Turn-On Time is the time interval between 50% of the control voltage and 90% of the detected RF. Turn-Off Time is the time interval between 50% of the control voltage and 10% of the detected RF. Switching Speed is defined as the slower of the two times (usually the Turn-On Time).
- (2) Rise Time is the time required for the detected RF to transition between 10% and 90% of its final value. Fall Time is the time required for the detected RF to transition between 90% and 10% of its initial value. Transition Time is defined as the slower of the two times (usually the Rise Time).
- (3) Measured into a 50 ohms with a 150MHz B.W. oscilloscope.

## ENVIRONMENTAL RATINGS

### Temperature:

Operating ——— -55°C to +85°C  
 Non-operating ——— -65°C to +125°C

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

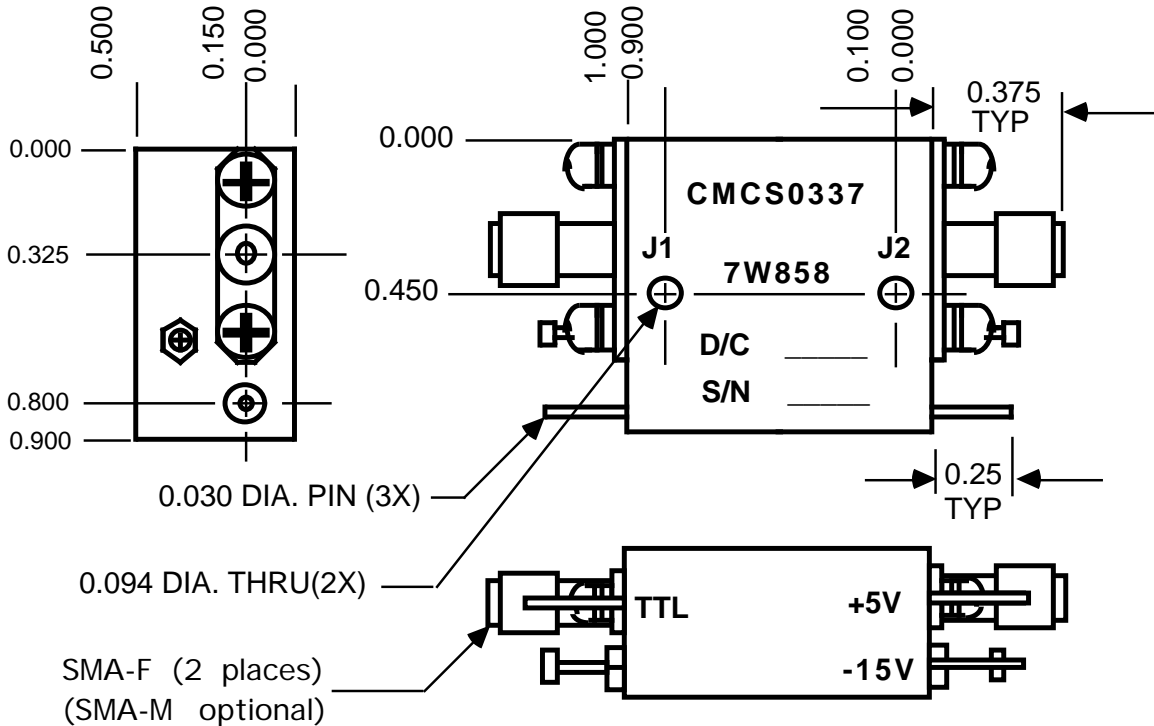
### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OUTLINE



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 Fremont, California 94538  
 510-651-3434



## DESCRIPTION

This single-pole single-throw PIN diode switch operates from a single 5 V supply and includes an integrated TTL compatible driver. It is housed in a microstrip/stripline compatible drop hermetic package that may be screened to the requirements of MIL-STD-883C. This switch may also be supplied in phase and amplitude matched sets where system requirements dictate.

## CMCS0292 SPST SWITCH

1µsec. Switching Speed

## MATCHING CAPABILITY

Amplitude:  $\pm 0.25$  dB <sup>(3)</sup>

Phase:  $\pm 8.0$  degree <sup>(4)</sup>

CHARACTERISTIC	WITH DRIVER	
	MAX.	TYP.
Switching Speed (2)	1µs	0.3ns
Impedance	50 ohm	
Power Handling (CW or peak)	+30 dBm max	
Positive Supply	5V±2% 75 mA max	
Operating RF Input Power	10 dBm max	

Control Logic	RF Path	Switch Characteristic
E1		
1(3)	J1 - J2	Low Loss
0(3)	J2 - J1	Isolation

MODEL	CHARACTERISTIC	FREQUENCY (GHz)	
		6.0-10.0	
SO292	INSERTION LOSS (dB max)	TYP	1.3
		MAX	1.5
	VSWR {On/Off} (max) (1)	2.0	
	ISOLATION (dB min)	40	

- (1) J1 - J2 = low loss state, J1 = isolation state
- (2) Turn on time is the time interval between 50% of the control voltage and 90% of the detected RF. Turn off time is the time interval between 50% of the control voltage and 10% of the detected RF. Switching Speed is defined as the lower of the two times (usually the turn on time).
- (3) "1" is 2.5V to 5.5V, "0" is 0V to 0.8V
- (4) At any 5°C window case temperature

## ENVIRONMENTAL RATINGS

### Temperature:

Operating ——— -55°C to +85°C  
Non-operating ——— -65°C to +125°C

### Altitude:

MIL-STD-202C, Method 105C,  
Cond. B (50,000ft)

### Humidity:

MIL-STD-202C, Method 103B,  
Cond. B (96 hrs. at 95%)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
Cond. D, 5 cycles

### Vibration:

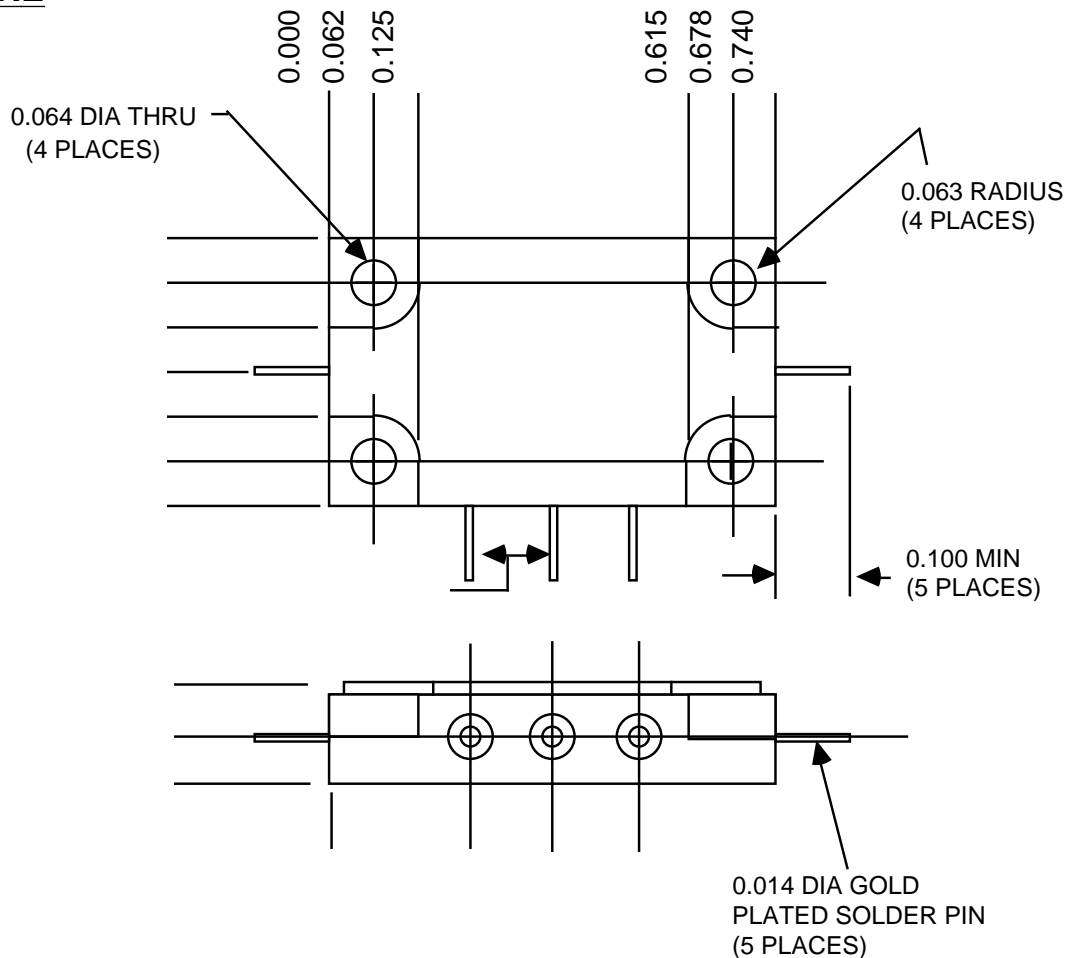
MIL-STD-202C, Method 204A,  
Cond. B (0.06" double amplitude  
or 15G, whichever is less)

