



P-DUKE POWER

FEC15W Series

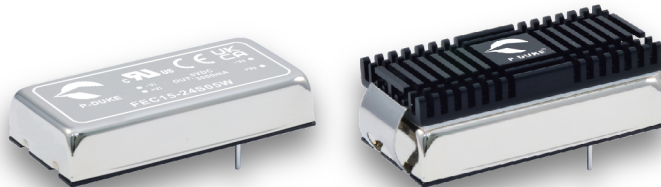
DC-DC Converter
Up to 15 Watts

3

YEARS
WARRANTY

ROHS
COMPLIANT

REACH
COMPLIANT



Automation



Datacom



IPC



Industry



Measurement



Telecom



Automobile



Boat



Charger



Medical



PV



Railway

UL US CB CE UK CA

1600
VDC
Isolation
Voltage

4 : 1
Wide
Input
Range

6
sided
Shielding

NO
Min. Load
Required

REMOTE
ON
OFF

OCP

OVP

SCP

UVP

PART NUMBER STRUCTURE

FEC15 -	48	S	05	W -	M3	P	HC
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Operating Temp. Options	Remote On/Off Options	Assembly Options
	24:9~36 48:18~75	S:Single	3P3:3.3 05:5 5P1:5.1 12:12 15:15	4:1	□:Standard -40~+105°C With derating M3:M3 Version -55~+105°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
	VDC	VDC	mA	mA	%	μF
FEC15-24S3P3W	9 ~ 36	3.3	4500	50	86	14700
FEC15-24S05W	9 ~ 36	5	3000	65	87	7200
FEC15-24S5P1W	9 ~ 36	5.1	3000	65	87	7200
FEC15-24S12W	9 ~ 36	12	1250	22	87	1250
FEC15-24S15W	9 ~ 36	15	1000	22	87	800
FEC15-24D05W	9 ~ 36	±5	±1500	55	87	±3600
FEC15-24D12W	9 ~ 36	±12	±625	30	88	±625
FEC15-24D15W	9 ~ 36	±15	±500	30	88	±400
FEC15-48S3P3W	18 ~ 75	3.3	4500	35	86	14700
FEC15-48S05W	18 ~ 75	5	3000	35	88	7200
FEC15-48S5P1W	18 ~ 75	5.1	3000	35	88	7200
FEC15-48S12W	18 ~ 75	12	1250	15	87	1250
FEC15-48S15W	18 ~ 75	15	1000	15	87	800
FEC15-48D05W	18 ~ 75	±5	±1500	35	88	±3600
FEC15-48D12W	18 ~ 75	±12	±625	17	88	±625
FEC15-48D15W	18 ~ 75	±15	±500	17	88	±400

INPUT SPECIFICATIONS							
Parameter	Conditions			Min.	Typ.	Max.	Unit
Operating input voltage range	24Vin(nom)			9	24	36	VDC
	48Vin(nom)			18	48	75	
Start up voltage	24Vin(nom)			9			VDC
	48Vin(nom)			18			
Shutdown voltage	24Vin(nom)			7	8	8.8	VDC
	48Vin(nom)			14.5	16	17.5	
Start up time	Constant resistive load	Power up		20			ms
Input surge voltage	100 ms, max.	24Vin(nom)		50			VDC
		48Vin(nom)		100			
Input filter				Pi type			
Remote ON/OFF (Option)	Referred to –Vin pin	Positive logic	DC-DC ON	Open or 3 ~ 12VDC			mA
			DC-DC OFF	Short or 0 ~ 1.2VDC			
		Negative logic	DC-DC ON	Short or 0 ~ 1.2VDC			
			DC-DC OFF	Open or 3 ~ 12VDC			
		Input current of Ctrl pin	-0.5	+0.5			
Remote off input current		2.5			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	%
	Single	-0.5		+0.5	%
Load regulation	No Load to Full Load	-0.5		+0.5	%
	Single	-1.0		+1.0	%
	Dual				
Cross regulation	Asymmetrical load 25%/100% FL	-5.0		+5.0	%
Ripple and noise	20MHz bandwidth		50		mVp-p
	With a 0.1μF/50V MLCC		75		
	Single 3.3Vout, 5Vout, 5.1Vout		75		
	Dual 12Vout, 15Vout				
	All				
Temperature coefficient		-0.02		+0.02	%/°C
Transient response recovery time	25% load step change		250		μs
Over voltage protection	Zener diode clamp		3.9		VDC
	3.3Vout		6.2		
	5Vout, 5.1Vout		15		
	12Vout		18		
	15Vout				
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	1600			VDC
	Input to Output	1600			
	Input (Output) to Case				
Case grounding				Connect case to -Vin with decoupling Y Cap	
Isolation resistance	500VDC	1			GΩ
Isolation capacitance				1500	pF
Switching frequency		360	400	440	kHz
Safety approvals	IEC /EN/ UL 62368-1			UL:E193009	
				CB: UL(Demko)	
Case material				Nickel-coated copper	
Base material				FR4 PCB	
Potting material				Epoxy (UL94 V-0)	
Weight				27g (0.95oz)	
MTBF	MIL-HDBK-217F, Full load			2.430 x 10 ⁶ hrs	

