

# FDD05 SERIES

DC - DC CONVERTER

5 ~ 6W SINGLE & DUAL OUTPUT



## FEATURES

- 4:1 & 3:1 & 2:1 WIDE INPUT RANGE
- I/O ISOLATION
- SHORT CIRCUIT PROTECTION
- HIGH PERFORMANCE
- 3 YEARS WARRANTY

## MODEL LIST

MODEL NO.	INPUT VOLTAGE	INPUT CURRENT (typ.)	OUTPUT WATTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFF. (min.)	EFF. (typ.)	CAPACITOR LOAD (max.)
<b>Single Output Models</b>								
FDD05 - 05S	20~60 VDC	135 mA	5 WATTS	+ 5 VDC	1000 mA	72%	74%	2200 $\mu$ F
FDD05 - 12S	20~60 VDC	160 mA	6 WATTS	+ 12 VDC	500 mA	72%	74%	1500 $\mu$ F
FDD05 - 15S	20~60 VDC	155 mA	6 WATTS	+ 15 VDC	400 mA	72%	74%	270 $\mu$ F
FDD05 - 05S1	9~18 VDC	550 mA	5 WATTS	+ 5 VDC	1000 mA	72%	74%	2200 $\mu$ F
FDD05 - 12S1	9~18 VDC	635 mA	6 WATTS	+ 12 VDC	500 mA	72%	74%	1500 $\mu$ F
FDD05 - 15S1	9~18 VDC	625 mA	6 WATTS	+ 15 VDC	400 mA	72%	74%	270 $\mu$ F
FDD05 - 05S2	18~36 VDC	275 mA	5 WATTS	+ 5 VDC	1000 mA	72%	74%	2200 $\mu$ F
FDD05 - 12S2	18~36 VDC	315 mA	6 WATTS	+ 12 VDC	500 mA	72%	74%	1500 $\mu$ F
FDD05 - 15S2	18~36 VDC	305 mA	6 WATTS	+ 15 VDC	400 mA	72%	74%	270 $\mu$ F
FDD05 - 05S3	36~72 VDC	135 mA	5 WATTS	+ 5 VDC	1000 mA	72%	74%	2200 $\mu$ F
FDD05 - 12S3	36~72 VDC	160 mA	6 WATTS	+ 12 VDC	500 mA	72%	74%	1500 $\mu$ F
FDD05 - 15S3	36~72 VDC	155 mA	6 WATTS	+ 15 VDC	400 mA	72%	74%	270 $\mu$ F
FDD05 - 05S4	9~36 VDC	275 mA	5 WATTS	+ 5 VDC	1000 mA	72%	74%	2200 $\mu$ F
FDD05 - 12S4	9~36 VDC	315 mA	6 WATTS	+ 12 VDC	500 mA	72%	74%	1500 $\mu$ F
FDD05 - 15S4	9~36 VDC	310 mA	6 WATTS	+ 15 VDC	400 mA	72%	74%	270 $\mu$ F
FDD05 - 05S5	18~72 VDC	135 mA	5 WATTS	+ 5 VDC	1000 mA	72%	74%	2200 $\mu$ F
FDD05 - 12S5	18~72 VDC	160 mA	6 WATTS	+ 12 VDC	500 mA	72%	74%	1500 $\mu$ F
FDD05 - 15S5	18~72 VDC	155 mA	6 WATTS	+ 15 VDC	400 mA	72%	74%	270 $\mu$ F
<b>Dual Output Models</b>								
FDD05 - 05D	20~60 VDC	140 mA	5 WATTS	$\pm$ 5 VDC	$\pm$ 500 mA	73%	75%	$\pm$ 680 $\mu$ F
FDD05 - 12D	20~60 VDC	160 mA	6 WATTS	$\pm$ 12 VDC	$\pm$ 250 mA	75%	77%	$\pm$ 150 $\mu$ F
FDD05 - 15D	20~60 VDC	155 mA	6 WATTS	$\pm$ 15 VDC	$\pm$ 200 mA	75%	77%	$\pm$ 68 $\mu$ F
FDD05 - 05D1	9~18 VDC	570 mA	5 WATTS	$\pm$ 5 VDC	$\pm$ 500 mA	73%	75%	$\pm$ 680 $\mu$ F
FDD05 - 12D1	9~18 VDC	645 mA	6 WATTS	$\pm$ 12 VDC	$\pm$ 250 mA	75%	77%	$\pm$ 150 $\mu$ F
FDD05 - 15D1	9~18 VDC	630 mA	6 WATTS	$\pm$ 15 VDC	$\pm$ 200 mA	75%	77%	$\pm$ 68 $\mu$ F
FDD05 - 05D2	18~36 VDC	280 mA	5 WATTS	$\pm$ 5 VDC	$\pm$ 500 mA	73%	75%	$\pm$ 680 $\mu$ F
FDD05 - 12D2	18~36 VDC	315 mA	6 WATTS	$\pm$ 12 VDC	$\pm$ 250 mA	75%	77%	$\pm$ 150 $\mu$ F
FDD05 - 15D2	18~36 VDC	310 mA	6 WATTS	$\pm$ 15 VDC	$\pm$ 200 mA	75%	77%	$\pm$ 68 $\mu$ F
FDD05 - 05D3	36~72 VDC	140 mA	5 WATTS	$\pm$ 5 VDC	$\pm$ 500 mA	73%	75%	$\pm$ 680 $\mu$ F
FDD05 - 12D3	36~72 VDC	160 mA	6 WATTS	$\pm$ 12 VDC	$\pm$ 250 mA	75%	77%	$\pm$ 150 $\mu$ F