### Shock:

MIL-STD-202C, Method 213,  
Cond. B (750G, 6ms)

---

## OUTLINE



Custom Microwave Components, Inc.

44249 Old Warm Springs Blvd.

Fremont, California 94538

510-651-3434



# STANDARD PRODUCTS

## DESCRIPTION

This line of solid state PIN diode matched variable attenuator are manufactured using standard CMC design and assembly techniques which have proven to surpass even the most stringent military requirements. Field replaceable connectors on a drop-in package allow for an easy transition from cabled breadboard to microstrip or stripline sub-system integration.

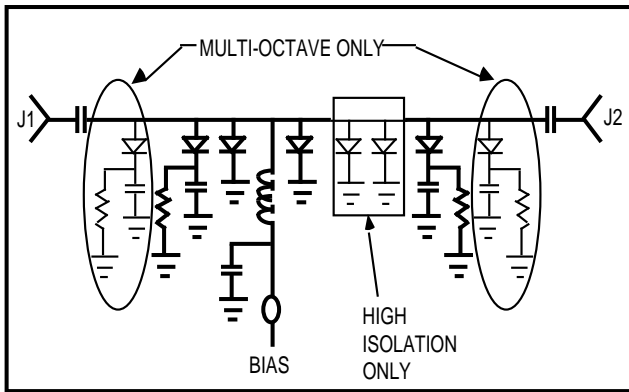
## ATTENUATOR

Matched Variable

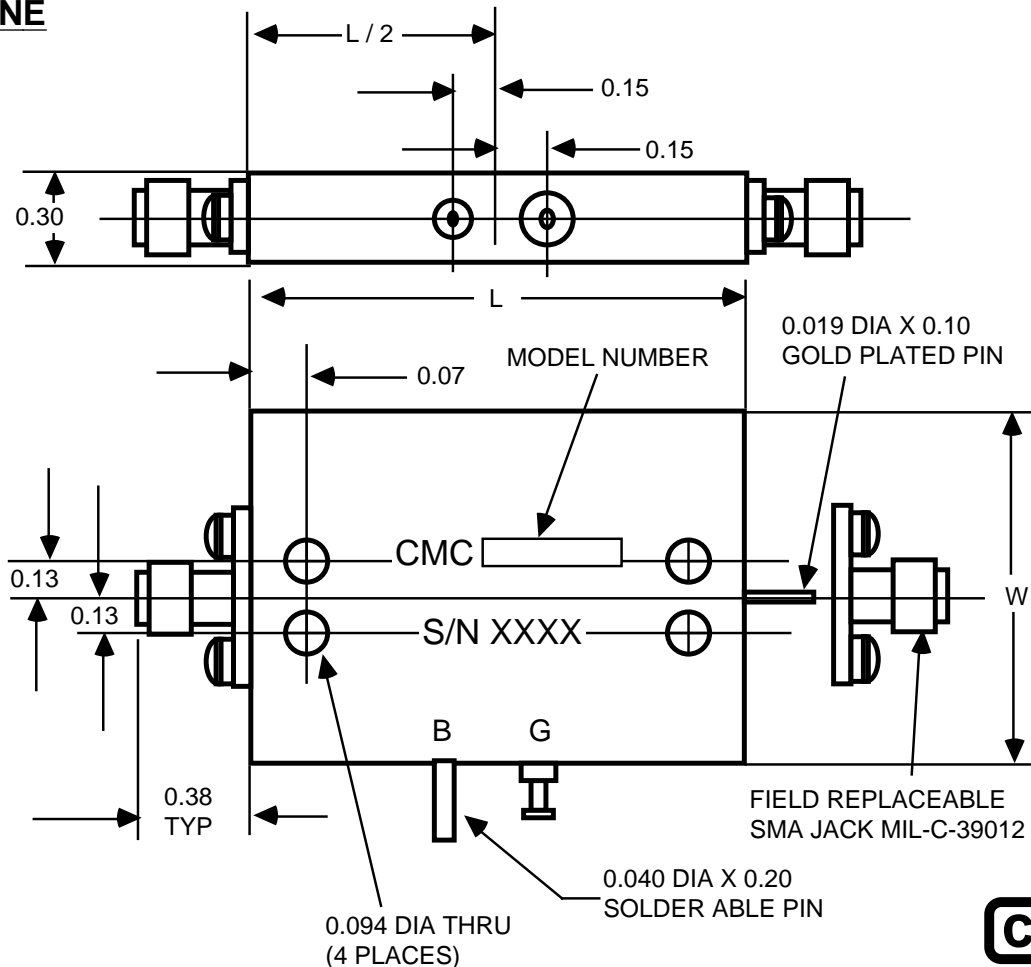
## ENVIRONMENTAL RATINGS

- Temperature:  
 Operating ——— -55°C to +85°C  
 Non-operating — -65°C to +125°C
- Humidity:  
 MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)
- Vibration:  
 MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)
- Altitude:  
 MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)
- Temp Cycling:  
 MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles
- Shock:  
 MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

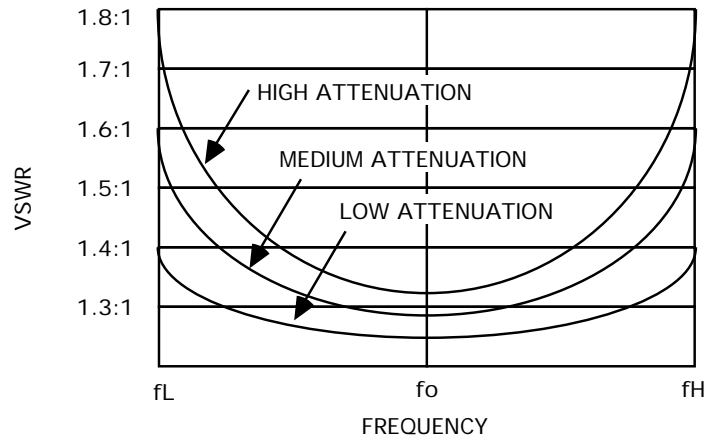
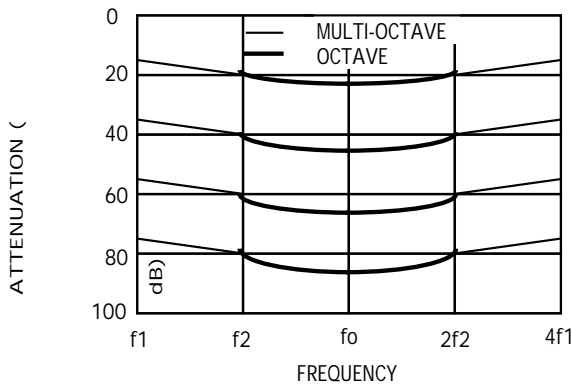
## SCHEMATIC



