

**SP4T High Isolation PIN Diode Switch DC to 20 GHz,
 38 dB, 24 dBm, 3.8 dB Loss and SMA**

The FMSW5006 is a Single Pole Four Throw (SP4T) Absorptive Switch that covers a wide frequency band from DC to 20 GHz. This general purpose design utilizes GaAs MESFET MMIC technology that has extremely fast switching speed levels of 17 nsec. Additional typical performance includes 42 dB Isolation up to 12 GHz, and 2.7 dB Insertion Loss at 6 GHz.

The design also incorporates CMOS driver circuitry that allows a single +5V biased voltage at very low DC current levels. The drop-in package is hermetically sealed with field replaceable SMA connectors. Operating temperature range is -55°C to +85°C. And for added confidence, this rugged package assembly is designed to meet MIL-STD-883 test conditions for Hermeticity and Temperature Cycle.

This High Isolation PIN Diode Switch is part of Fairview Microwave's expanding line of PIN Diode Switch offerings. These parts offer high isolation performance in a very wide Frequency Range coverage and outstanding electrical performance in the band.



Features:

- SP4T Absorptive Switch Design
- GaAs MESFET MMIC Technology
- Ultra Fast Switching Speed 17 nsec typical
- High Isolation 42 dB typical up to 12 GHz
- Low Insertion Loss 2.7 dB typical at 6 GHz
- CMOS Driver Circuit
- Hermetically Sealed Module
- Field Replaceable SMA Connectors
- -55°C to +85°C Operating Temperature
- Designed to meet MIL-STD-883 Conditions

Applications:

- Electronic Warfare
- Electronic Countermeasures
- Microwave Radio
- VSAT
- Radar
- Space Systems
- Test Instrumentation
- Telecom Infrastructure
- Base station Infrastructure

Electrical Specifications

Description	Min	Typ	Max	Units
Frequency Range	DC		20	GHz
Insertion Loss		3.8		dB
Isolation		38		dB
Control Input		TTL		
Power Handling		+24		dBm

Performance by Frequency

Description	Frequency	Min.	Typ.	Max	Units
Insertion Loss	DC - 6 Ghz		-2.7		dB
	DC - 12 Ghz		-2.8		dB
	DC - 20 Ghz		-3.8		dB
Isolation	DC - 6 Ghz	44	48		dB
	DC - 12 Ghz	36	42		dB
	DC - 20 Ghz	35	38		dB
Return Loss	DC - 12 Ghz		12		dB
	DC - 20 Ghz		10		dB
Return Loss RF1, RF2	DC - 12 Ghz		15		dB
	DC - 20 Ghz		10		dB
Input Power for 1 dB Compression	0.5 - 20 Ghz	+20.5	+24		dBm
Input Third Order Intercept (Two-Tone Input Power = +7 dBm Each Tone)	0.5 - 20 Ghz	+36.5	+40		dBm
Switching Characteristics					
tRISE, tFALL (10/90% RF)			17		ns
tON, tOFF (50% CTL to 10/90% RF)	DC - 20 Ghz		130		ns

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Absolute Maximum Rating

RF Input Power	+24 dBm
Supply Voltage (Vdc)	+7V
Control Voltage Range (Vctl)	-0.5V to Vdc +1V
Storage Temperature	-65 to +150 °C
Operating Temperature	-55 to +85 °C

Control Voltages

State	Bias Condition
High	+3.0 to Vdc @ 1 mA Typ.
Low	0 to +1.5V @ 20 µA Typ.

Bias Voltage & Current

Vdc Range = +5 Vdc ± 10%	
Vdc (V)	Idc (Typ.) (mA)
+5.0	1.4

(Bias current increases with switching rate to 15 - 20 mA.)