# FDD05 SERIES

SINGLE & DUAL OUTPUT

## MODEL LIST

MODEL NO.	INPUT VOLTAGE	INPUT CURRENT (typ.)	OUTPUT WATTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFF. (min.)	EFF. (typ.)	CAPACITOR LOAD (max.)
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### Dual Output Models

FDD05 - 15D3	36~72 VDC	155 mA	6 WATTS	± 15 VDC	± 200 mA	75%	77%	± 68 $\mu$ F
FDD05 - 05D4	9~36 VDC	280 mA	5 WATTS	± 5 VDC	± 500 mA	73%	75%	± 680 $\mu$ F
FDD05 - 12D4	9~36 VDC	315 mA	6 WATTS	± 12 VDC	± 250 mA	75%	77%	± 150 $\mu$ F
FDD05 - 15D4	9~36 VDC	310 mA	6 WATTS	± 15 VDC	± 200 mA	75%	77%	± 68 $\mu$ F
FDD05 - 05D5	18~72 VDC	140 mA	5 WATTS	± 5 VDC	± 500 mA	73%	75%	± 680 $\mu$ F
FDD05 - 12D5	18~72 VDC	160 mA	6 WATTS	± 12 VDC	± 250 mA	75%	77%	± 150 $\mu$ F
FDD05 - 15D5	18~72 VDC	155 mA	6 WATTS	± 15 VDC	± 200 mA	75%	77%	± 68 $\mu$ F

## SPECIFICATION

All Specifications Typical At Nominal Line, Full Load, 25°C Unless Otherwise Noticed

GENERAL							
Characteristics	Conditions	min.	typ.	max.	unit		
Switching frequency	$V_i$ nom, $I_o$ nom	80			KHz		
Isolation voltage	Input - Output	1,500			VDC		
Isolation resistance	Input - Output, @ 500VDC	100			$M\Omega$		
Isolation capacitance	100KHz / 1V			330	PF		
Ambient temperature	Operating at $V_i$ nom, $I_o$ nom	-25		+ 71	°C		
Case temperature	Operating at $V_i$ nom, $I_o$ nom			+ 90	°C		
Derating	$V_i$ nom	See derating curve					
Storage temperature	Non operational	-40		+ 100	°C		
Relative humidity	$V_i$ nom, $I_o$ nom	20		95	% RH		
Temperature coefficient	$V_i$ nom, $I_o$ min			± 0.02	% / °C		
Dimension		L50.8 x W50.8 x H12.0				mm	
MTBF	Bellcore issue 6 @ 40°C, GB		1,120,000		Hours		
Cooling	Free air convection						

## INPUT SPECIFICATIONS

Characteristics	Conditions	min.	typ.	max.	unit	
Input voltage range	$T_a$ min ... $T_a$ max, $I_o$ nom	2 : 1	9	12	18	VDC
			18	24	36	VDC
			36	48	72	VDC
		3 : 1	20	48	60	VDC
		4 : 1	9	24	36	VDC
			18	48	72	VDC
No load input current	$V_i$ nom, $I_o = 0$	12V		40	mA	
		24V		25	mA	
		48V		15	mA	
Input voltage w/o damage	$I_o$ nom	12V		20	VDC	
		24V		40	VDC	
		48V		75	VDC	
Startup voltage	$I_o$ nom	12V	8.5		VDC	
		24V	8.5		VDC	
		48V	16		VDC	
Input filter	Pi type					

