



# P-DUKE POWER

## FDC10 • FDC10W Series

DC-DC Converter  
Up to 10 Watts

**3**  
YEARS  
WARRANTY

ROHS  
COMPLIANT

REACH  
COMPLIANT



Automation



Datacom



IPC



Industry



Measurement



Telecom



Automobile



Boat



Charger



Medical



PV



Railway

UL US CB CE

**1600**  
VDC  
Isolation  
Voltage

**4 : 1**  
Wide  
Input  
Range

**2 : 1**  
Input  
Range

**6** sided  
Shielding

**NO**  
Min. Load  
Required

REMOTE  
**ON**  
**OFF**

**OCP**

**OVP**

**SCP**

### PART NUMBER STRUCTURE

FDC10 -	48	S	05	W -	M2	P	HC
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Operating Temp. Option	Remote On/Off Option	Assembly Option
	12:9~18 24:18~36 48:36~75	S:Single  D: Dual	33:3.3 05:5 12:12 15:15  05:±5 12:±12 15:±15	□:2:1	□:-25~+85°C With derating M1:-25~+85°C Without derating M2:-40~+85°C With derating M3:-55~+85°C With derating	□:No pin P:Positive logic N:Negative logic	□: None HC: Heat-sink with Clamp
	24:9~36 48:18~75	S:Single  D: Dual	33:3.3 05:5 12:12 15:15  05:±5 12:±12 15:±15	W:4:1	□:-25~+85°C With derating M2:-40~+85°C With derating M3:-55~+85°C With derating	□:No pin P:Positive logic N:Negative logic	□:None HC:Heat-sink with Clamp

**TECHNICAL SPECIFICATION** All specifications are typical at nominal input, full load and 25°C unless otherwise noted

Model Number	Input Range	Output Voltage	Output Current @Full Load	Input Current @ No Load	Efficiency	Maximum Capacitor Load (1)
	VDC	VDC	mA	mA	%	μF
FDC10-12S33	9 ~ 18	3.3	2000	17	80	6800
FDC10-12S05	9 ~ 18	5	2000	21	81	4700
FDC10-12S12	9 ~ 18	12	830	38	84	690
FDC10-12S15	9 ~ 18	15	670	36	84	470
FDC10-12D05	9 ~ 18	±5	±1000	39	84	±680
FDC10-12D12	9 ~ 18	±12	±416	47	83	±330
FDC10-12D15	9 ~ 18	±15	±333	45	84	±110
FDC10-24S33	18 ~ 36	3.3	2000	15	80	6800
FDC10-24S05	18 ~ 36	5	2000	22	82	4700
FDC10-24S12	18 ~ 36	12	830	18	84	690
FDC10-24S15	18 ~ 36	15	670	36	84	470
FDC10-24D05	18 ~ 36	±5	±1000	28	83	±680
FDC10-24D12	18 ~ 36	±12	±416	24	85	±330
FDC10-24D15	18 ~ 36	±15	±333	31	84	±110
FDC10-48S33	36 ~ 75	3.3	2000	11	80	6800
FDC10-48S05	36 ~ 75	5	2000	14	84	4700
FDC10-48S12	36 ~ 75	12	830	14	86	690
FDC10-48S15	36 ~ 75	15	670	10	87	470
FDC10-48D05	36 ~ 75	±5	±1000	16	84	±680
FDC10-48D12	36 ~ 75	±12	±416	19	86	±330
FDC10-48D15	36 ~ 75	±15	±333	16	85	±110
FDC10-24S33W	9 ~ 36	3.3	2500	13	78	6800
FDC10-24S05W	9 ~ 36	5	2000	11	80	4700
FDC10-24S12W	9 ~ 36	12	830	16	84	690
FDC10-24S15W	9 ~ 36	15	670	26	81	470
FDC10-24D05W	9 ~ 36	±5	±1000	15	82	±680
FDC10-24D12W	9 ~ 36	±12	±416	15	80	±330
FDC10-24D15W	9 ~ 36	±15	±333	22	80	±110
FDC10-48S33W	18 ~ 75	3.3	2500	10	76	6800
FDC10-48S05W	18 ~ 75	5	2000	9	81	4700
FDC10-48S12W	18 ~ 75	12	830	9	84	690
FDC10-48S15W	18 ~ 75	15	670	11	84	470
FDC10-48D05W	18 ~ 75	±5	±1000	12	82	±680
FDC10-48D12W	18 ~ 75	±12	±416	20	78	±330
FDC10-48D15W	18 ~ 75	±15	±333	20	81	±110

