SPECTRADYNAMICS, INC

PD-15RMi-C
PULSE DISTRIBUTION AMPLIFIER
OPERATING MANUAL

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PD-15RMi-C Pulse Distribution Amplifier Operating Manual

MODEL: PD-15RMi-C R01-2025/MD-PU-FA

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1.0 Introduction

The PD-15RMi-C is a TTL Pulse Distribution Amplifier that provides distribution for one pulse per second (PPS) signals. The amplifier can also be used to distribute pulses with a repetition rate up to 100 MHz.

The PD-15RMi-C is designed for maximum flexibility and is housed in a 1U, 19-inch rackmount enclosure that may contain up to three pulse distribution modules. The table below shows the available options identified by the part number. Each module provides five buffered outputs designed to drive low impedance loads and long 50 or 75 ohm cables. The standard unit is manufactured with 50 ohm input impedance and 10 ohm output impedance to provide a 4.3 volt peak-to-peak signal into 50 ohm load.

The channel-to-channel delay differences are typically less than 100 ps. The distribution modules typically have 3 ps/ºC temperature coefficient of propagation delay. The small propagation delay characteristics and low temperature coefficient of delay are essential for the distribution of high quality timing signals.

This instrument is designed to be powered by a 100 to 240 VAC mains source or by a +12 to +36 VDC power source. If both AC and DC sources are powering the instrument, the DC source will be used as backup power in case of AC power outages. The instrument is designed to 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.

PD-15RMi Options

Part Number	Number of Inputs	Number of Outputs	AC Voltage Operation	DC Voltage Operation
PD-15RMi-A	1	5	√	√
PD-15RMi-C	3	15 (five per input)	√	√
PD-15RMi-C1	1	10	√	√
PD-15RMi-C2	2	10 (five per input)	√	√
PD-15RMi-C3	1	15	√	√

2.0 Safety and Preparation for Use

The PD-15RMi-C 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 with a 100 to 240 VAC, 12 W, 47 to 63 Hz power source. DC operation with +12 to +36 VDC, 0.3 Amperes is also possible.

Fuse
A 3.0 Ampere, 250 V, 5X10 mm slow-blow fuse is used for 100 to 240 VAC operation.
A 2.5 Ampere, 250 V, 5X10 mm slow-blow fuse is used for DC power operation.
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 the instrument.

DC Power
The instrument has a RM12BRD-6PH DC connector on the back panel with the following configuration:

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

DC connector
RM12BRD-6PH(71)

DC mating connector
RM12BPE-6S(81)

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.

2.0 Safety and Preparation for Use

Requirements for the external DC power supply

The following specifications should be used to ensure optimum performance:

DC Supply voltage	+12 to +36 VDC, 0.3 Amps
Line regulation	+/-0.05% for a 10% line change
Load regulation	+/-0.05% for a 50% load change
Output ripple	< 5 mV peak-to-peak
Pin configuration	Same as RM12BRD-6PH DC connector on the back panel

Verify that the connector from the DC power supply has the correct pin configuration. 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

2.2 Instrument safety and preparation for use

1 PPS Signals

The 1 PPS signal to be distributed should conform to TTL specifications. Make sure that only TTL level (0 to 5 V) signals are applied to the 1PPS INPUT Connector. Do not apply negative voltages as they will damage the pulse distribution amplifier.

Absolute Maximum Ratings:

Voltage at 1 PPS input	-0.7 VDC to +5.5 VDC
Reverse Voltage at 1 PPS output	-0.7 VDC to +5.5 VDC
DC Supply Voltage	+36 VDC
Storage Temperature	-10 to +75 ºC
Operation Environment	0 to +50 ºC

3.0 Front Panel

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

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

PPS LEDs
The PD-15RMi-C may contain up to three pulse distribution modules, each module is monitored by the corresponding PPS LED labeled PPS 1, PPS 2 and PPS 3. All LEDs are installed on every PD-15RMi-C option. Only PD-15RMi-C options with 3 modules come with three functioning monitor LEDs. All other PD-15RMi-C options will have a non-working monitor LED. Please refer to PD-15RMi-C options table on page 1.

PPS LEDs will flash on the falling edge of the 1 PPS output signal from the corresponding pulse distribution module.

4.0 Back Panel

AC Power

The PD-15RMi-C is configured to operate on 100 to 240 VAC.

DC Power

The PD-15RMi-C may also operate on DC power from 12 to 36 VDC as the main power supply. When the instrument 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.

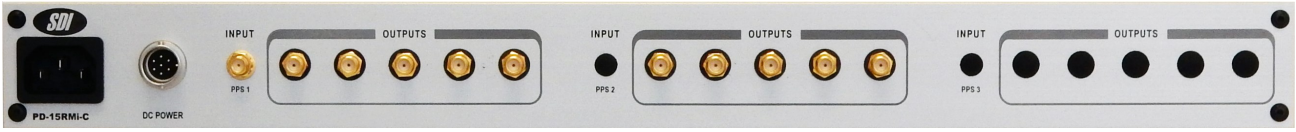
INPUT

The number of available inputs are determined by the PD-15RMi-C part number. 1 PPS signals or pulses with repetition rate up to 100 MHz may be provided to any SMA connector labeled INPUT. Input signals must conform to TTL levels. Only the PD-15RMi-C includes all SMA input connectors as shown on the picture above. Other options are shown below.