Truth Table

Control Input	Signal Path State	
VCTL1	VCTL2	RFC to:
LOW	LOW	RF1
LOW	HIGH	RF2
HIGH	LOW	RF3
HIGH	HIGH	RF4

Mechanical Specifications

Size

Length	1.68 in [42.67 mm]
Width/Dia.	1.6 in [40.64 mm]
Height	0.325 in [8.26 mm]

Environmental Specifications By Design

Temperature

Operating Range	-55 to +85 deg C
Storage Range	-65 to +150 deg C

Temperature Cycling
 Hermetic Seal

MIL-STD-883, Method 101C, Cond B
 Gross Leak MIL-STD-883 Method 1014C1/Fine Leak MIL-STD-883, Method 1014A2, 5 x 10⁻⁸ atm cc

ESD Sensitivity

ESD Sensitive Material, Transport material in Approved ESD bags. Handle only in ESD Workstation.

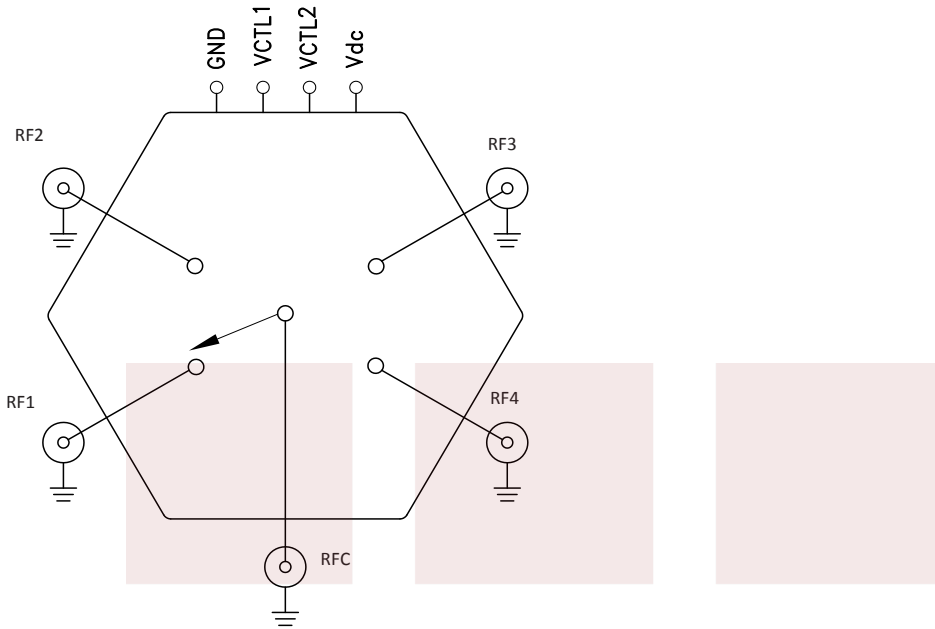


Compliance Certifications (see [product page](#) for current document)

Plotted and Other Data

Notes:

- Values at +25 °C, sea level

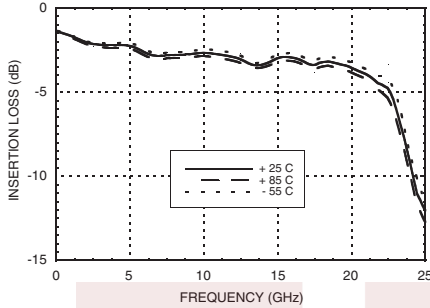


Pin Descriptions

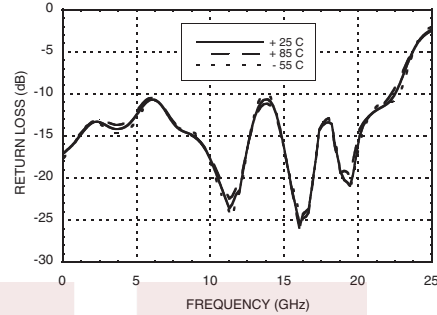
Pin Number	Function	Description	Interface Schematic
1	GND	Power supply ground.	
2, 3	Vctl1, 2	CMOS interface, control voltages per table. Requires active pull up to +5V (V _{dc}).	
4	Vdc	Supply voltage	
5 - 9	RFC, RF1, RF2, RF3, RF4	RF connector, SMA female, field replaceable. These pins are DC coupled and matched to 50 Ohms. DC blocking capacitors are required if external RF line potential is not equal to 0V.	