**INPUT SPECIFICATIONS**

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range	FDC10 series	12Vin(nom)	9	12	18	VDC
		24Vin(nom)	18	24	36	
		48Vin(nom)	36	48	75	
	FDC10W series	24Vin(nom)	9	24	36	VDC
		48Vin(nom)	18	48	75	
Input reflected ripple current				30		mAp-p
Start up time	Constant resistive load	Power up		20		ms
Input surge voltage	100 ms, max.	12Vin(nom)			36	VDC
		24Vin(nom)			50	
		48Vin(nom)			100	
Input filter				Pi type		
Remote ON/OFF (Option)	Referred to -Vin pin	Positive logic	DC-DC ON	Open or 3.5 ~ 12VDC		
				DC-DC OFF	Short or 0 ~ 1.2VDC	
		Negative logic	DC-DC ON		Short or 0 ~ 1.2VDC	
				DC-DC OFF	Open or 3.5 ~ 12VDC	
		Input current of Ctrl pin	-0.5			+1.0
		Remote off input current		20		mA

**OUTPUT SPECIFICATIONS**

Parameter	Conditions		Min.	Typ.	Max.	Unit
Voltage accuracy			-1.0		+1.0	%
Line regulation	Low Line to High Line at Full Load		-0.2		+0.2	%
Load regulation	No Load to Full Load	Single	-0.5		+0.5	%
		Dual	-1.0		+1.0	
Cross regulation	Asymmetrical load 25%/100% FL	Dual	-5.0		+5.0	%
Ripple and noise	Measured by 20MHz bandwidth	Single		50		mVp-p
		Dual		75		
Temperature coefficient			-0.02		+0.02	%/°C
Transient response recovery time	25% load step change			250		µs
Over voltage protection	Zener diode clamp	3.3Vout		3.9		VDC
		5Vout		6.2		
		12Vout		15		
		15Vout		18		
Over load protection	% of Iout rated				150	%
Short circuit protection			Continuous, automatic recovery			

**GENERAL SPECIFICATIONS**

Parameter	Conditions		Min.	Typ.	Max.	Unit
Isolation voltage	1 minute	Input to Output	1600			VDC
		Input (Output) to Case	1600			
Isolation resistance	500VDC		1			GΩ
Isolation capacitance					300	pF
Switching frequency			270	300	330	kHz
Safety approvals	IEC/ UL/ EN60950-1				UL:E193009 CB: UL(Demko)	
Case material			Nickel-coated copper			
Base material			Non-conductive black plastic			
Potting material			Epoxy (UL94 V-0)			
Weight			27g (0.95oz)			
MTBF	MIL-HDBK-217F, Full load		3.342 x 10 <sup>6</sup> hrs			

## ENVIRONMENTAL SPECIFICATIONS

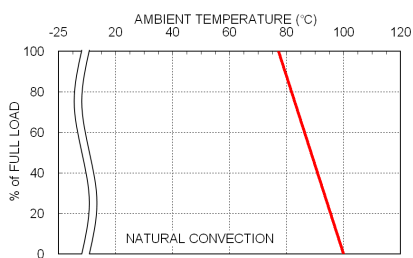
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	Standard	With derating	-25	+85	°C
	M1	Without derating	-40	+85	
	M2	With derating	-40	+85	
	M3	With derating	-55	+85	
*M1 version is more efficient; therefore, it can be operated in a more extensive temperature range than standard and M2 version.					
Maximum case temperature				+105	°C
Storage temperature range		-55		+125	°C
Thermal impedance	Natural convection	Without heat-sink	12		°C/W
		With heat-sink	10		
Thermal shock					MIL-STD-810F
Vibration					MIL-STD-810F
Relative humidity					5% to 95% RH

## EMC SPECIFICATIONS

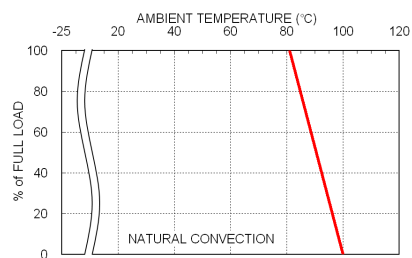
Parameter	Conditions	Level
EMI	EN55022 With external components	Class A, Class B
ESD	EN61000-4-2 Air $\pm 8kV$ and Contact $\pm 6kV$	Perf. Criteria B
Radiated immunity	EN61000-4-3 10 V/m	Perf. Criteria A
Fast transient	EN61000-4-4 $\pm 2kV$	Perf. Criteria B
	With an external input filter capacitor (Nippon chemi-con KY series, 220 $\mu F$ /100V)	
Surge	EN61000-4-5 $\pm 2kV$	Perf. Criteria B
	With an external input filter capacitor (Nippon chemi-con KY series, 220 $\mu F$ /100V)	
Conducted immunity	EN61000-4-6 10 Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8 100A/m continuous; 1000A/m 1 second	Perf. Criteria A

**CAUTION:** This power module is not internally fused. An input line fuse must always be used.

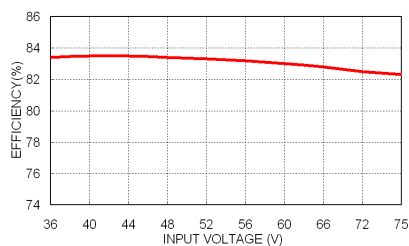
## CHARACTERISTIC CURVE



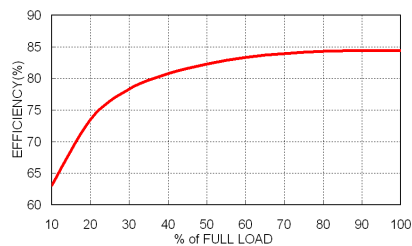
FDC10-48S05 Derating Curve



FDC10-48S05 Derating Curve With Heat-sink



FDC10-48S05 Efficiency vs. Input Voltage



FDC10-48S05 Efficiency vs. Output Load

## FUSE CONSIDERATION

This power module is not internally fused. An input line fuse must always be used.