OUTPUTS

The number of available outputs per 1PPS input are determined by the part number below. Any PD-15RMi-C output may be used to drive the input of another 1PPS distribution module. All outputs are designed to drive 50-ohm loads.

PD-15RMi-C1



PD-15RMi-C2

PD-15RMi-C3

5.0 Installation

The instrument may be mounted in a standard 19-inch instrument rack or may be operated on a laboratory bench.

Connecting power

The PD-15RMi-C ships with a standard North American, European, or Chinese IEC power cord and a RM12BPE-6S DC connector.

You may prepare a DC power cable with the DC connector following the connector configuration on page 2.

Locate the AC POWER entry module on the rear of the enclosure and connect the AC power cord. If you already prepared the DC power cord you may also connect it to the instrument.

6.0 Operation

To operate the PD-15RMi-C, plug the power cord into an appropriate AC power outlet. You may also connect the DC power cable to an appropriate DC power supply.

Providing DC power to the PD-15RMi-C is optional and is used as backup power in the event of AC power outages. The instrument is designed to automatically switch from AC to DC power supply operation using a Schottky diode network and charge storage capacitors to avoid any glitches and ensure uninterrupted continuous operation.

Once AC power is supplied to the PD-15RMi-C, the LED on the front panel labeled AC POWER will turn on. If DC power is also applied to the instrument, the monitor LED labeled DC POWER will light up.

1 PPS Signal Distribution

Attach an SMA cable with the 1PPS signal to be distributed to any of the SMA connectors label INPUT located on the back panel. The PPS LED located on the front panel will flash on the falling edge of each output pulse and five buffered outputs will be available at the SMA connectors labeled OUTPUTS.

Although the device was designed to distribute precision one pulse per second signals, it may be used to distribute pulses up to a frequency of 100 MHz.

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 cords and remove the top cover. Check the main AC power fuse and power cord. If the fuse is blown replace it 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 cords and remove the top cover. Check the main DC power fuse and power cord. If the fuse is blown replace it 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.

PPS LEDs are off.
Make sure that the provided signal to the instrument conforms with TTL levels.
If the input signal is correct and the LED remains off, the instrument will have to be returned for repair.

8.0 Specifications

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Rise time	10 - 90 %	-	0.8	0.9	ns
Fall time	10 - 90 %	-	0.8	0.9	ns
Propagation delay	50 ohm load	-	7	9	ns
Differential delay	Channel - Channel	-	100	200	ps
Input High Level	Input signal into 50 ohm load	2	-	5	V
Input Low Level	Input signal into 50 ohm load	-0.7	-	0.8	
Frequency range	50% duty cycle	0	100	105	MHz
Temp-delay Coefficient	0 - 50 ºC	-	3	5	ps/ºC
Pulse Distribution Amplifiers are manufactured with 50 ohm input impedance and 10 ohm output impedance					
Impedance	Input	-	50	-	Ohms
	Output	-	10	-	
Output High Level	50 ohm load, 10 ohm output	3.6	4.3	5.0	V
Output Low Level	50 ohm load, 10 ohm output	-	0.1	0.2	
The following specifications are for a Pulse Distribution Amplifier with 50 ohm input and output impedance To purchase this option, please use part number: PD-15RMi-C Opt 50 ohm					
Impedance	Input	-	50	-	Ohms
	Output	-	50	-	
Output High Level	50 ohm load, 50 ohm output impedance	2.4	2.6	2.8	V
Output Low Level	50 ohm load, 50 ohm output impedance	-	0.1	0.2	

Specifications are valid for all PD-15RMi-C options: C, C1, C2 and C3.

Other Specifications

Rackmount chassis	1U H, 19“ W, 14” D
Unit weight	10 lb
AC Input Voltage Range	100 to 240 VAC, 12 W, 47 to 63 Hz
DC Input Voltage Range	+12 to +36 VDC, 0.3 A
Storage temperature	-10 to +75 ºC
Operation environment	0 to +50 ºC
Humidity	5% to 95% Non-condensing
Overvoltage category	OVC II
Pollution degree	PD 2
Altitude	2000 m
Indoor use only	

9.0 Cleaning and Decontamination Instructions

Ensure that all required electrical safe work practices are followed before cleaning the instrument.

1. If possible, disconnect power before cleaning to prevent electrical shock or damage.
2. If possible, allow hot surfaces to cool before cleaning.
3. Lint-free, microfiber cloths are recommended to attract dust and dirt without leaving particles behind. Avoid abrasive cloths, towels, or paper towels.
4. For instruments with touchscreen, a screen wipe designed to remove grime and dust is recommended to clean the screen and avoid damage to the screen.
5. Avoid aerosol sprays, bleaches, or abrasives.
6. Never spray cleaners directly onto equipment or on displays.

10.0 Warranty and Service

Warranty

The PD-15RMi-C 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 PD-15RMi-C 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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