



SPECTRADYNAMICS, INC.



**LOW NOISE FREQUENCY MULTIPLIER
FS100-RM
OPERATING MANUAL**

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Description



The FS100-RM is an ultra-low noise multiplying frequency synthesizer. The standard FS100-RM unit multiplies a frequency input of 5 MHz or 10MHz +13dbm to provide six different outputs, 10MHz, 20MHz, 40MHz, 80MHz, 90MHz and 100MHz. The input frequency must be specified when placing the order.

The FS100-RM unit may be modified upon request to only provide the output frequencies of your choice.

The nominal output level of all output frequencies is $+13 \pm 1$ 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.

Safety and Preparation for Use



CAUTION!

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 may be setup to operate on 100-120 or 220-240 VAC and a line frequency of 50 to 60 Hz. **The setup voltage for this FS100-RM is specified on page 4.**

Fuse

A 0.50 Ampere 250V slow-blow fuse is used for 100-120 VAC operation.
A 0.25 Ampere 250V slow-blow fuse is used for 220-240 VAC operation.
Only replace fuses with the same type and specifications.

Line Cord

The instrument has a detachable, three wire power cord for connection to a grounded 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.

Service

Do not attempt to service or adjust the instrument unless another person, capable of providing first aid or resuscitation, is present. Contact SDI for any questions or repairs.

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The Front Panel



AC Power LED

The AC POWER LED will turn on when AC power is applied to unit and the unit is operating properly.

DC Power LED

If the FS100-RM was manufactured with the battery backup option the DC POWER LED should be on when DC power is applied and the unit is operating properly. If the FS100-RM is not equipped with the battery backup option, the DC POWER LED will not be connected but will still be on the front panel.

SMA INPUT

The 5 MHz or 10 MHz +13 dBm signal to be multiplied should be connected to the SMA connector labeled INPUT.

SMA OUTPUTS

The standard FS100-RM has the capability to provide six different output frequencies. If you acquired the standard unit you will have six output frequencies available, 10MHz, 20MHz, 40MHz, 80MHz, 90MHz and 100MHz with a nominal output level of +13 \pm 1 dBm.

The Back Panel



AC POWER ENTRY MODULE

The FS100-RM is configured to operate on:

100-120 VAC

220-240 VAC

DC POWER ENTRY MODULE

Optional Battery Backup Connector for +24 VDC Backup power source.

Battery Backup Module



Description

If you acquired the optional battery backup module for your FS100-RM you will be able to power your instrument with an external +24 VDC power source. In case of loss of the main AC power this module will automatically power the unit. The switch from AC to DC supply operation is affected by a Schottky diode network and charge storage capacitors to ensure glitch free operation. The +24 VDC power source connector is located on the back panel of the instrument. The +24 VDC ground is not connected to the instrument case ground internally, however both ground connections are available at the DC power connector and may be connected together at this point.

DC Voltage

The +24 VDC may be used as backup power to prevent loss of signal during power outages. The DC power supply should be able to provide +24 VDC at 2A. For optimum performance the following specifications should be used for the power supply.

DC Supply	+24 VDC, 2 A
Line regulation	+/- 0.05% for a 10% line change
Load regulation	+/- 0.05% for a 50% load change
Output ripple	< 5mV peak-to-peak
DC Fuse	2.0 Ampere 250V slow-blow

Fuse

A 2.0 Ampere 250V slow-blow fuse is used for +24 VDC operation. Replace fuses with the same type and specifications

Service

Do not attempt to service or adjust the instrument unless another person, capable of providing first aid or resuscitation, is present. Contact SDI for any questions or repairs.

Operation

To operate the unit on DC power, locate the DC power entry connector on the rear panel and connect the power cable. When DC power is applied to the unit, the LED located on the front panel labeled DC POWER should light up. **Connection of the +24 VDC supply is optional.**

DC Connector



WARNING!

DO NOT APPLY AC VOLTAGE TO THIS UNIT THROUGH THE 6 PIN CONNECTOR ON THE REAR OF THE UNIT!

Failure to follow these directions will cause injury or death to personnel, cause irreparable damage to the instrument and void all warranties.

WARNING!

DO NOT REVERSE THE POLARITY OF THE SUPPLY VOLTAGE!

Reversing the polarity of the power supply will cause damage to the unit and void all warranties.

WARNING!

The chassis of the instrument is internally connected to DC ground.

The +24 VDC connector is wired as follows:

Pin 1 NC

Pin 2 NC

Pin 3 NC

Pin 4 +24 VDC GND return

Pin 5 +24 VDC power

Pin 6 Chassis GND / Earth GND



This unit is designed to operate only with the specified voltage on page 4. For conversion to a different voltage of operation contact SDI.

To operate the unit, locate the power entry module on the rear of the enclosure and connect the power cord. Plug the unit into an appropriate power outlet. A LED on the front panel labeled AC POWER will turn on. The 5 MHz or 10 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 second set of SMA connectors labeled OUTPUTS. The input signal level must be greater than +12 dBm, otherwise the synthesizer will not function properly and noise performance will be seriously degraded. **The multiplying synthesizer 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 @ Input	20 VDC Maximum
DC Current @ Input	100 mA Maximum
DC Voltage @ Output	50 VDC Maximum
Storage Temperature	-10 to +75 °C
Operation Environment	0 to +50 °C
Rack Mount Chassis	1U H, 19" W, 14" D

Specifications



PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Output Power	+13 dBm input	-	13	-	dBm
Impedance	input output	- -	50 50	- -	Ohms
Return Loss	input(S11) output(S22)	- -	-15 -15	- -	dB
Spurious	Harmonics of input frequency	-	-55	-45	dB
Harmonic Distortion	+13 dBm output	-	-55	-45	dBc
Phase Noise referred to the input	1 Hz 1 kHz 10 kHz	- - -	-145 -170 -175	-140 -167 -173	dBc/Hz
Temperature-delay Coefficient	0 - 50 °C	-	45	50	ps/°C

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

Warranty



The FS100-RM 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 FS100-RM 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.