This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.

To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.

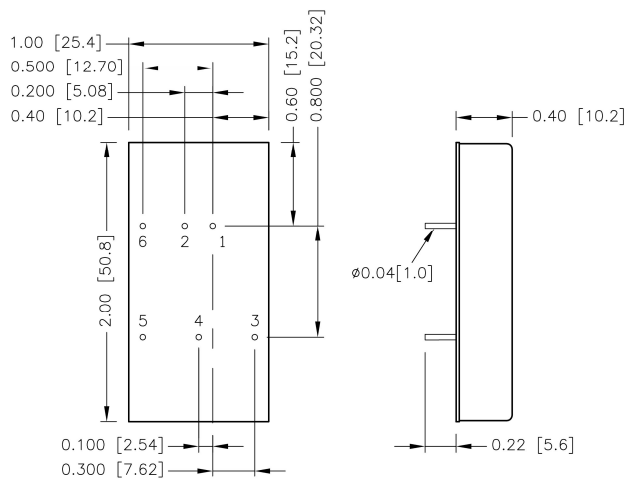
The input line fuse suggest as below :

Model	Fuse Rating (A)	Fuse Type
FDC10-12S□□、FDC10-12D□□	2	Slow-Blow
FDC10-24S□□、FDC10-24D□□	1	Slow-Blow
FDC10-48S□□、FDC10-48D□□	0.5	Slow-Blow

Model	Fuse Rating (A)	Fuse Type
FDC10-24S□□W、FDC10-24D□□W	2	Slow-Blow
FDC10-48S□□W、FDC10-48D□□W	1	Slow-Blow

The table based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin.

## MECHANICAL DRAWING



BOTTOM VIEW

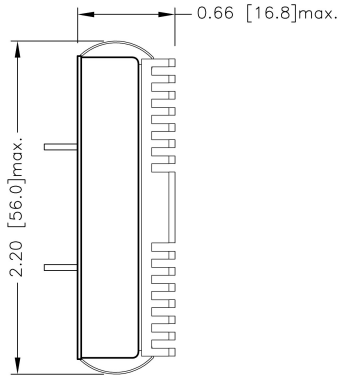
## PIN CONNECTION

PIN	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	No pin	Common
5	-Vout	-Vout
6	Ctrl(Optional)	Ctrl(Optional)

- All dimensions in inch (mm)
- Tolerance :x.xx±0.02 (x.x±0.5)  
x.xxx±0.01 (x.xx±0.25)
- Pin pitch tolerance ±0.01 (0.25)
- Pin dimension tolerance ±0.004(0.1)

**HEAT-SINK OPTIONS**

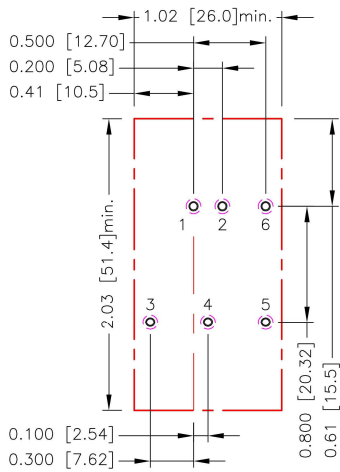
-HC (Heat-sink with clamps)



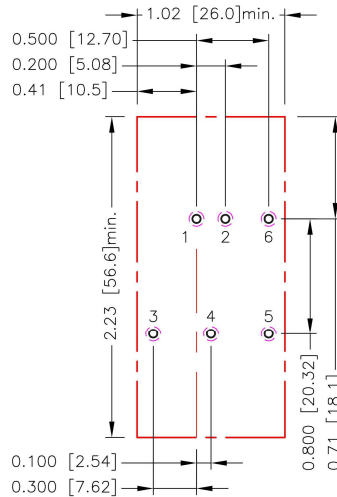
\* All dimensions in inch (mm)

**RECOMMENDED PAD LAYOUT**

**Standard**



**-HC**



All dimensions in inch[mm]  
 Pad size(lead free recommended)  
 Through hole 1.2.3.4.5.6:  $\varnothing 0.051[\varnothing 1.30]$   
 Top view pad 1.2.3.4.5.6:  $\varnothing 0.064[\varnothing 1.63]$   
 Bottom view pad 1.2.3.4.5.6:  $\varnothing 0.102[2.60]$