## OUTLINE



# ELECTRICAL PERFORMANCE



Bandwidth	Frequency Range (dB) GHz	Dynamic Range (dB)	VSWR		Insertion Loss (dB)	Dimensions (in.)		Model Number
			Loss State	Atten State		L	W	
Octave	0.5 - 1.0	30	1.3	1.8	1.3	1.75	1.0	V0019
	1.0 - 2.0	30	1.4	1.8	1.1	1.50	1.0	V0020
	2.0 - 4.0	30	1.5	1.8	1.1	1.25	1.0	V0021
	4.0 - 8.0	30	1.6	1.8	1.3	1.25	0.65	V0022
	8.0 - 12.0	30	1.7	1.6	1.4	1.25	0.65	V0023
	12.0 - 18.0	30	1.8	1.6	1.7	1.00	0.65	V0024
Multi-Octave	0.5 - 2.0	30	1.4	1.8	1.8	2.25	1.0	V0025
	1.0 - 4.0	30	1.6	1.8	1.4	1.50	1.0	V0026
	2.0 - 8.0	30	1.8	1.8	1.8	1.50	0.65	V0027
	5.0 - 18.0	30	2.0	2.0	2.3	1.50	0.65	V0028
Octave	0.5 - 1.0	55	1.3	1.8	1.6	2.25	1.0	V0029
	1.0 - 2.0	55	1.4	1.8	1.4	2.00	1.0	V0030
	2.0 - 4.0	55	1.5	1.8	1.3	1.50	1.0	V0031
	4.0 - 8.0	55	1.6	1.8	1.5	1.50	0.65	V0032
	8.0 - 12.0	55	1.7	1.6	1.6	1.50	0.65	V0033
	12.0 - 18.0	55	1.8	1.6	1.9	1.25	0.65	V0034
Multi-Octave	0.5 - 2.0	50	1.4	1.8	2.0	2.50	1.0	V0035
	1.0 - 4.0	50	1.6	1.8	1.6	1.75	1.0	V0036
	2.0 - 8.0	50	1.8	1.8	2.0	1.75	0.65	V0037
	5.0 - 18.0	50	2.0	2.0	2.5	1.75	0.65	V0038
Octave	0.5 - 1.0	80	1.3	1.8	2.0	3.00	1.0	V0039
	1.0 - 2.0	80	1.4	1.8	1.6	2.50	1.0	V0040
	2.0 - 4.0	80	1.5	1.8	1.5	1.50	1.0	V0041
	4.0 - 8.0	80	1.6	1.8	1.7	1.50	0.65	V0042
	8.0 - 12.0	80	1.7	1.6	1.9	1.50	0.65	V0043
	12.0 - 18.0	80	1.8	1.6	2.2	1.50	0.65	V0044
Multi-Octave	0.5 - 2.0	75	1.4	1.8	2.3	3.00	1.0	V0045
	1.0 - 4.0	75	1.6	1.8	1.8	2.00	1.0	V0046
	2.0 - 8.0	75	1.8	1.8	2.2	2.00	0.65	V0047
	5.0 - 18.0	75	2.0	2.0	2.8	2.00	0.65	V0048

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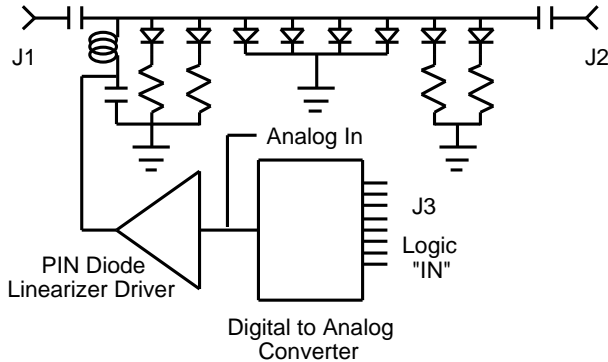
44249 Old Warm Springs Blvd.  
Fremont, California 94538  
510-651-3434

# STANDARD PRODUCTS

## DESCRIPTION

This line of octave band, linearized, temperature compensated, and digitized Digital PIN Diode Attenuators can be tailored to meet specific requirements. Options allow specifying the attenuation as well as the frequency range when ordering.

## SCHEMATIC



## Digital PIN Diode Attenuators SERIES "DPDA-"

## ELECTRICAL SPECIFICATIONS

**Mean Attenuation Ranges:** 30, 32, 60, 64, or as specified up to 80 dB. (see note 1 and "Specifying an Attenuator")

**Attenuation Accuracy (dB):** (see note 2)

0-30 dB.....	±0.5
30-50 dB.....	±1.0
50-60 dB.....	±1.5
60-80 dB.....	±2.0

**Logic Code:** 8-BIT Binary, All Inputs = "0" = Insertion Loss, All Inputs = "1" = Maximum Attenuation, MSB is set at the specified Mean Attenuation Range divided by 2.

**Logic "In" Impedance:** Each control BIT, 1 TTL Load

**Monotonicity:** Guaranteed

**Operating Power:** 10 mW CW or Pk/50 mW CW or Pk (see note 3)

**Survival Power:** 1W Avg., 25 W Pk (1 µsec PW)

**Switching Time:** 10 µsec max/1 µsec max (see note 4)

**Supply Requirements:** +12V ± 5% @ 150 mA max., -12V ± 5% @ 50 mA max. (see "Specifying an Attenuator" for options)

## J3 PIN FUNCTIONS

PIN N°	FUNCTION	PIN N°	FUNCTION
1	GND	9	BIT 5 (MSB/8)
2	ANALOG IN	10	BIT 6 (MSB/4)
3	NOT USED	11	BIT 7 (MSB/2)
4	GND	12	BIT 8 (MSB)
5	BIT 1 (LSB)	13	+V
6	BIT 2 (MSB/64)	14	-V
7	BIT 3 (MSB/32)	15	NOT USED
8	BIT 4 (MSB/16)		

## TYPICAL PERFORMANCE

FREQ CODE	FREQUENCY RANGE (GHZ)	INSERTION LOSS (DB)	VSWR	FLATNESS (DB) IN MEAN ATTENUATION RANGE OF				
				0-10 DB	10-20 DB	20-40 DB	40-60 DB	60-80 DB
005010	0.5-1.0	1.8	1.8	±.3	±.8	±1.7	±2.2	±3.5
010020	1.0-2.0	2.0	1.8	±.3	±.8	±1.7	±2.2	±3.5
020040	2.0-4.0	2.4	1.8	±.3	±.8	±1.5	±2.2	±3.5
040080	4.0-8.0	2.9	1.7	±.3	±.8	±1.5	±2.2	±3.5
080180	8.0-18.0	4.0	1.8	±.7	±1.0	±1.5	±2.2	±3.5

(1) Mean Attenuation Range is specified in part number when ordering (see "Specifying an Attenuator").

(2) As applicable to the mean attenuation range of the specified attenuator. (see \*1)

(3) Maximum operating power is 10 mW CW or peak for all units where the lowest operating frequency is less than 2 GHz and 50 mW CW or peak for all units where the lowest operating frequency is greater than or equal to 2 GHz.

(4) Switching time is 10 µsec for all units where the lowest operating frequency is less than 2 GHz and 1 µsec for all units where the lowest operating frequency is greater than or equal to 2 GHz.

(5) Outline dimensions for a specified attenuator (other than those attenuators listed in the tables) shall be that of the listed attenuator within which is contained the lowest operating frequency of the specified attenuator. For example, a 7.9-8.4 GHz attenuator will have the dimensions of the "040080" frequency code attenuator since 7.9 is between 4.0 and 8.0.

