

# 200FR series



www.martekpower.com

## Single & Dual Output DC/DC Converter



### DESCRIPTIONS

The 200FR series 2 watt power modules are specially designed to provide low output ripple, and tight regulation in a low-profile 24 pin DIP package. The series consists of 20 models with input voltages of 5V, 12V, 24V and 48V, and offers regulated output voltages of 5V, 12V, 14V,  $\pm 12V$  and  $\pm 15V$ .

The  $-25^{\circ}\text{C}$  to  $+71^{\circ}\text{C}$  operating temperature range makes it ideal for data communication equipment, mobile battery driven equipment, distributed power systems, telecommunication equipment, mixed analog/digital subsystems, automatic test instrumentation and industrial robot systems.

### OUTPUT CHARACTERISTICS

|                                | Min        | Typ        | Max     | Unit/Comments  |
|--------------------------------|------------|------------|---------|--|
| Output Voltage Set Point       | $\pm 2.0$  | $\pm 4.0$  |         | % Output voltage at nominal line & FL  |
| Output Voltage Balance (Duals) | $\pm 1.0$  | $\pm 3.0$  |         | % Equal Output Loads   |
| Line Regulation                | $\pm 0.2$  | $\pm 0.5$  |         | % Output voltage measured from min. input line to maximum                            |
| Load Regulation                | $\pm 0.2$  | $\pm 0.5$  |         | % Output voltage measured from FL to 10% load  |
| Ripple/Noise                   |            | 45         | 50      | mV p-p, Nom.Line @FL, 20MHz B.W., using 1 $\mu\text{f}$ bypass capacitor             |
| Ripple/Noise                   |            |            | 75      | mV p-p, Over Line, Load & Temp., 20 MHz B.W., using 1 $\mu\text{f}$ bypass capacitor |
| Overload Protection            | 120        |            |         | %Rated Output Load   |
| Short Circuit Protection       |            |            |         | Continuous, Automatic Recovery   |
| Transient Response Deviation   |            |            | $\pm 6$ | % deviation of $V_{out}$ for a 50% load change                                       |
| Transient Recovery Time        |            |            | 50      | $\mu\text{S}$ for 50% load change  |
| Temperature Coefficient        | $\pm 0.01$ | $\pm 0.02$ |         | % per degree C   |

### FEATURES

- Up to 61 % Efficiency
- Single and Dual Output, 2 watt converter
- Available in 5, 12, 24 and 48 VDC Inputs
- Industry Standard Pinout
- Short Circuit Protection

### INPUT CHARACTERISTICS

|                                | Min  | Typ  | Max  | Unit/Comments      |
|--------------------------------|------|------|------|--------------------|
| Input Voltage                  |      |      |      |                    |
| 5 VDC Input Models             | 4.5  | 5    | 5.5  | VDC                |
| 12 VDC Input Models            | 10.8 | 12   | 13.2 | VDC                |
| 24 VDC Input Models            | 21.6 | 24   | 26.4 | VDC                |
| 48 VDC Input Models            | 43.2 | 48   | 52.8 | VDC                |
| Input Fuse Requirements        |      |      |      |                    |
| 5 VDC Input Models             |      | 1500 |      | mA; Slow blow type |
| 12 VDC Input Models            |      | 700  |      | mA; Slow blow type |
| 24 VDC Input Models            |      | 350  |      | mA; Slow blow type |
| 48 VDC Input Models            |      | 135  |      | mA; Slow blow type |
| Reverse Polarity Input Current |      |      | 0.5  | Amp                |
| Short Circuit Input Power      |      |      | 2000 | mW                 |
| Input Filter                   |      |      |      | Pi Filter          |

### GENERAL CHARACTERISTICS

|                       | Min  | Typ | Max | Unit/Comments   |
|-----------------------|------|-----|-----|---|
| Switching Frequency   | 40   | 80  |     | kHz   |
| Isolation Voltage     | 500  |     |     | VDC, 1 minute   |
| Isolation Resistance  | 1000 |     |     | Mohm, 500VDC  |
| Isolation Capacitance |      | 100 | 150 | pF, 100kHz, 1Volt                                     |
| MTBF (MIL-HBK-217F)   | 800  |     |     | Thousand Hours, $+25^{\circ}\text{C}$ , Ground Benign |

Martek Power reserves the right to change specifications without notice.

