



SPECTRADYNAMICS, INC



**FS-100RM-5
LOW NOISE FREQUENCY MULTIPLIER
OPERATING MANUAL**

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1.0 Introduction

The FS-100RM-5 is an ultra-low noise frequency multiplier that takes an input signal at 5 MHz. This versatile unit allows customers to select the output frequencies of choice at the time of ordering. Available output frequencies are: 10, 20, 40, 80, 90 and 100 MHz. The nominal output level of all output frequencies is $+13 \pm 2$ dBm. All outputs are bandpass filtered to provide better than 50 dB of rejection for all spurious and harmonic signals. The ultra-low residual phase noise of the multiplier allows it to be used with state-of-the-art crystal frequency sources without degrading phase noise or environmental stability.

The FS-100RM-5 is designed to be powered by a 100 to 240 VAC mains source and/or an optional +12 to +36 VDC power source. If the instrument is acquired without the optional battery back up module, the back panel will contain a black plastic cover instead of a DC connector. When the unit contains a DC connector on the back panel, the user may power the unit with both AC and DC power sources, in case of a loss of the main AC power the instrument will automatically switch from AC to DC supply operation using a Schottky diode network and charge storage capacitors to avoid any glitches and ensure uninterrupted continuous operation.

2.0 Safety and Preparation for Use

The FS-100RM-5 was designed for indoor use only and is not intended for operation outdoors or in a wet environment. The instrument may be mounted in a standard 19-inch instrumentation rack or may be used on a laboratory bench.

Inspect the instrument and power cords for damage before first use.

2.1 Electrical safety and preparation for use

Voltages capable of causing injury or death are present in this instrument. Use extreme caution whenever the instrument cover is removed.

Line Voltage

This instrument is designed to operate on either 100 to 240VAC, 47 to 63 Hz AC and/or +12 to +36 VDC at 1 Ampere power source.

Fuse

A 1.0 Ampere 250V slow-blow fuse is used for 100-240 VAC operation.

A 1.0 Ampere 250V slow-blow fuse is used for the DC power protection.

Only replace fuses with the same type and specifications.

AC Power

The instrument has a detachable three wire power cord for connection to a grounded AC power source. The enclosure of the unit is directly connected to the outlet ground to protect against electrical shock. Always use an outlet with a protective ground and do not disable this safety mechanism. Detaching the AC power cord is the only option of disconnecting the unit from the AC mains supply. Make sure you have access to the rear panel or provide an external accessible AC disconnect means for your FS-100RM-5.

DC Power - Optional -

When the unit contains a DC connector on the back panel, the connector is configured as follows:

Pin 1 NC

Pin 2 NC

Pin 3 NC

Pin 4 +12 to +36 VDC power return

Pin 5 +12 to +36 VDC power

Pin 6 Chassis GND /Earth GND

2.0 Safety and Preparation for Use

Verify that the connector from your DC power supply has the pin configuration mentioned on page 2. Do not apply AC voltage to the DC power connector. Failure to follow these directions may cause injury or death to personnel, cause irreparable damage to the instrument and voids all warranties.

If you provide DC power to your unit, detaching the DC power cord is the only option of disconnecting the unit from the DC mains supply. Make sure you have access to the rear panel or provide an external accessible DC disconnect means for your FS-100RM-5.

Please note that the power return (pin 4) is NOT connected to the instrument case ground internally, however both ground connections (pin 4 and pin 6) are available at the DC power connector and may be connected together at this point.

2.2 Instrument safety and preparation for use

Input RF Signals

The 5 MHz input signal level must be greater than +10 dBm, otherwise the multiplier will not function properly and noise performance may be seriously degraded. The multiplier is not a linear device therefore the output power does not vary linearly with input power. The absolute maximum specifications should be observed to obtain the optimum performance and ensure reliability.

Absolute Maximum Ratings

Input RF Power	+20 dBm Maximum
Reverse RF Power	+20 dBm Maximum
DC Voltage @ RF Input	20 VDC Maximum
DC Current @ RF Input	100 mA Maximum
DC Voltage @ RF Output	50 VDC Maximum
Storage Temperature	-10 to +75 °C
Operation Environment	0 to +50 °C
Humidity	5% to 95% Non-condensing

3.0 Front Panel



AC Power

The AC Power LED turns on when AC power is applied to unit.

DC Power

The DC Power LED is on when DC power is applied to unit.