## ENVIRONMENTAL RATINGS

### Temperature:

Operating ——— -55°C to +85°C  
 Non-operating — -65°C to +125°C

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

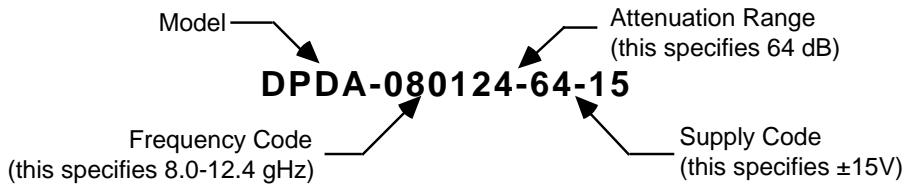
### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## SPECIFYING AN ATTENUATOR

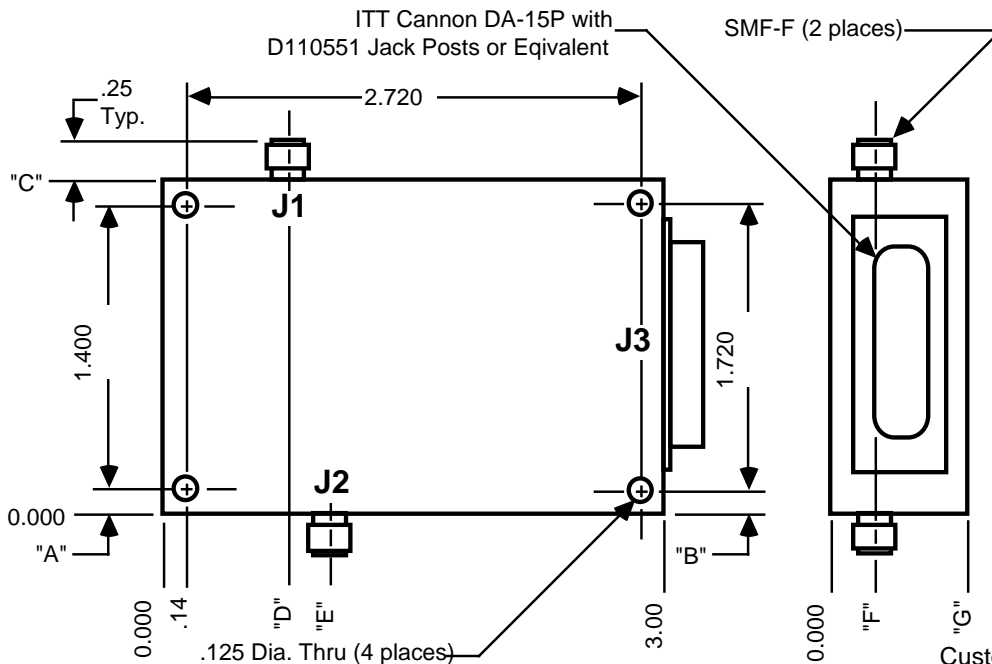


SUPPLY CODES	VOLTAGES
(NONE)	±12V
15	±15V

## OUTLINE

(see \*5 for more details)

FREQ CODE	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"	DIM "F"	DIM "G"
005010	.58	.42	2.56	.56	1.53	.31	.82
010020	.58	.42	2.56	.56	1.53	.29	.82
020040	.30	.14	2.00	.50	1.29	.34	.82
040080	.30	.14	2.00	.75	1.19	.34	.82
080180	.30	.14	2.00	.75	1.00	.27	.80



Custom Microwave Components, Inc.  
 44249 Old Warm Springs Blvd.  
 Fremont, California 94538  
 510-651-3434



## Description

Mechanically adjustable attenuators, as unexciting as they may appear, have the unsung reputation of being a "work horse" microwave component. They are, however, unsurpassed in applications requiring an inexpensive field-adjustable narrow to medium-bandwidth attenuator.

## Features

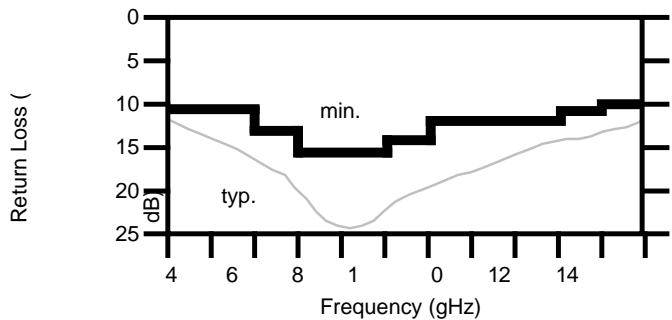
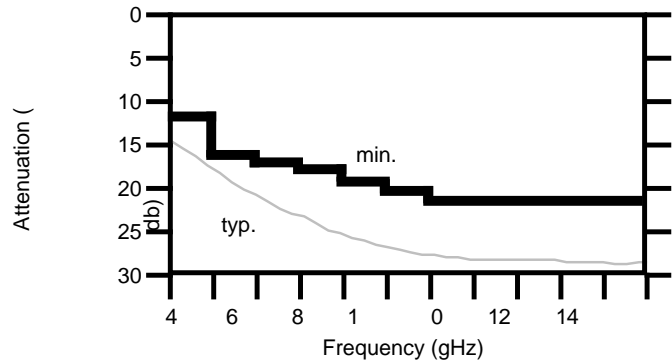
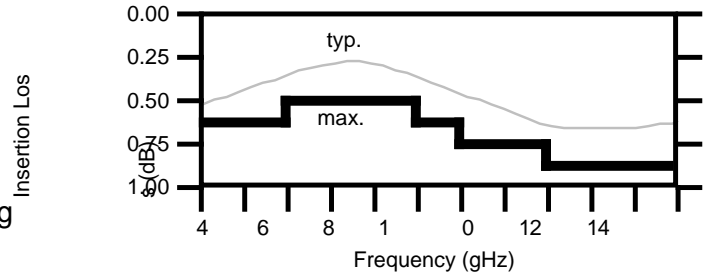
- 1) Broadband (up to 4 to 15 GHz)
- 2) Continuously variable attenuation providing fine tuning control.
- 3) Thermally stable attenuation.
- 4) Reliable and repeatable operation.
- 5) Extremely low EMI/RFI emittance and susceptance.
- 6) All stainless steel fittings, hardware, and connectors providing superior tolerance to harsh environments.

## Miscellaneous Characteristics

R.F. Power Handling: 36 dBm  
 Characteristic Impedance: 50  
 Attenuation Stability: 0.2 dB  
 EM Radiation: <-60 dBc  
 EM Susceptibility: <-60 dBc  
 Size: (see outline on back of this sheet)  
 Finish: Black epoxy paint with white epoxy ink labeling.

# Mechanically Adjustable Attenuator CMCV0590

## Typical R.F. Performance



## Tabulated Electrical Performance

Frequency (GHz)		4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15
Insertion Loss (dB)	typ.	0.5	0.5	0.4	0.4	0.4	0.5	0.6	0.6	0.7	0.7	0.7
	max.	0.6	0.6	0.5	0.5	0.5	0.6	0.7	0.7	0.8	0.8	0.8
Attenuation Range (dB)	typ.	14	19	22	23	25	26	27	27	27	27	27
	min.	12	16	17	18	19	20	21	21	21	21	21
VSWR	max.	1.85:1	1.85:1	1.60:1	1.40:1	1.40:1	1.50:1	1.70:1	1.70:1	1.70:1	1.80:1	1.90:1



# Environmental Ratings

**Temperature:**

Operating \_\_\_\_\_ -0.0°C to +85°C  
 Non-Operating \_\_\_\_\_ -55°C to +85°C

**Humidity:**

MIL- STD-202, Method 203,  
 Condition B (96 hours at 95%)

**Vibration:**

MIL-STD-167 (1 hour per resonance)  
 Sinusoidal - 0.1 g's 25-2000 Hz  
 Random - 6 g's 20-2000 Hz

**Shock:**

MIL-S-901, Grade A, Class I  
 or II as appropriate

**Altitude:**

MIL-STD-202, Method 105C,  
 Condition B (50,000 ft.)