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SINGLE & DUAL OUTPUT

## SPECIFICATION

All Specifications Typical At Nominal Line, Full Load, 25°C Unless Otherwise Noticed

### OUTPUT SPECIFICATIONS

Characteristics	Conditions	min.	typ.	max.	unit
Output voltage accuracy	Vi nom, Io nom			± 2	%
Minimum load	Vi nom, single output models	0			%
	Vi nom, dual output models (each output)	20			%
Line regulation	Io nom, Vi min ...Vi max			± 1	%
Load regulation	Vi nom, Io 0 ...Io nom, single output models			± 2	%
	Vi nom, Io min ...Io nom, dual output models			± 5	%
Cross regulation (Dual model)	Aymmetrical load 20% - 100% FL			± 10	%
Startup time	Vi nom, Io nom			30	ms
Transient recovery time	Vi nom, I ~0.5 Io nom			3	ms
Ripple & noise	Vi nom, Io nom, BW = 20MHz			150	mV
Efficiency	Vi nom, Io nom, Po / Pi	Up to 77%, See model list and efficiency curve			

### CONTROL AND PROTECTION

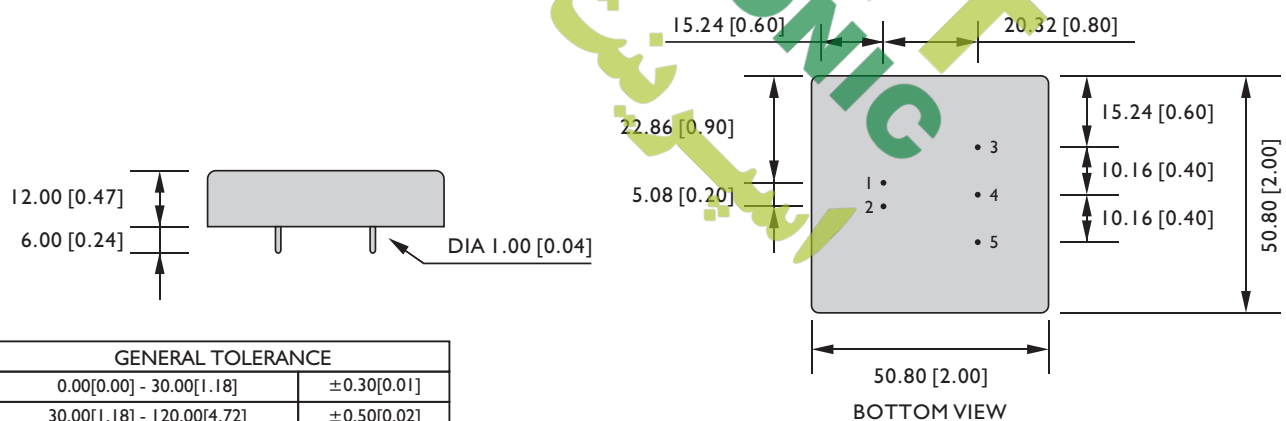
Input reversed	External shunt diode, external fuse recommended (12Vin : 1.5A, 24Vin : 1.5A, 48Vin : 1A)
Output short circuit	Current limited (Auto-recovery)

### PHYSICAL CHARACTERISTICS

Case size	50.8 x 50.8 x 12.0 mm (2 x 2 x 0.47 inches)
Case material	Plastic
Weight	45 g
Potting material	Epoxy

### MECHANISM & PIN CONFIGURATION

mm [inch]



### PIN ASSIGNMENT

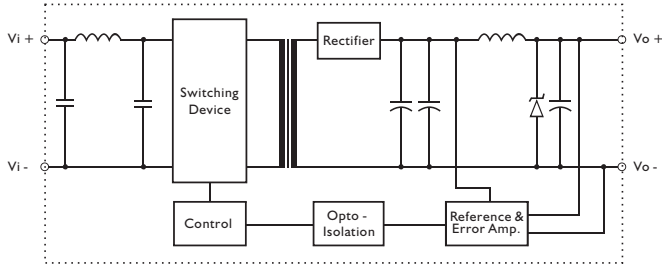
GENERAL					
PIN NO.	1	2	3	4	5
SINGLE	Vi+	Vi-	Vo+	NO PIN	Vo-
DUAL	Vi+	Vi-	Vo+	com	Vo-