Typical Performance Data

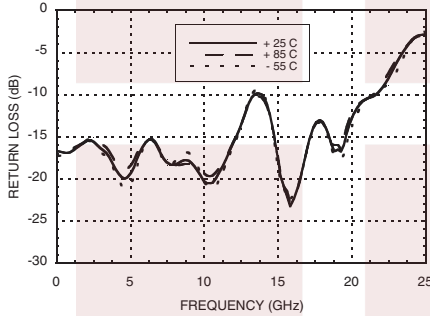
Insertion Loss



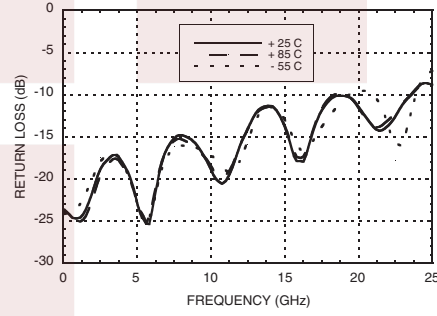
Return Loss RFC



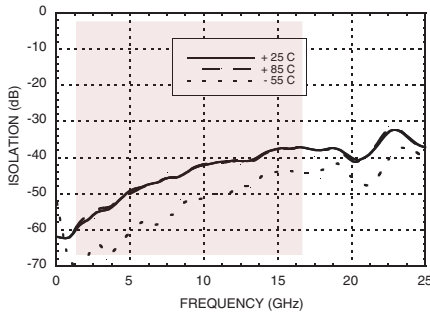
Return Loss RF1, RF2, RF3, RF4 On



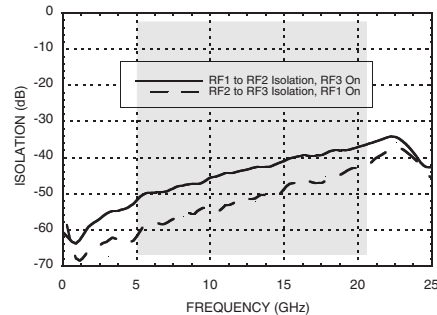
Return Loss RF1, RF2, RF3, RF4 Off



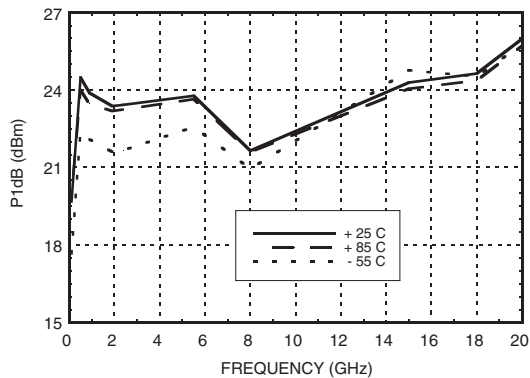
Isolations



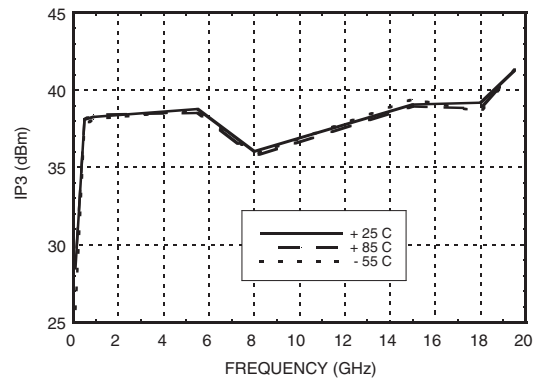
Isolation Between Ports RF1 and RF2



Input P1dB Compression Point



Input Third Order Intercept Point

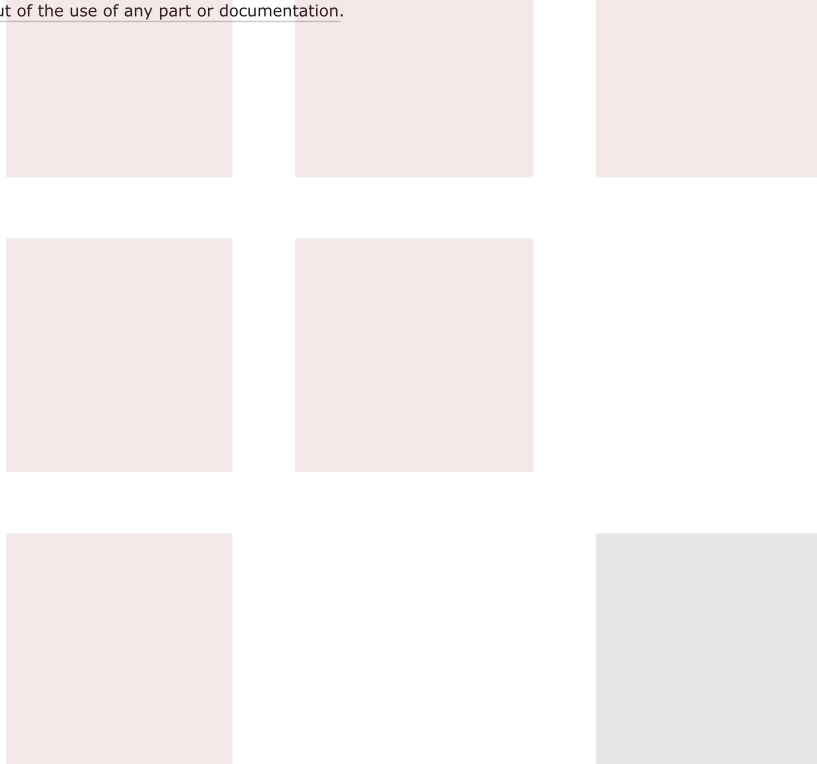


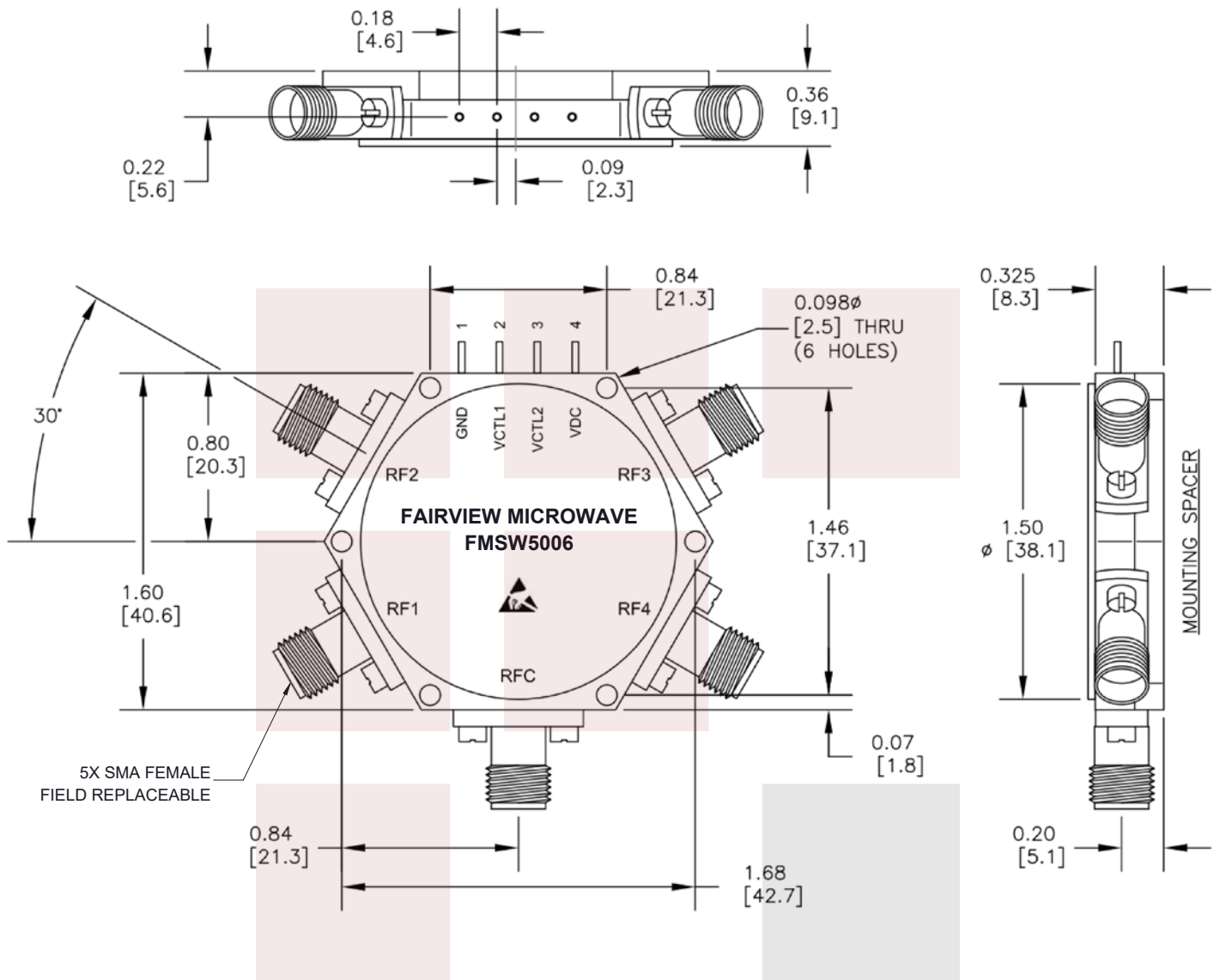