ENVIRONMENTAL SPECIFICATIONS

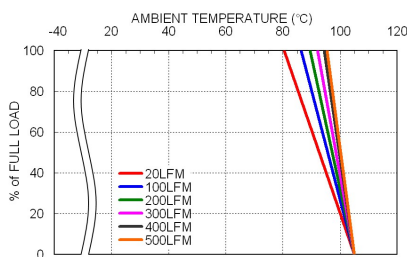
ENVIRONMENTAL OPERATING CONDITIONS						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating ambient temperature	Standard	With derating	-40		+105	°C
	M3	With derating	-55		+105	
Maximum case temperature					105	°C
Storage temperature range			-55		+125	°C
Thermal impedance	Without heat-sink			12		°C/W
	With heat-sink			10		
Thermal shock						MIL-STD-810F
Vibration						MIL-STD-810F
Relative humidity						5% to 95% RH

EMC SPECIFICATIONS

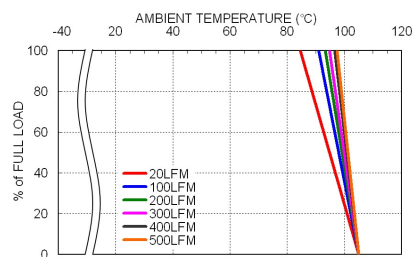
Parameter	Conditions	Level
EMI	EN55032	Class A, Class B
EMS	EN55024	
ESD	EN61000-4-2	Air $\pm 8\text{kV}$ and Contact $\pm 6\text{kV}$
Radiated immunity	EN61000-4-3	10 V/m
Fast transient	EN61000-4-4	$\pm 2\text{kV}$
Surge	EN61000-4-5	With an external input filter capacitor (Nippon chemi-con KY series, 220 μF /100V) $\pm 1\text{kV}$
Conducted immunity	EN61000-4-6	10 Vr.m.s
Power frequency magnetic field	EN61000-4-8	100A/m continuous; 1000A/m 1 second

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

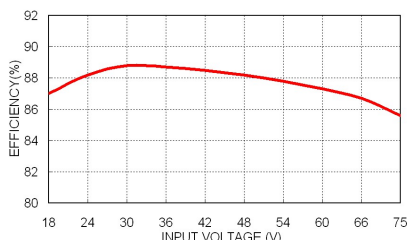
CHARACTERISTIC CURVE



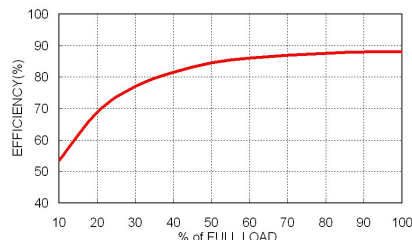
FEC15-48S05W Derating Curve



FEC15-48S05W Derating Curve With Heat-sink



FEC15-48S05W Efficiency vs. Input Voltage



FEC15-48S05W 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.