# FDD05 SERIES

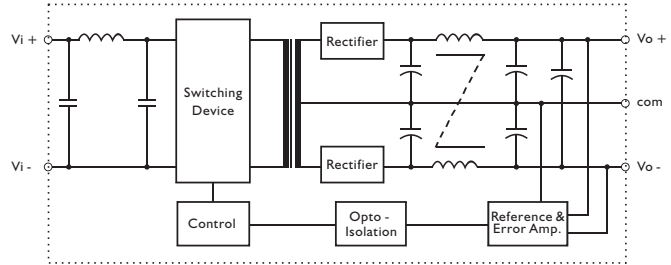
SINGLE & DUAL OUTPUT

## CIRCUIT SCHEMATIC

• Block diagram for FDD05 series with single output

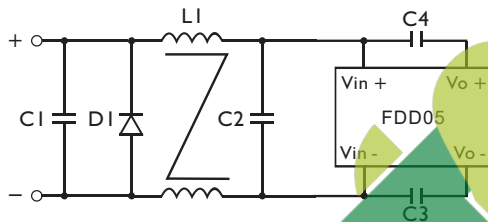


• Block diagram for FDD05 series with dual output



## RECOMMENDED CIRCUIT

• Recommended filter for EN55022 Class B compliance

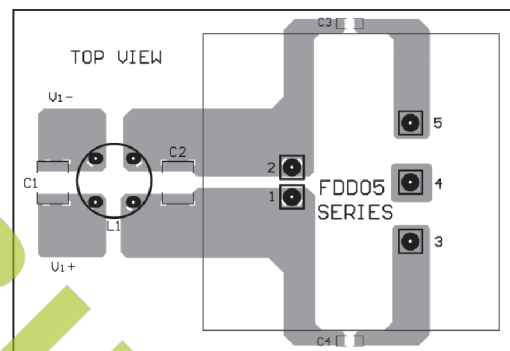


NOTE: D1 - Reverse Diode (2A/100V)

• The components used in the above figure, together with the manufacturer part numbers for these components, are as follows.

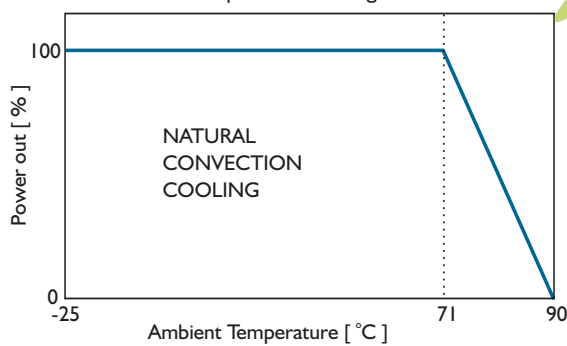
	C1	C2	C3	C4	L1
FDD05-XXS1/S2/S4 XXD1/D2/D4	6.8 $\mu$ F / 50V MLCC	3.3 $\mu$ F / 50V MLCC	InF/2KV MLCC	InF/2KV MLCC	0.5mH Common Choke
FDD05-XXS/S3/S5 XXD/D3/D5	4.7 $\mu$ F / 100V MLCC	4.7 $\mu$ F / 100V MLCC	InF/2KV MLCC	InF/2KV MLCC	3mH Common Choke

• Recommended EN 55022 Class B filter circuit layout.

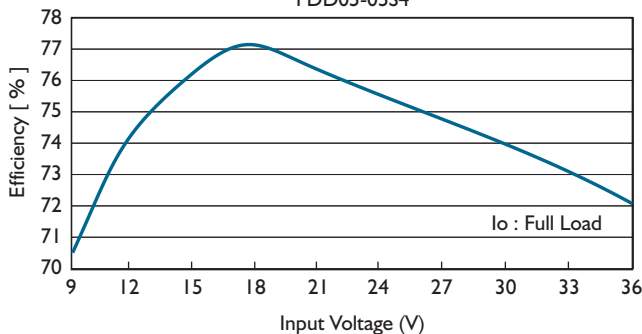


## DERATING AND EFFICIENCY CURVE

Temperature derating curve



Efficiency Vs Input Voltage  
FDD05-05S4



Efficiency Vs Output Load  
FDD05-05S4

