



- ▶ **Miniature Single-Inline Package (SIP)**
- ▶ **Tight Regulation (200FSR Series)**
- ▶ **22 Models**
- ▶ **500 VDC Input/Output Isolation**
- ▶ **Single and Dual Outputs**
- ▶ **Requires Only 0.425 Square Inches of Board Space**
- ▶ **Low Cost**

## 200FS / FSR Series

### General Description

The **200FS** and **200FSR** are a family of cost effective 1.8 and 2W single & dual output DC/DC converters. These converters use innovative engineering to combine miniature SIP packaging and low cost without sacrificing performance or field reliability. High performance features include 500 VDC input/output isolation, high efficiency operation and low noise operation. The 200FSR series is tightly regulated.

Twenty two models operate from input bus voltages of 5 and 12 VDC; producing output voltage levels of 5, 9, 12, 15,  $\pm 5$ ,  $\pm 12$  or  $\pm 15$  VDC. Standard features include an output voltage accuracy of  $\pm 3.0\%$  and an input voltage range of  $\pm 5\%$  tolerance.

All models are packaged in ultra-miniature 1.25 x 0.34 x 0.57 inch single-inline package (SIP). Operation is specified over the full operating temperature range of  $-25^{\circ}\text{C}$  to  $+71^{\circ}\text{C}$  with no derating required. Cooling is by free-air convection.

### Electrical Specifications

#### Input Specifications:

Input Voltage Range	$\pm 5\%$
Input Filter	Internal Capacitor
Reflected Ripple Current	See Model Selection Guide

#### Output Specifications:

Output Voltage Accuracy	$\pm 3\%$
Voltage Balance (Dual Outputs)	$\pm 1\%$
Ripple & Noise (20 MHz BW)	1% Pk-Pk, Max.
Line Regulation (200FS models) <sup>(1)</sup>	$\pm 1.2\%/%$ change in $V_{in}$
Line Regulation (200FSR models) <sup>(1)</sup>	$\pm 0.3\%$
Load Regulation (200FS models) <sup>(2)</sup>	$\pm 10\%$
Load Regulation (200FSR models) <sup>(2)</sup>	$\pm 0.5\%$
Minimum Load	20%
Temperature Coefficient @ FL	$\pm 0.02\%/^{\circ}\text{C}$
Transient Response <sup>(3)</sup>	$< 500 \mu\text{Sec.}$
Short Circuit Protection	Momentary

#### General Specifications:

Efficiency	See Model Selection Guide
Isolation Voltage (1 min)	500 VDC
Isolation Capacitance	60 pF
Isolation Resistance	$10^9 \Omega$
Switching Frequency	$< 25 \text{ kHz}$

#### Environmental Specifications:

Operating Temperature Range (Ambient)	$-25^{\circ}\text{C}$ to $+71^{\circ}\text{C}$
Storage Temperature Range	$-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$
Derating	None Required
Humidity	Up to 95%, Non-condensing
Cooling	Free-air Convection

#### Physical Characteristics:

Size	1.25 x 0.34 x 0.57 inches (31.8 x 8.6 x 14.5 mm)
Weight	0.1 Oz (3g)
Case Material	Non-conductive Black Plastic

#### Absolute Maximum Ratings:<sup>(4)</sup>

Input Voltage	175% of Nominal Input Line
Output Short Circuit Duration	Momentary
Internal Power Dissipation, 200FS	1.4W
200FSR	1.9W

All specifications are typical @  $+25^{\circ}\text{C}$  with nominal input voltage and under full output load conditions, unless otherwise noted. Specifications subject to change without notice.

#### Notes:

- Line regulation is measured by monitoring the output voltage while the module input voltage is varied from low line to high line.
- Load regulation is measured at nominal input voltage while the output load is varied from no load to full load. Dual output models are loaded equally.
- Transient response is measured to within a 1% error band with a 25% step load change for single output units and a 50% load step for dual output units.
- Absolute Maximum Ratings are specification limits that, if exceeded, could permanently damage the unit. These are not continuous operating ratings.

#### Application Notes:

- Converters may be configured to produce different outputs. Please contact the factory for more information.
- These units operate as complete converters with no need for external components. However, in some noise sensitive analog applications it is recommended that a 15  $\mu\text{F}$  - 25V tantalum electrolytic capacitor be placed in parallel with a 0.1  $\mu\text{F}$  ceramic capacitor as close to the load as possible. This will reduce ripple significantly.

