



- STANDARD “FULL BRICK” PACKAGE
- POWER DENSITY UP TO 5.53W/CM<sup>3</sup>
- EFFICIENCIES FROM 86-91%
- ACTIVE LOAD SHARING
- WIDE INPUT VOLTAGE RANGE
- REMOTE ON/OFF
- NO NEED FOR “MASTER/SLAVE”



F SERIES - DC/DC

#### POWER SUPPLY DESIGN EXCELLENCE

The Powerstax F Series represents a major achievement in the development of high power, high-density DC to DC converter modules, providing up to 500Watts of power in the industry standard “full brick” size case. The comprehensive list of

in-built protection functions such as over voltage protection, under voltage protection and short circuit protection are complemented by unique features such as the thermal monitoring voltage to provide early warning of system fault.

STANDARD MODEL	INPUT VOLTAGE (RANGE)	MAX.INPUT CURRENT	OUTPUT VOLTAGE	OUTPUT CURRENT	OUTPUT POWER	TYPICAL EFFICIENCY
F211-024-050 F211-024-120	24V (18-36V)	16.0A	5V 12V	42.0A 17.5A	210W	>86%
F211-048-050 F211-048-120	48V (36-75V)	7.0A	5V 12V	42.0A 17.5A	210W	>86%
F351-012-120 F351-012-240 F351-012-280 F351-012-480	12V (11-18V)	35.0A	12V 24V 28V 48V	30.0A 15.0A 12.8A 7.5A	360W 360W 360W 360W	>87%
F501-024-120 F501-024-150 F501-024-240 F501-024-280 F501-024-480	24V (18-36V)	23.0A	12V 15V 24V 28V 48V	37.5A 30.0A 18.8A 16.1A 10.4A	450W 450W 450W 450W 500W	>91%
F501-048-120 F501-048-150 F501-048-240 F501-048-280 F501-048-480	48V (36-72V)	11.5A	12V 15V 24V 28V 48V	41.7A 33.3A 20.8A 17.8A 10.4A	500W 500W 500W 500W 500W	>91%

**OTHER HIGH DENSITY PRODUCTS**  
 F501-385 - High Voltage DC Input  
 FP Series - PFC Front-Ends  
 FAC Series - Integrated AC/DC  
 FC Series - Fuel Cell DC/DC



INPUT SPECIFICATIONS	12V Input	24V Input	48V Input
Input Voltage (range)	see model table		
Input Current (max.)	see model table		
Input Current (standby)	<90mA		
Vin (on) (input rising)	11.1V	17.5V	35.9V
Vin (off) (input falling)	10.0V	15.6V	30.9V
Surge Withstand	25V	50V	100V
Ripple Rejection (120Hz)	60dB		
Protection	an external fuse of appropriate type & rating is required to meet agency requirements		

OUTPUT SPECIFICATIONS	
Voltage Setpoint	±0.7% Vout nom. (at full load)
Voltage Tolerance Band	±1.1% Vout nom. (all line, load & temperature conditions)
Line Regulation	>0.5% Vout nom. (Vin minimum to Vin maximum)
Load Regulation	>0.05% Vout nom. (no load to full load)
Current Share Error	<±10% Io max.
Temperature Coefficient	>3mV/°C (20°C to 100°C)
Transient Response	>1.5% Vout nom. (50% load step at 0.1A/μs)
Over Temperature Shutdown	100-110°C, 105°C typ.
Settling Time	>500μs (to 10% of peak deviation)
Current Limit	100-130% Iout max., 115% Io typ.
Ripple & Noise (rms)	>0.3% Vout nom. (10-100% Iout, 20MHz bandwidth)
Short Circuit Current Limit	3.3% maximum output current
Trim Range	60 to 100% Vout nom. (subject to Pout max. and Iout max.)

GENERAL & ENVIRONMENTAL SPECIFICATIONS	
Temperature Range	-20°C to +100°C operating, -40°C to +125°C storage
Humidity	10-90%RH, non-condensing
Cooling	maintain baseplate @ <100°C, see mechanical drawings
Switching Frequency (range)	300kHz (273-315kHz)
Isolation Capacitance	470pF (input/output)
Isolation Resistance	10MΩ (input/output)
Isolation Voltage	2000VACrms (input/output, reinforced insulation) 1000VACrms (input/baseplate, basic insulation) 500VACrms (output/baseplate, operational insulation)
Thermal Resistance	0.1°C/W (baseplate to heatsink with thermal pad)
Pin Soldering Temperature	260°C max. (<5s wave) or 390°C max. (<7s hand)
Pin Material	brass with gold plate
Case Material	aluminium
Weight	<170g
MTBF	1,100,000 hours (Belcore SR332)