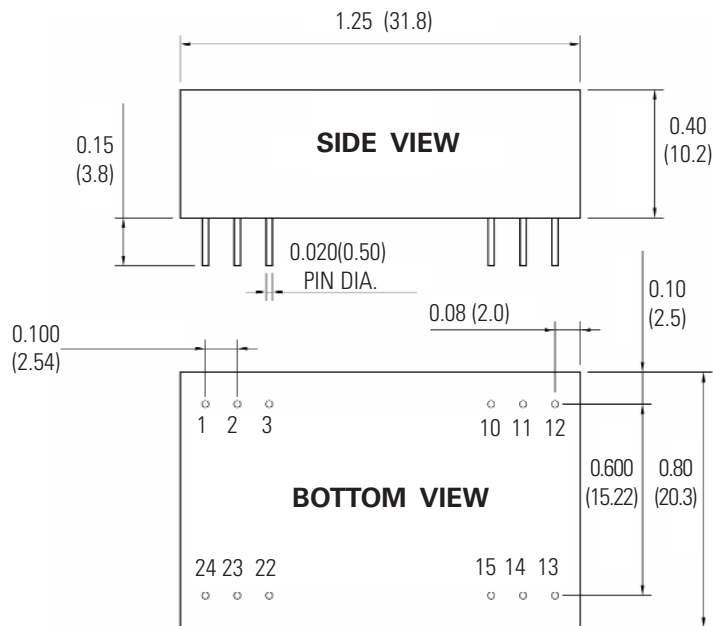
## ENVIRONMENTAL SPECIFICATIONS

|                       | Min | Typ | Max  | Unit/Comments              |
|-----------------------|-----|-----|------|----------------------------|
| Operating Temp. Range | -25 |     | +71  | °C; Ambient                |
| Operating Temp. Range | -25 |     | +90  | °C; Case                   |
| Storage Temp. Range   | -40 |     | +125 | °C                         |
| Relative Humidity     |     |     | 95   | % Humidity; non-condensing |
| Cooling               |     |     |      | Free-Air Convection        |

## PHYSICAL CHARACTERISTICS

|               | Unit/Comments                                      |
|---------------|--|
| Case Size     | 1.25 X 0.8 X 0.4 inches<br>(31.8 X 20.3 X 10.2 mm) |
| Case Material | Non-Conductive Black Plastic                       |
| Flammability  | UL94V-0  |
| Weight        | 12.1 Grams   |

## OUTLINE DRAWING



## PIN OUT CHART

| Pins | Single | Dual   |
|------|--------|--------|
| 1    | + Vin  | + Vin  |
| 2    | NC     | - Vout |
| 3    | NC     | Common |
| 10   | - Vout | Common |
| 11   | + Vout | + Vout |
| 12   | - Vin  | - Vin  |
| 13   | - Vin  | - Vin  |
| 14   | + Vout | + Vout |
| 15   | - Vout | Common |
| 22   | NC     | Common |
| 23   | NC     | -V out |
| 24   | + Vin  | +V in  |

NC = No Connection

### Notes:

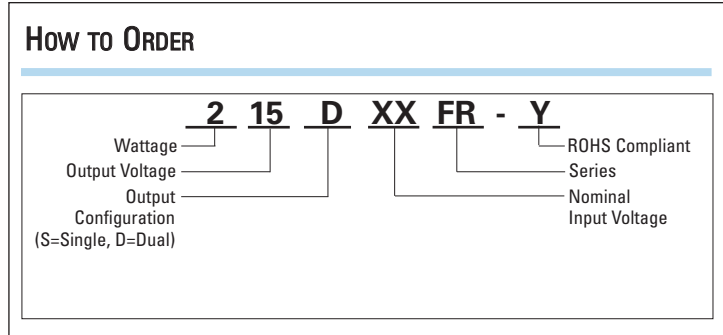
1. Unless otherwise specified dimensions are in inches (mm).

| Tolerances | Inches         | mm           |
|------------|----------------|--------------|
|            | X.XX = ±0.02   | X.X = ±0.5   |
|            | X.XXX = ±0.010 | X.XX = ±0.25 |
| Pin :      | ±0.002         | ±0.05        |

All specifications are typical at nominal input, nominal load and 25°C unless otherwise specified.

Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low ESR capacitor of 2.2mF for the 5V input devices, a 1.0mF for the 12V input devices and a 0.47mF for the 24V and 48V devices.

## How To ORDER

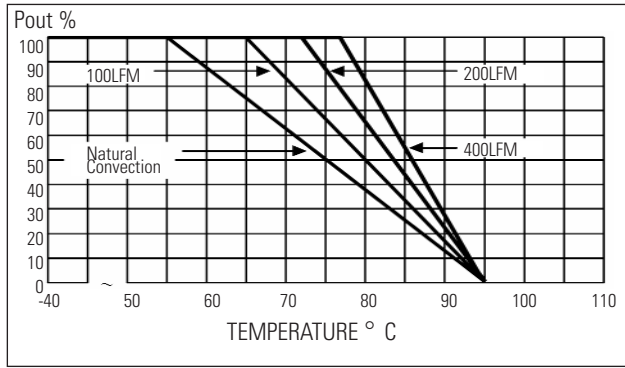


## MODEL SELECTION CHART

| Model    | Nominal Input Voltage (VDC) | Output Voltage (VDC) | Full Load Output Current (mA) | No Load Input Current (mA) | Full Load Input Current (mA) | Reflected Ripple Current (mA) | Efficiency (%) |
|----------|-----------------------------|----------------------|-------------------------------|----------------------------|------------------------------|-------------------------------|----------------|
| 205S5FR  | 5                           | 5                    | 400                           | 80                         | 800                          | 80                            | 50             |
| 212S5FR  | 5                           | 12                   | 165                           | 80                         | 730                          | 80                            | 54             |
| 215S5FR  | 5                           | 15                   | 133                           | 80                         | 690                          | 80                            | 57             |
| 212D5FR  | 5                           | ±12                  | ±83                           | 80                         | 740                          | 80                            | 53             |
| 215D5FR  | 5                           | ±15                  | ±66                           | 80                         | 770                          | 80                            | 51             |
| 205S12FR | 12                          | 5                    | 400                           | 40                         | 330                          | 30                            | 50             |
| 212S12FR | 12                          | 12                   | 165                           | 40                         | 295                          | 30                            | 56             |
| 215S12FR | 12                          | 15                   | 133                           | 40                         | 265                          | 30                            | 62             |
| 212D12FR | 12                          | ±12                  | ±83                           | 40                         | 280                          | 30                            | 59             |
| 215D12FR | 12                          | ±15                  | ±66                           | 40                         | 280                          | 30                            | 59             |
| 205S24FR | 24                          | 5                    | 400                           | 20                         | 163                          | 15                            | 51             |
| 212S24FR | 24                          | 12                   | 165                           | 20                         | 135                          | 15                            | 61             |
| 215S24FR | 24                          | 15                   | 133                           | 20                         | 135                          | 15                            | 61             |
| 212D24FR | 24                          | ±12                  | ±83                           | 20                         | 135                          | 15                            | 61             |
| 215D24FR | 24                          | ±15                  | ±66                           | 20                         | 135                          | 15                            | 61             |
| 205S48FR | 48                          | 5                    | 400                           | 10                         | 83                           | 10                            | 50             |
| 212S48FR | 48                          | 12                   | 165                           | 10                         | 70                           | 10                            | 59             |
| 215S48FR | 48                          | 15                   | 133                           | 10                         | 70                           | 10                            | 59             |
| 212D48FR | 48                          | ±12                  | ±83                           | 10                         | 80                           | 10                            | 51             |
| 215D48FR | 48                          | ±15                  | ±66                           | 10                         | 80                           | 10                            | 51             |

# DERATING CURVES

**MODEL 200FR - 5V output only**



**MODEL 200FR - all other outputs**