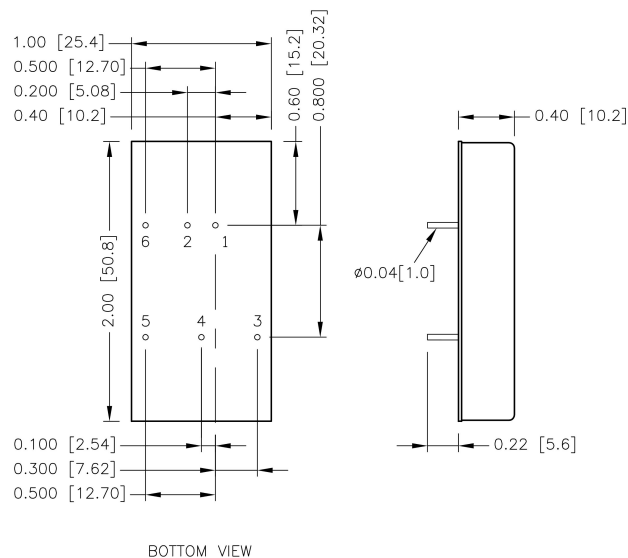
To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.

The input line fuse suggest as below :

Model	Fuse Rating (A)	Fuse Type
FEC15-24S□□W、FEC15-24D□□W	3.15	Slow-Blow
FEC15-48S□□W、FEC15-48D□□W	1.6	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



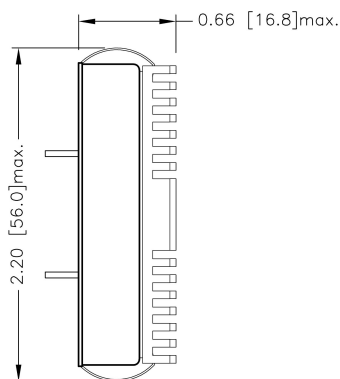
PIN CONNECTION

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 : $x.xx \pm 0.02$ [$x.x \pm 0.5$]
 $x.xxx \pm 0.01$ [$x.xx \pm 0.25$]
3. Pin pitch tolerance ± 0.01 [0.25]
4. Pin dimension tolerance ± 0.004 [0.10]

HEAT-SINK OPTIONS

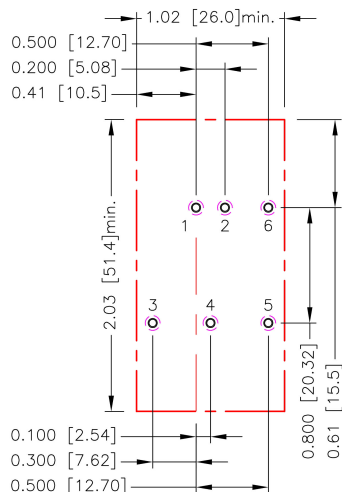
-HC (Heat-sink with clamps)



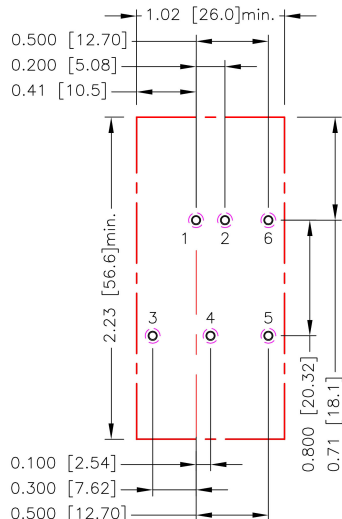
* All dimensions in inch [mm]

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.

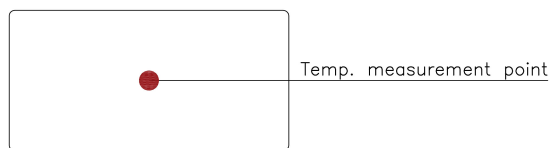
The case temperature (T_c) should be measured at the position as the figure below.

The temperature at this location should not exceed "Maximum case temperature".

When Operating, adequate cooling must be provided to maintain the test point temperature at or below "Maximum case temperature".

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