**Thermal Cycling:**

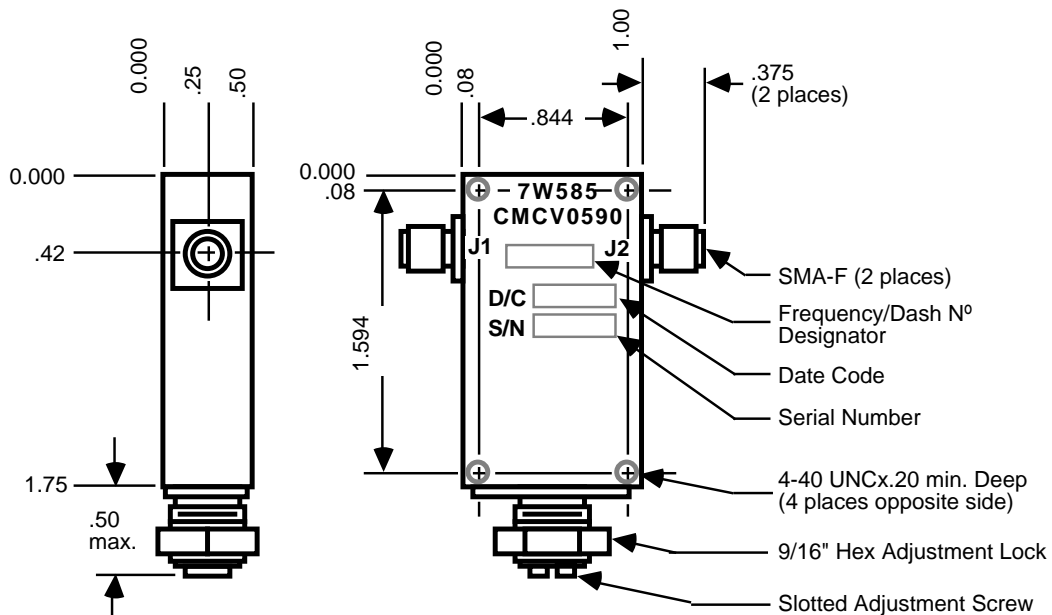
MIL-STD-202C, Method 213,  
 Condition B (5 cycles)

# Specifying An Attenuator



Note: This particular Freq/Dash N° specifies a 4.8 to 11.3 GHz attenuator.

# Outline Drawing



**Custom Microwave Components, Inc.**

5640 Stewart Avenue  
 Fremont, California 94538  
 Tel (510) 651-3434 Fax (510)653-1054

REL V0590-1192

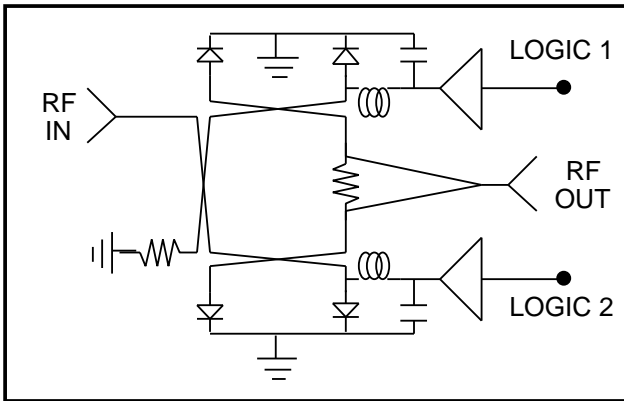
# STANDARD PRODUCTS

## DESCRIPTION

This line of inexpensive quadrature modulators find use in narrow-band (less than 10 percent) applications. Several options exist to allow tailoring and specifying devices to meet particular requirements.

## QUADRAPHASE MODULATOR SERIES "NQPM-"

## SCHEMATIC



## ELECTRICAL SPECIFICATIONS

**Frequency Range:** Any specified frequency between 1 and 20 GHz over a maximum of a 10% bandwidth. (see note 1)

**Relative Phase States:** 0, 90, 180, and 270

**Phase State Accuracy:**  $\pm \{5^\circ + X^\circ\}$  (where  $X^\circ$  is defined in note 2)

**Resulting Amplitude Modulation:**  $\pm 1$  dB max.

**Logic Impedance:** TTL, ECL (see note 1)

**Switching Speed:** 25 nS max. (see note 3)

**Transition Time:** 5 nS max. (see note 4)

**Repetition Rate:** 10 MHz max. (see note 5)

**Video Transients:** (see notes 1 and 6)

**Operating Power:** +20 dBm CW or Peak

**Survival Power:** +27 dBm CW or Peak

**Spurious Harmonics:** -30 dBc

**Supply Requirements:** +V  $\pm 5\%$  @ 50 mA max., -V  $\pm 5\%$  @ 50 mA max. (see note 1)

## R.F. PERFORMANCE

FREQUENCY RANGE (GHZ)	INSERTION LOSS (DB) (7)	VSWR (8)
1.0-2.0	7.0	1.50
2.0-4.0	7.2	1.65
4.0-8.0	7.5	1.75
8.0-12.0	8.0	1.85
12.0-18.0	8.5	2.00
18.0-20.0	9.0	2.20

(1) Specified by options designated in part number.

(2) The factor, "X°", is defined as the bandwidth (%) times the frequency (GHz) divided by 10. For example: A 5% BW unit centered at 10 GHz would have an "X°" of 10° or a total "Phase State Accuracy" of  $\pm 10^\circ$ .

(3) "Switching Speed" is defined as the time between the 50% point of the control voltage and where the detected phase has reached 90% of its final value.

(4) "Transition Time" is defined as the time between the 10% and the 90% points of the detected phase.

(5) Exceeding specified modulation rate may result in excessive driver dissipation and can cause device failure.

(6) Measured into a 50 ohms with a 150MHz B.W. oscilloscope. Typically 2V p-p max. unfiltered and 50mV p-p max. with filtering. Filtering will typically add 0.3dB insertion loss per filter in a transmission path.

(7) Insertion Loss may be improved over that specified for either very narrow band units or for units operating near the low end of each frequency band listed.

(8) VSWR may be improved over that specified for either very narrow band units or for units operating near the low end of each frequency band listed.

## ENVIRONMENTAL RATINGS

### Temperature:

Operating ——— -55°C to +85°C  
 Non-operating — -65°C to +125°C

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

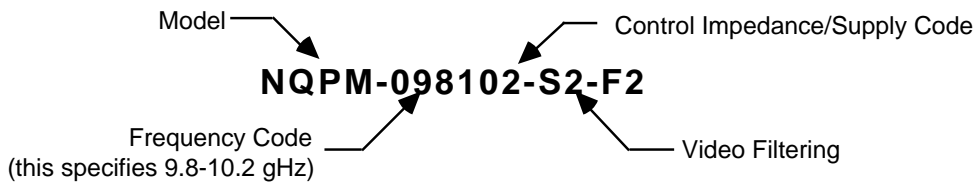
### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