F SERIES - DC/DC

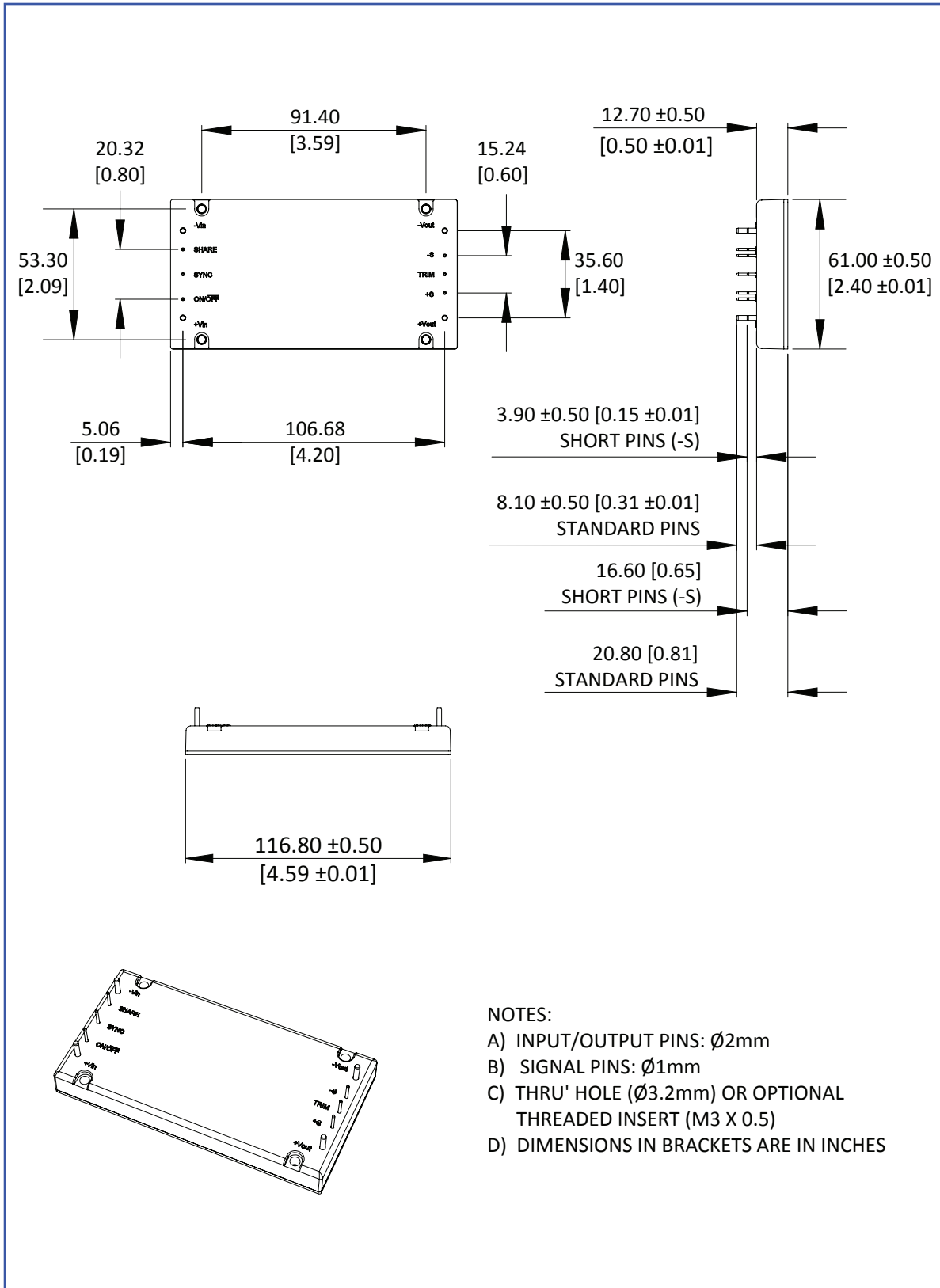
CONTROL SPECIFICATIONS				
<b>Primary Side</b>				
ON/OFF disable	external open collector or equivalent drive circuit	0V min.	2.4V typ.	
ON/OFF enable	external open collector or equivalent drive circuit		2.7V typ.	5V max.
ON/OFF driven voltage	external drive source voltage			7V max.
ON/OFF enable delay	delay to 50% output voltage, +Vout to -Vout		2ms typ.	5ms max.
ON/OFF pull-up resistance	internal pull-up to 5V		18kΩ	
ON/OFF series resistance	internal pull-down to -Vin when OT, OV or UV tripped		220Ω	
ON/OFF temp. shutdown	increasing baseplate temperature, centre	100°C	105°C	125°C
ON/OFF temp. restart	decreasing baseplate temperature, centre		90°C	
ON/OFF temp. sense voltage	advance trip warning		2.7V	4.5V
ON/OFF temp. sense voltage	advance trip warning @ 90°C	3.25V	3.5V	3.75V
ON/OFF temp. sense voltage	prior threshold	2.4V		2.7V
ON/OFF temp. sense voltage	post threshold	2.0V		2.4V
ON/OFF temp. sense voltage	after restart		3.5V	
ON/OFF input Under Voltage	turn-on (increasing input Vin)	see input specifications		
ON/OFF input Under Voltage	turn-off (decreasing input Vin)	see input specifications		
ON/OFF input Over Voltage	turn-off/on			
ON/OFF alarm	UV and OV fault alarm, sink 1.5mA			0.8V
ON/OFF alarm	OT trip	2.1V		2.4V
SYNC amplitude	external drive source	3V	4V	30V
SYNC width	maximum Tr and Tf to be nominally 10% of pulse width	50ns	100ns	200ns
SYNC control range	single and multiple modules	320kHz	330kHz	360kHz
SYNC resistance	resistance to -Vin		90Ω	
<b>Secondary Side</b>				
SHARE resistance	resistance to Vout		330Ω	
TRIM voltage	reference to -Sense	2.487V	2.5V	2.513V
TRIM resistance	internal series resistance		10kΩ	