SP4T High Isolation PIN Diode Switch DC to 20 GHz, 38 dB, 24 dBm, 3.8 dB Loss and SMA from Fairview Microwave is in-stock and available to ship same-day. All of our RF/microwave products are available off-the-shelf from our ISO 9001:2008 certified facilities in Allen, Texas. Fairview Microwave is RF on-demand.

For additional information on this product, please click the following link: [SP4T High Isolation PIN Diode Switch DC to 20 GHz, 38 dB, 24 dBm, 3.8 dB Loss and SMA FMSW5006](#)

URL: <https://www.fairviewmicrowave.com/high-isolation-pin-diode-switch-20-ghz-38db-3.8db-fmsw5006-p.aspx>

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STANDARD TOLERANCES	
.X	± 0.2
.XX	± 0.01
.XXX	± 0.005

*STANDARD TOLERANCES APPLY ONLY TO DIMENSIONS IN INCHES

TRUTH TABLE		
CONTROL INPUT	SIGNAL PATH STATE	
VCTL1	VCTL2	RFC to:
LOW	LOW	RF1
LOW	HIGH	RF2
HIGH	LOW	RF3
HIGH	HIGH	RF4

<p>Fairview Microwave RF COMPONENTS ON DEMAND. <i>Done!</i></p>	NOTES: 1. UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE NOMINAL. 2. ALL SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE AT ANY TIME. 3. DIMENSIONS ARE IN INCHES [mm].	
	TITLE SP4T High Isolation PIN Diode Switch DC to 20 GHz, 38 dB, 24 dBm, 3.8 dB Loss and SMA	DWG NO FMSW5006
CAD FILE 05/21/18	SHEET 1 OF 1	SCALE N/A
SIZE A	7361	