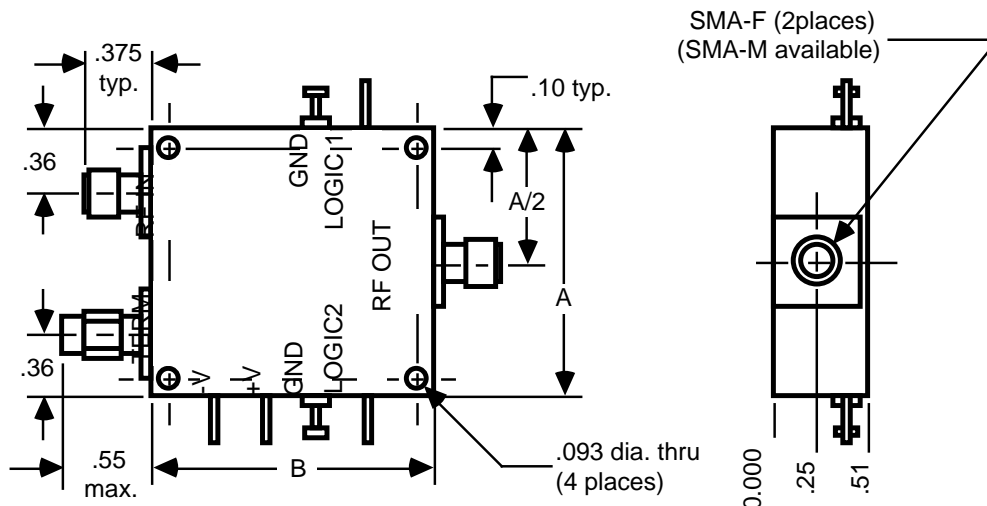
## SPECIFYING A QUADRAPHASE MODULATOR



CONTROL IMPEDANCE	SUPPLIES R'QD	CODE
ECL	+5V, -5.2V	S1
TTL	+5V, -5V	S2
	+5V, -12V	S3
	+5V, -15V	S4

PORTS WITH VIDEO FILTERS	CODE
(NONE)	(STD)
RF IN	F2
RF OUT	F3
RF IN & OUT	F4

## OUTLINE



FREQUENCY (GHZ)	DIM. "A"	DIM. "B"
1.0-2.0	2.50	2.58
2.0-4.0	2.00	2.08
4.0-8.0	1.50	1.58
8.0-20.0	1.25	1.33

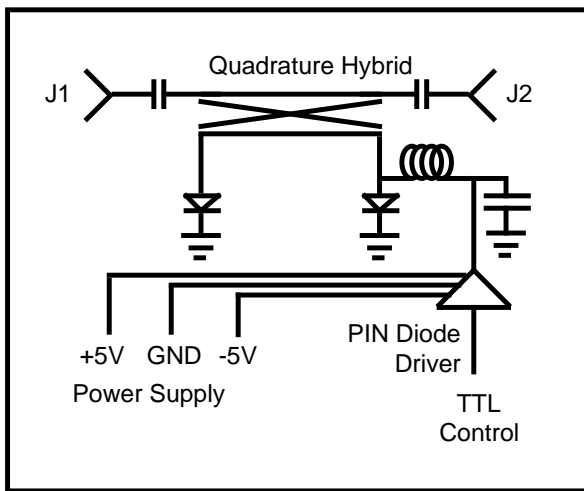


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 Fremont, California 94538  
 510-651-3434

## DESCRIPTION

This high-speed, high repetition rate, wide-band, 180° PIN diode phase shifter/modulator utilizes MIC hybrid technology to yield a small, high-performance, and ruggedized unit featuring field-replaceable connectors. Diodes are selected to minimize the insertion loss variation as a function of phase state.

## SCHEMATIC



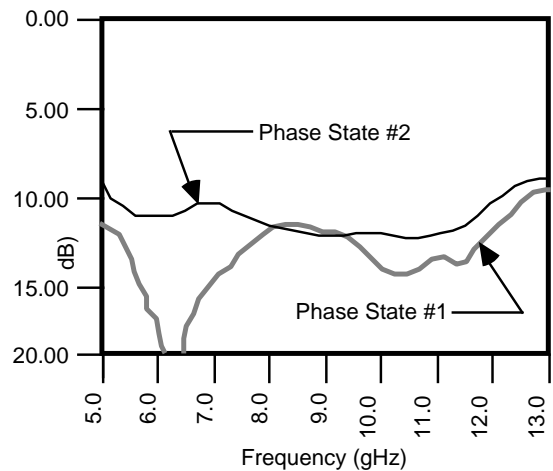
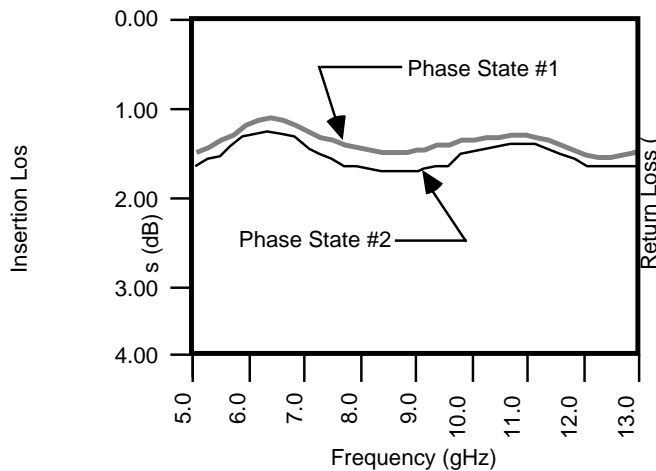
## 180° Phase Shifter CMCF0617

10 mHz Modulation Rate,  $\pm 0.25$  dB Insertion Loss Variation

## ELECTRICAL SPECIFICATIONS

CHARACTERISTIC	MAX.	TYP.
Frequency (GHz)	6.5-12.4	5.5-13.0
Insertion Loss (dB)	2.3	1.8
Insertion Loss Variation (dB)	$\pm 0.25$	$\pm 0.10$
VSWR	2.0:1	1.8:1
Phase Shift ( $180^\circ \pm \_\_^\circ$ )	$\pm 20^\circ$	$\pm 15^\circ$
Switching Speed (1)	40ns	25ns
Repetition Rate (2)	10 mHz	12 mHz
Power Handling (CW or peak)	+27 dBm	+30 dBm
Positive Supply	5V $\pm 2\%$ 50 mA max	
Negative Supply	-5V $\pm 2\%$ -20 mA max	
Control Impedance	TTL (1 unit loads max)	

## TYPICAL PERFORMANCE



- (1) Turn-On Time is the time interval between 50% of the control voltage and 90% of the detected RF. Turn-Off Time is the time interval between 50% of the control voltage and 10% of the detected RF. Switching Speed is defined as the slower of the two times (usually the Turn-On Time).
- (2) Exceeding the maximum Repetition Rate may result in excessive power dissipation in the PIN Diode Driver and can cause unit failure.

## ENVIRONMENTAL RATINGS

### Temperature:

Operating ——— -55°C to +85°C  
 Non-operating ——— -65°C to +125°C

### Altitude:

MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

### Humidity:

MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

### Temp Cycling:

MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

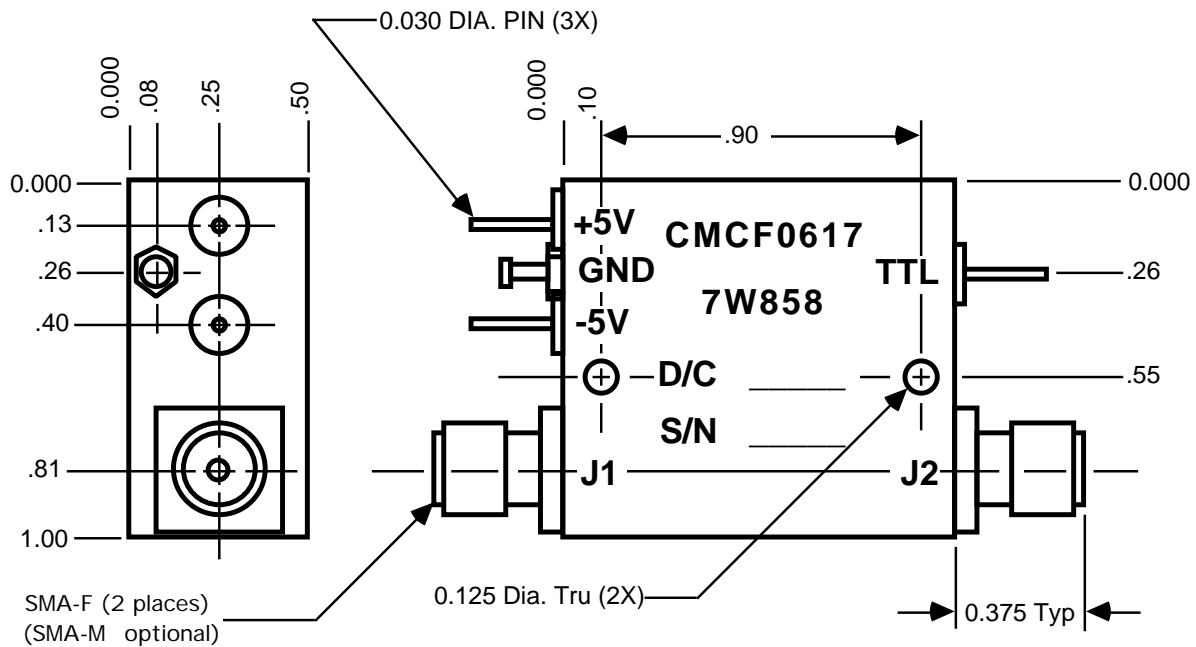
### Vibration:

MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

### Shock:

MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OUTLINE



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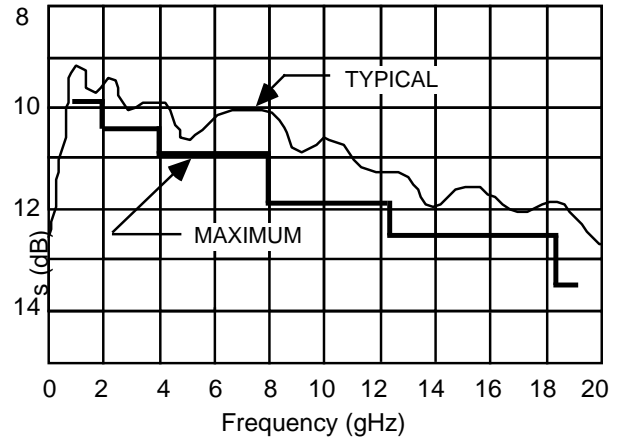


## DESCRIPTION

Model CMCP0321 is a 8-way Wilkinson power splitter/combiner that features low loss, high isolation, and excellent port to port amplitude balance over a broad range of frequencies. Microstrip design and construction allows the production of a small, repeatable, and light weight unit. All R.F. connectors are of the field replaceable type and can be substituted with male connectors or removed to yield a drop-in package with glass to metal seals at the R.F. ports.

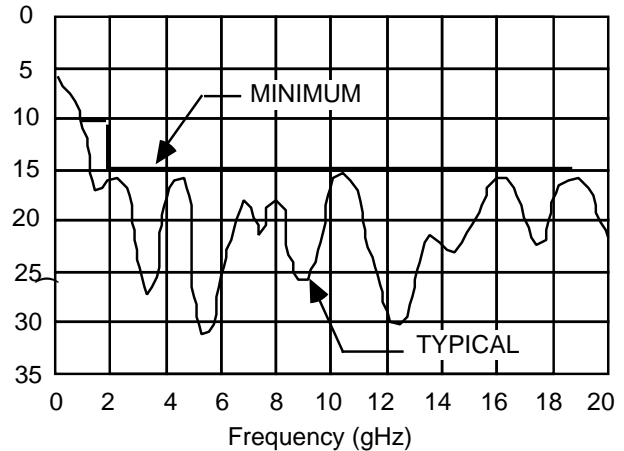
**CMCP0321**  
8-Way Power Divider

## ELECTRICAL PERFORMANCE



### Power Handling Capability

1 Watt max (2.0:1 VSWR terminations)

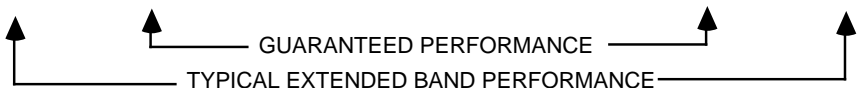


## MECHANICAL

Finish.....Standard: nickel plate  
Optional: epoxy paint

Weight.....220 grams

		FREQUENCY (GHz)					
		1.0-2.0	2.0-4.0	4.0-8.0	8.0-12.4	12.4-18.0	18.0-18.6
INSERTION LOSS (dB) (above 9dB split)	TYP.	0.7	1.1	1.6	2.6	3.2	3.8
	MAX.	0.9	1.4	1.9	2.9	3.5	4.5
VSWR (max)	OUTPUT	1.35	1.55	1.90	1.90	2.00	2.10
	INPUT	1.95	1.95	1.95	1.80	1.80	1.80
ISOLATION (dB min)		8.5	15	15	15	15	15
AMPLITUDE BALANCE (±dB)		0.2	0.3	0.5	0.5	1.0	1.2



## ENVIRONMENTAL RATINGS

Temperature:  
 Operating----- -55°C to +85°C  
 Non-operating----- -65°C to +125°C

Altitude:  
 MIL-STD-202C, Method 105C,  
 Cond. B (50,000ft)

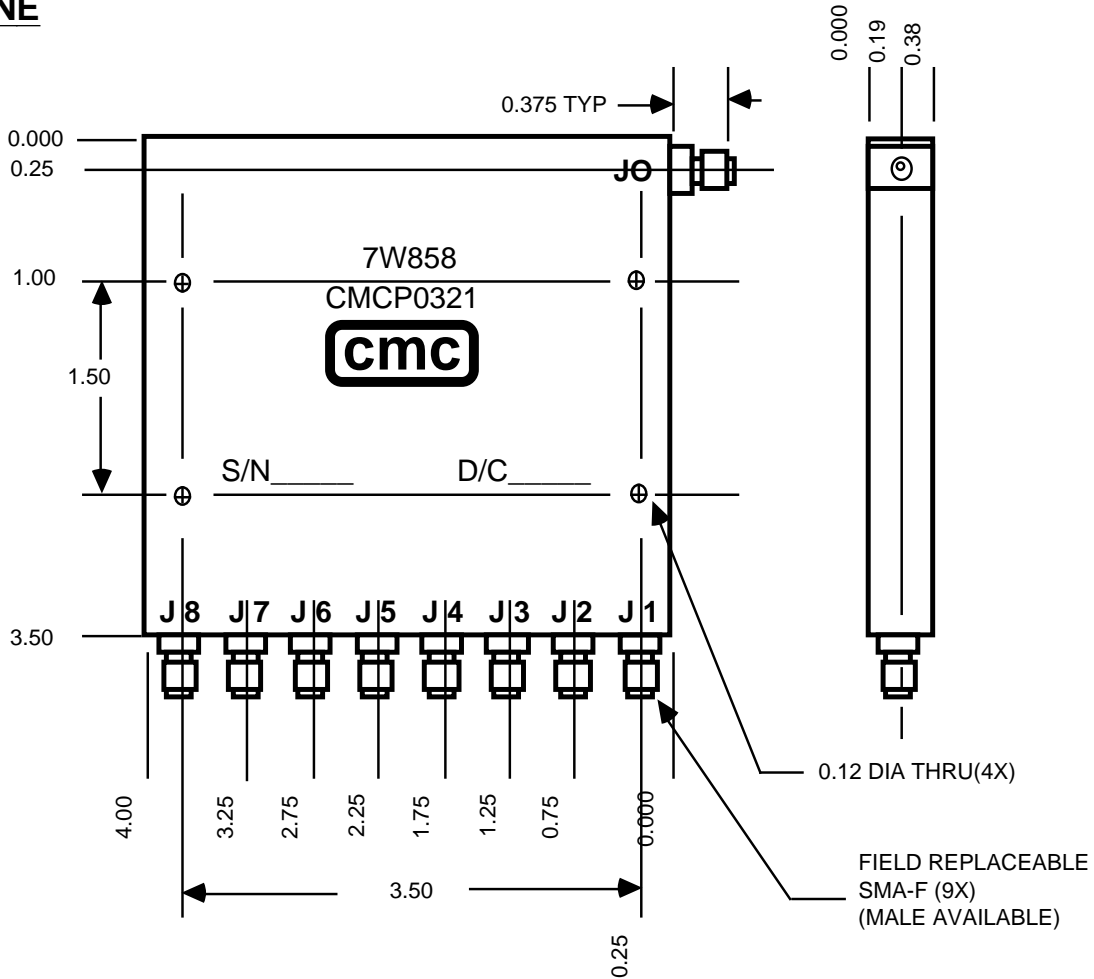
Humidity:  
 MIL-STD-202C, Method 103B,  
 Cond. B (96 hrs. at 95%)