\* For information on the standard conditions and methods used or approved by **CDI** to test DC/DC converter parameters, see the application note "Testing DC/DC converters" on page 92.

## Typical Applications:

- ▶ Mixed Analog/Digital Subsystem
- ▶ Mobile/Portable Equipment
- ▶ Distributed Power Networks
- ▶ RS-232 Line Drivers
- ▶ General Purpose Board Level DC/DC Converter

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**200FS/FSR Series**  
 ULTRA-MINIATURE SINGLE-INLINE PACKAGE  
 2W SINGLE and DUAL OUTPUT  
 ISOLATED DC/DC CONVERTERS

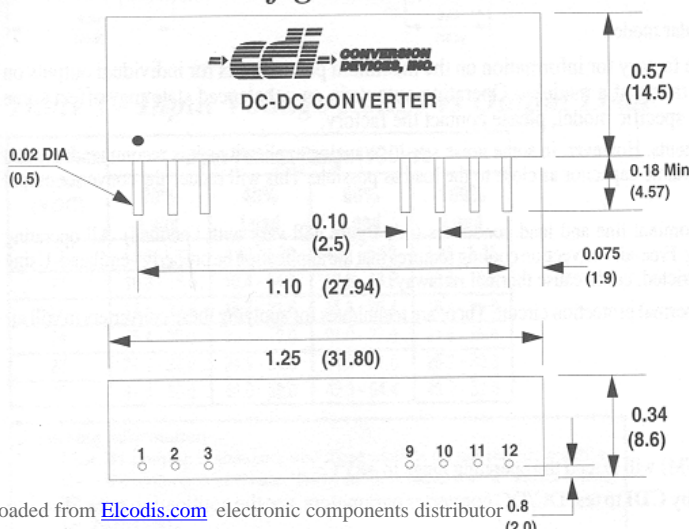
### Model Selection Guide for 200FS Series

Model Number	Input				Output		Efficiency @FL (%)
	Nominal Voltage (VDC)	Current (mA)		Reflected Ripple (mA P-P)	Voltage (VDC)	Current (mA)	
		No-Load	Full-Load				
205S5FS	5	55	610	68	5	400	64
209S5FS	5	55	600	60	9	222	67
212S5FS	5	40	560	56	12	166	71
215S5FS	5	70	560	56	15	133	71
205D5FS	5	50	514	52	± 5	± 200	78
212D5FS	5	60	500	50	± 12	± 83	80
215D5FS	5	65	800	80	± 15	± 66	67
205S12FS	12	25	250	25	5	400	67
212S12FS	12	25	220	22	12	166	76
212D12FS	12	25	240	24	± 12	± 83	69
215D12FS	12	25	240	24	± 15	± 66	69

### Model Selection Guide for 200FSR Series

Model Number	Input				Output		Efficiency @FL (%)
	Nominal Voltage (VDC)	Current (mA)		Reflected Ripple (mA P-P)	Voltage (VDC)	Current (mA)	
		No-Load	Full-Load				
205S5FSR	5	55	740	68	5	360	48
209S5FSR	5	55	720	60	9	200	50
212S5FSR	5	40	720	56	12	150	50
215S5FSR	5	70	720	56	15	120	50
205D5FSR	5	50	720	52	± 5	± 180	50
212D5FSR	5	60	720	50	± 12	± 75	50
215D5FSR	5	65	720	80	± 15	± 60	50
205S12FSR	12	25	308	25	5	360	48
212S12FSR	12	25	300	22	12	150	50
212D12FSR	12	25	300	24	± 12	± 75	50
215D12FSR	12	25	300	24	± 15	± 60	50

### Mechanical Configuration:



### Pin-Out

Pin	Single Output	Dual Output
1	+V Input	+V Input
2	N/C	-V Input
3	-V Output	Common
9	N/C	N/C
10	-V Output	Common
11	+V Output	+V Output
12	-V Input	-V Input

Note: All dimensions are typical in inches (mm).  
 Tolerance X.XX = ± 0.02, (± 0.5)  
 X.XXX = ± 0.010, (± 0.25)  
 N/C = No Connection