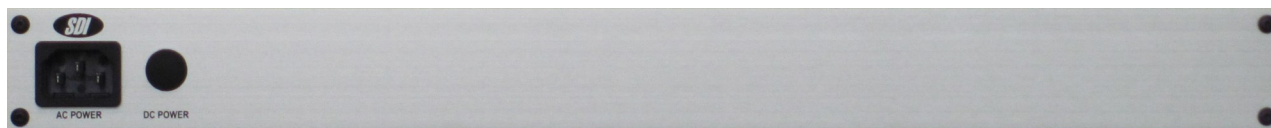
INPUT

A 5 MHz RF signal with a level greater than +10 dBm may be connected to the SMA connector labeled INPUT.

OUTPUTS

This versatile unit allows customers to select the output frequencies of choice at time of ordering. Available output frequencies are: 10, 20, 40, 80, 90 and 100 MHz.

4.0 Back Panel



AC POWER

The FS-100RM-5 is configured to operate on 100 to 240 VAC.

DC POWER

If the instrument was acquired with the optional DC battery back up module, the unit may operate on +12 to +36 VDC at 1 Ampere. When the FS-100RM-5 is set up to operate with both AC and DC power sources at the same time the DC power is used as backup power in case of AC power outages.

5.0 Installation

Connecting power

The FS-100RM-5 ships with a standard North American or European IEC power cord. The instrument may be mounted in a standard 19-inch instrument rack or may be operated on a laboratory bench.

Locate the AC POWER entry module on the rear of the enclosure, connect the power cord and turn on the power.

In the case that the FS-100RM-5 was acquired with the optional DC battery backup module, you may locate the DC connector on the rear of the enclosure, connect the DC power cord and turn on the power.

6.0 Operation

Once power is supplied to the instrument and the instrument is turned on, the LED on the front panel labeled AC will turn on. If you also apply the DC voltage the LED labeled DC POWER on the front panel should light up. The 5 MHz input signal to be multiplied should be connected to the SMA connector on the front panel labeled INPUT. The multiplied signals will be available at the SMA connectors labeled OUTPUTS.

7.0 Troubleshooting

Do not attempt to service or adjust the instrument unless another person, capable of providing first aid or resuscitation, is present. If there are problems that cannot be resolved by the troubleshooting steps below please contact technical support.

Technical Support

Tel: +1 (303) 665-1852 , Fax: +1 (303) 604-6088

support@spectradynamics.com, www.spectradynamics.com

AC Power LED does not turn on.

Disconnect the power cord. Check the main AC power fuse and power cord. If the fuse is blown replace with same type and rating. Please contact SDI if the fuse blows again or if the event that caused the fuse to blow is not known.

DC Power LED does not turn on.

Disconnect the power cord. Check the main DC power fuse and power cord. If the fuse is blown replace with same type and rating. Please contact SDI if the fuse blows again or if the event that caused the fuse to blow is not known.

No signal on the RF outputs.

Verify that the input signal frequency is 5 MHz +/- 250kHz, and that the amplitude of the signal is greater than +10 dBm.

8.0 Specifications

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Output Power	+13 dBm input	+10	+13	+15	dBm
Impedance	input output		50 50		Ohms
Return Loss	input(S11) output(S22)	-15 -15	-20 -20		dB
Spurious	Harmonics of input frequency		-55	-45	dBc
Harmonic Distortion	+13 dBm output Harmonics of output frequency		-55	-45	dBc
Phase Noise	1 Hz		-143	-140	dBc/Hz
Referred to 5MHz	1 kHz		-170	-167	
input	10 kHz		-176	-173	
Temperature-delay Coefficient	0 - 50 °C		45	50	ps/°C

All tests done at 5 MHz and +13 dBm input unless otherwise specified.

9.0 Warranty and Service

Warranty

The FS-100RM-5 is warranted to be free of defects under normal operating conditions, as specified, for one year from date of original shipment from SpectraDynamics, Inc. (SDI). SDI's obligation and liability under this warranty is expressly limited to repairing or replacing, at SDI's option, any product not meeting the said specifications. This warranty shall be in effect for one (1) year from the date a FS-100RM-5 is sold by SDI. SDI makes no other warranty, express or implied, and makes no warranty of the fitness for any particular purpose. SDI's obligation under this warranty shall not include any transportation charges or costs of installation or any liability for direct, indirect, or consequential damages or delay. Any improper use, operation beyond capacity, substitution of parts not approved by SDI, or any alteration or repair by others in such manner as in SDI's reasonable judgement affects the product materially and adversely shall void this warranty. No employee or representative of SDI is authorized to change this warranty in any way or grant any other warranty.

Service

Do not attempt to service or adjust the instrument unless another person, capable of providing first aid or resuscitation, is present. Please remember that any alteration or repair may void the warranty. Contact SDI with any questions or to request an RMA if a repair is needed.

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