Temp Cycling:  
 MIL-STD-202C, Method 105C,  
 Cond. D, 5 cycles

Vibration:  
 MIL-STD-202C, Method 204A,  
 Cond. B (0.06" double amplitude  
 or 15G, whichever is less)

Shock:  
 MIL-STD-202C, Method 213,  
 Cond. B (750G, 6ms)

## OUTLINE



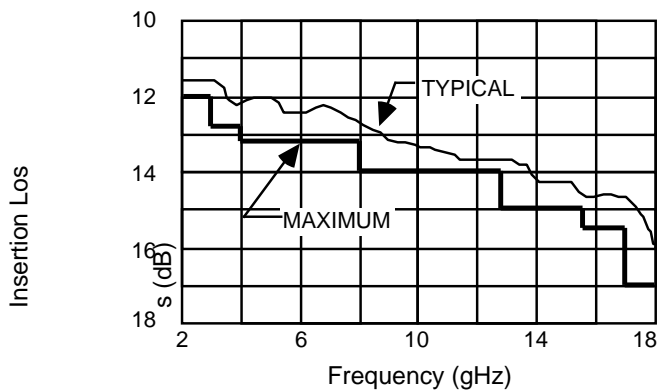
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# CMCI0230

## POWER DIVIDER/SWITCH MATRIX

Model CMCI0230 is a wide band (2 to 18 GHz) eight by eight power divider/switch matrix. It consists of a series of eight 8-way power dividers connected perpendicularly to a series of eight non-reflective single-pole eight-throw switches. This results in a "blocking" switch matrix where any of eight signals present at the eight input ports can be directed to any combination of eight output ports. Each output port, however, can be accessed by only a single input at any one time. Some of the CMCI0230's salient features are its extreme small size and modular construction made possible by a unique flush-mount press-fit R.F. in-terconnect system. System integration is simplified since all of the power supply and control interfaces are located on a single multi-pin connector.



INSERTION LOSS (dB)	FREQUENCY (GHz)						
	2.0-3.0	3.0-4.0	4.0-8.0	8.0-12.4	12.4-15.5	15.5-17.0	17.0-18.0
MAX.	12.0	12.8	13.2	14.0	15.0	15.5	17.0
TYP.	11.5	12.0	12.5	13.5	14.5	15.0	16.0

## ELECTRICAL PERFORMANCE

RF Frequency Range..... 2.0 - 18.0 GHz

VSWR (input)..... 2.0:1 max.  
1.9:1 typ.

VSWR (output)..... 2.5:1 max.  
2.0:1 typ.

Isolation..... 15 dB min.  
(power dividers) 16 dB typ.

Isolation..... 60 dB min.  
(switches) 65 dB typ.

## CONTROL CHARACTERISTICS

Impedance..... TTL

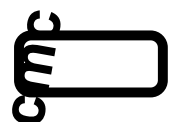
Logic..... each switch is  
three bit decoded  
with a fourth control  
for disabling all  
switch arms

Switching Speed..... 2  $\mu$ sec max.  
0.3  $\mu$ sec typ.

## POWER SUPPLY RQMNTS

+5 VDC, 1.2 A max., 1.0 A typ.

-15 VDC, 0.6 A max., 0.5 A typ.



**MECHANICAL**

Dimension..... per OUTLINE  
drawing on page 3

**CONNECTORS:**

RF Input/Output.... field replaceable  
SMA-F (SMA-M is  
also available)

Control/Power..... Type "D" 37 pin socket  
(CANNON MDM-37S  
with jackposts)

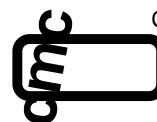
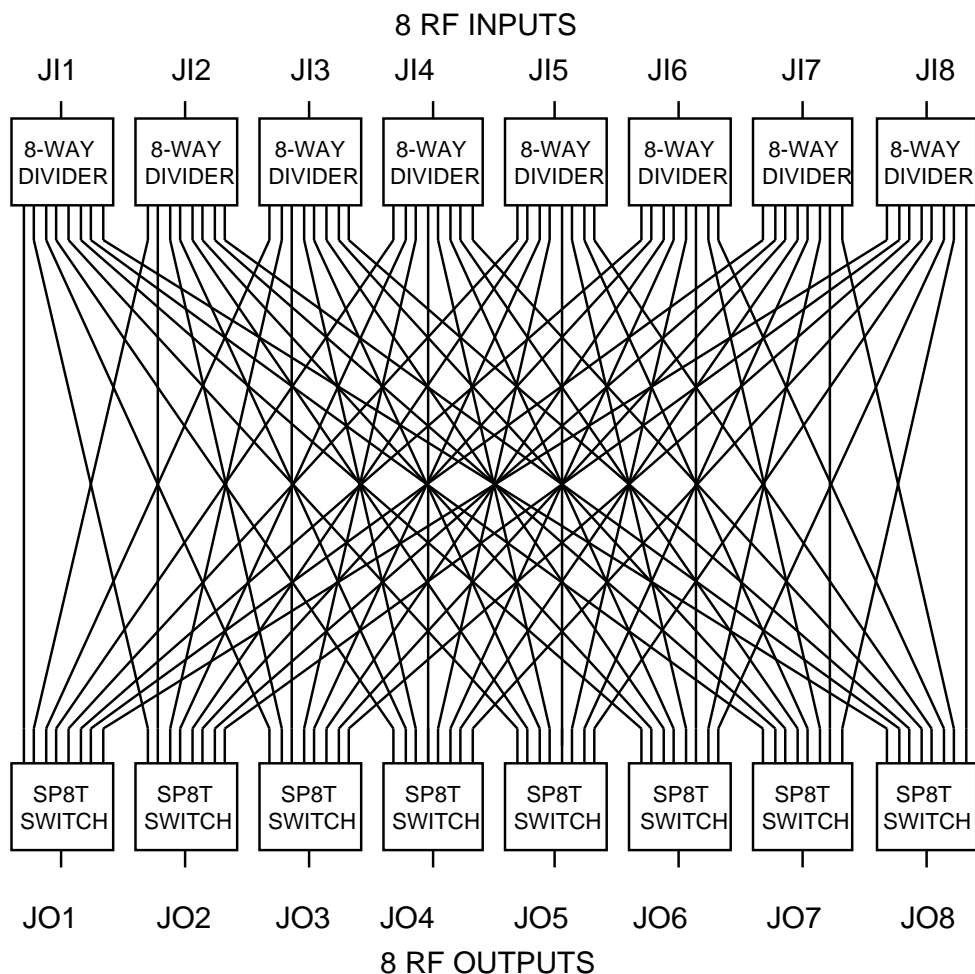
**ENVIRONMENTAL RATINGS**

Operating Temp..... 0 °C to +65°C

Storage Temp..... -20°C to +71 °C

Humidity..... 95% relative  
humidity

Burn-in..... each unit is  
subjected to a  
100 hours burn-  
in test at +50°C

**SCHEMATIC**

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**OUTLINE**