SAFETY & EMC SPECIFICATIONS	
Safety Standards	UL/EN/IEC60950-1 2nd Ed. (F501 UL Approved, F351 & F211 designed to meet)
Emissions	EN55011, level B (Conducted & Radiated)
Immunity	ESD - EN61000-4-2, Radiated RF - EN61000-4-3, Conducted RF - EN61000-4-6, Fast Transients - EN61000-4-4, Input Surges - EN61000-4-11

Note 1: Consult factory for details of suitable external filtering.



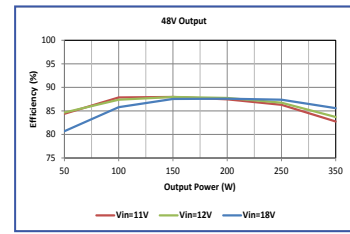
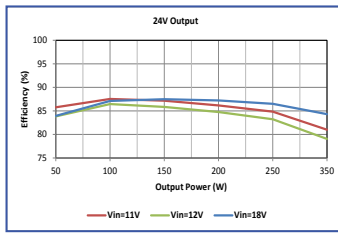
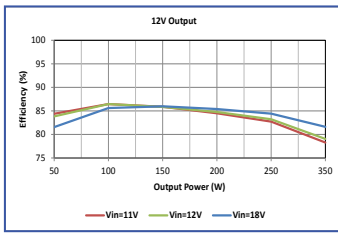
### MECHANICALS



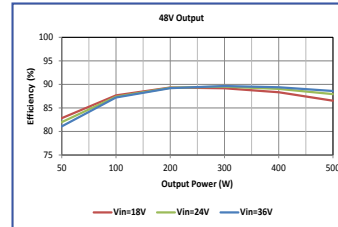
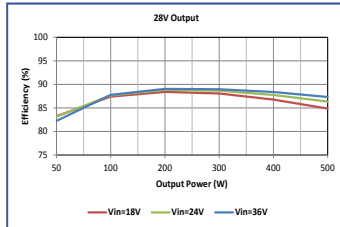
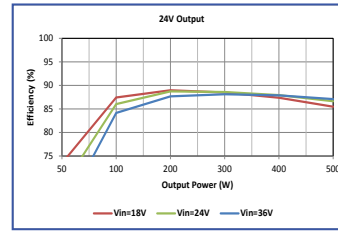
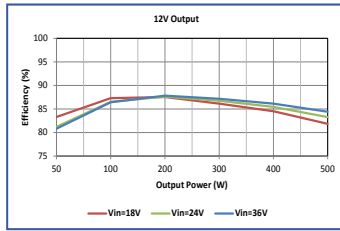
F SERIES - DC/DC



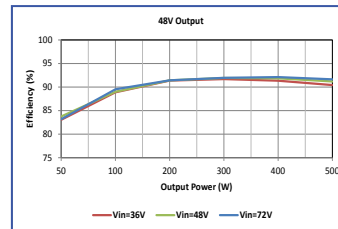
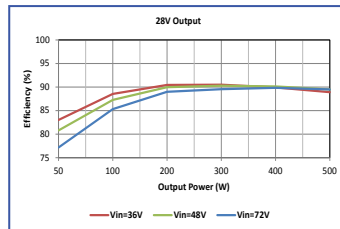
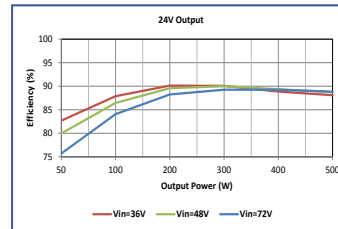
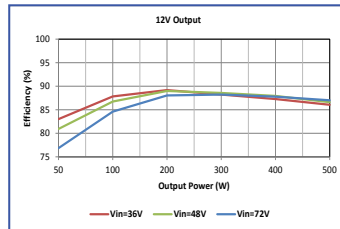
### EFFICIENCY CURVES



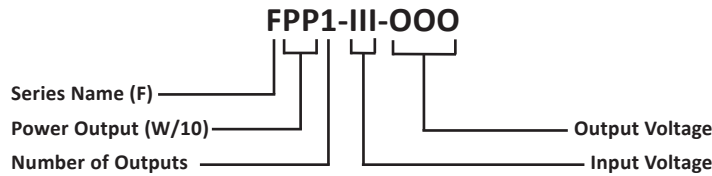
### F501 - 24V INPUT



### F501 - 48V INPUT



### MODEL NUMBER CONFIGURATION GUIDE



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

F SERIES - DC/DC

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