



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



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	33:3.3 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
		D:Dual	05:±5 12:±12 15:±15				
	24:9~36 48:18~75	S:Single	33:3.3 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
		D:Dual	05:±5 12:±12 15:±15				

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	
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	
		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 ⁶ hrs	

ENVIRONMENTAL SPECIFICATIONS

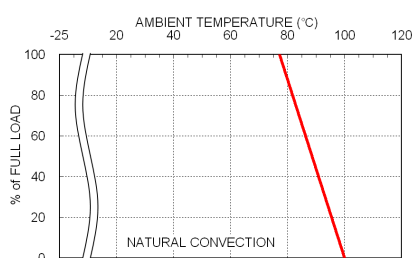
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	Standard M1 M2 M3 *M1 version is more efficient; therefore, it can be operated in a more extensive temperature range than standard and M2 version.	-25 -40 -40 -55		+85 +85 +85 +85	°C
Maximum case temperature				+105	°C
Storage temperature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

EMC SPECIFICATIONS

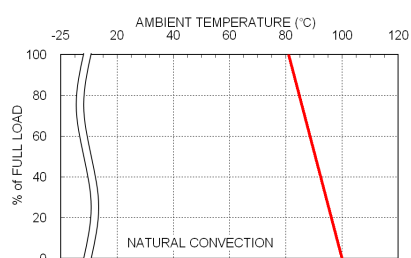
Parameter	Conditions	Level
EMI	EN55032 With external components	Class A, Class B
ESD	EN61000-4-2 Air $\pm 8\text{kV}$ and Contact $\pm 6\text{kV}$	Perf. Criteria B
Radiated immunity	EN61000-4-3 10 V/m	Perf. Criteria A
Fast transient	EN61000-4-4 $\pm 2\text{kV}$	Perf. Criteria B
Surge	EN61000-4-5 $\pm 2\text{kV}$ With an external input filter capacitor (Nippon chemi-con KY series, 220 $\mu\text{F}/100\text{V}$) With an external input filter capacitor (Nippon chemi-con KY series, 220 $\mu\text{F}/100\text{V}$)	Perf. Criteria B
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.

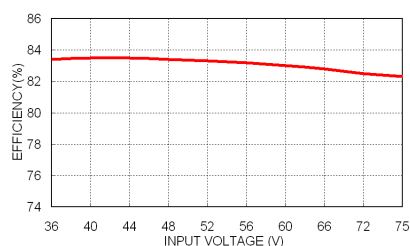
CHARACTERISTIC CURVE



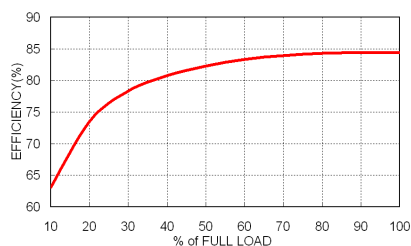
FDC10-48S05 Derating Curve



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.

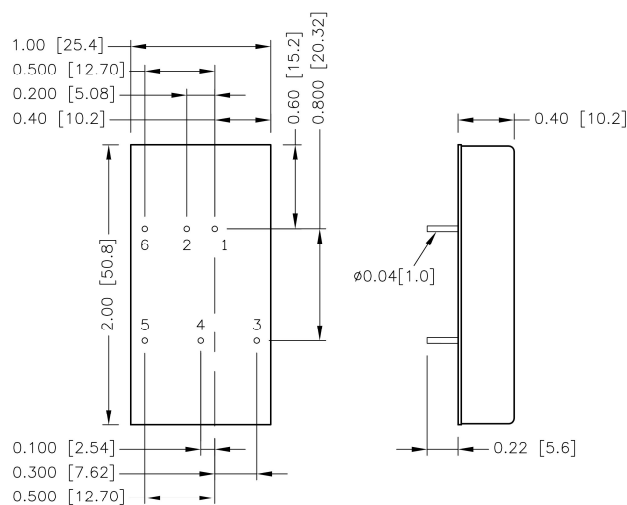
The input line fuse suggest as below :

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

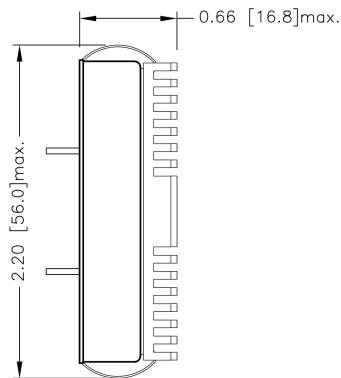
PIN CONNECTION

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

1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]
x.xxx±0.01 [x.xx±0.25]
3. Pin pitch tolerance ±0.01 [0.25]
4. Pin dimension tolerance ±0.004[0.10]

HEAT-SINK OPTIONS

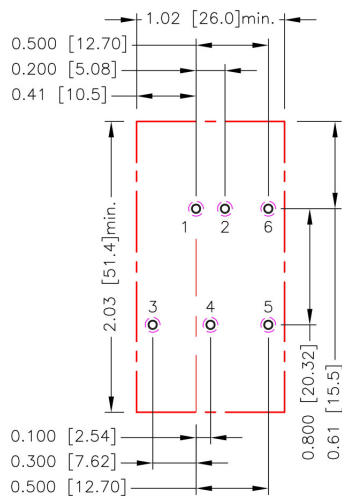
-HC (Heat-sink with clamps)



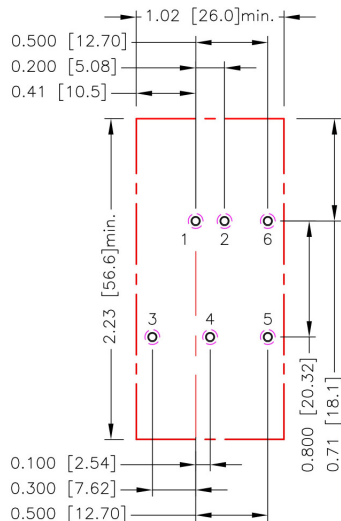
* All dimensions in inch [mm]

RECOMMENDED PAD LAYOUT

Standard



-HC



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

THERMAL CONSIDERATIONS

The power module operates in a variety of thermal environments.

However, sufficient cooling should be provided to help ensure reliable operation of the unit.

Heat is removed by conduction, convection, and radiation to the surrounding Environment.

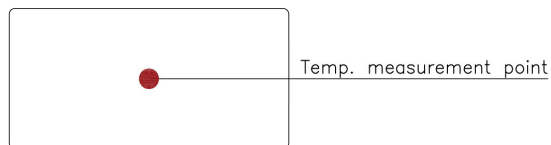
Proper cooling can be verified by measuring the point as the figure below.

The temperature at this location should not exceed 105°C.

When Operating, adequate cooling must be provided to maintain the test point temperature at or below 105°C.

Although the maximum point Temperature of the power modules is 105°C, you can limit this Temperature to a lower value for extremely high reliability.

- Thermal test condition with vertical direction by natural convection (20LFM).



TOP VIEW