P-DUKE POWER

FED30 Series

DC-DC Converter
Up to 30 Watts

3 YEARS WARRANTY

RoHS COMPLIANT

REACH COMPLIANT

Automation | Datacom | IPC

Industry | Measurement | Telecom

Automobile | Boat | Charger

Medical | PV | Railway

c UL us | CB | CE | UKCA

1600 VDC Isolation Voltage | 2 : 1 Input Range | 6 sided Shielding | NO Min. Load Required | REMOTE ON OFF | OCP | OTP | OVP | SCP | UVP

PART NUMBER STRUCTURE

FED30 - 48 S 05 - N HC

Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Remote Control Options	Assembly Options
	12:9~18 **24:**18~36 **48:**36~75	**S:**Single	**1P5:** 1.5 **2P5:** 2.5 **3P3:** 3.3 **05:** 5 **5P1:** 5.1 **12:** 12 **15:** 15	□: 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℃ unless otherwise noted

Model Number	Input Range	Output Voltage	Output Current @Full Load	Input Current @ No Load	Efficiency	Maximum Capacitor Load
	VDC	VDC	A	mA	%	μF
FED30-12S1P5	9 ~ 18	1.5	8.5	70	79	20000
FED30-12S2P5	9 ~ 18	2.5	8	100	84	20000
FED30-12S3P3	9 ~ 18	3.3	8	105	85	20000
FED30-12S05	9 ~ 18	5	6	130	87	14400
FED30-12S5P1	9 ~ 18	5.1	6	130	87	14400
FED30-12S12	9 ~ 18	12	2.5	90	89	3000
FED30-12S15	9 ~ 18	15	2	80	89	2000
FED30-12D05	9 ~ 18	±5	±3	120	87	±3000
FED30-12D12	9 ~ 18	±12	±1.25	50	87	±2000
FED30-12D15	9 ~ 18	±15	±1	40	87	±1300
FED30-24S1P5	18 ~ 36	1.5	8.5	50	80	20000
FED30-24S2P5	18 ~ 36	2.5	8	50	85	20000
FED30-24S3P3	18 ~ 36	3.3	8	50	87	20000
FED30-24S05	18 ~ 36	5	6	75	90	14400
FED30-24S5P1	18 ~ 36	5.1	6	75	90	14400
FED30-24S12	18 ~ 36	12	2.5	40	91	3000
FED30-24S15	18 ~ 36	15	2	35	91	2000
FED30-24D05	18 ~ 36	±5	±3	70	90	±3000
FED30-24D12	18 ~ 36	±12	±1.25	30	89	±2000
FED30-24D15	18 ~ 36	±15	±1	30	90	±1300
FED30-48S1P5	36 ~ 75	1.5	8.5	45	80	20000
FED30-48S2P5	36 ~ 75	2.5	8	45	85	20000
FED30-48S3P3	36 ~ 75	3.3	8	30	87	20000
FED30-48S05	36 ~ 75	5	6	45	90	14400
FED30-48S5P1	36 ~ 75	5.1	6	45	89	14400
FED30-48S12	36 ~ 75	12	2.5	45	91	3000
FED30-48S15	36 ~ 75	15	2	50	91	2000
FED30-48D05	36 ~ 75	±5	±3	35	90	±3000
FED30-48D12	36 ~ 75	±12	±1.25	30	88	±2000
FED30-48D15	36 ~ 75	±15	±1	20	89	±1300

INPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range		12Vin(nom)	9	12	18	VDC
		24Vin(nom)	18	24	36	
		48Vin(nom)	36	48	75	
Start up voltage		12Vin(nom)			9	VDC
		24Vin(nom)			18	
		48Vin(nom)			36	
Shutdown voltage		12Vin(nom)	7	8	8.8	VDC
		24Vin(nom)	15	16	17.5	
		48Vin(nom)	31.5	33	34.5	
Start up time	Constant resistive load	Power up		30		ms
		Remote ON/OFF		30		
Input surge voltage	100 ms, max.	12Vin(nom)			25	VDC
		24Vin(nom)			50	
		48Vin(nom)			100	
Input filter				Pi type		
Remote ON/OFF	Referred to –Vin pin	Positive logic (Standard) DC-DC ON		Open or 3 ~ 12VDC		
		Positive logic (Standard) DC-DC OFF		Short or 0 ~ 1.2VDC		
		Negative logic (Option) DC-DC ON		Short or 0 ~ 1.2VDC		
		Negative logic (Option) DC-DC OFF		Open or 3 ~ 12VDC		
		Input current of Ctrl pin	-0.5		+0.5	mA
		Remote off input current		3.0		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	%
Voltage adjustability	Single output		-10		+10	%
Ripple and noise	Measured by 20MHz bandwidth	Others		100		mVp-p
	With a 1μF/50V MLCC	12Vout, 15Vout		150		
Temperature coefficient			-0.02		+0.02	%/℃
Transient response recovery time	25% load step change			250		μs
Over voltage protection		1.5Vout		2.0		VDC
		2.5Vout		3.3		
		3.3Vout		3.9		
		5Vout, 5.1Vout		6.2		
		12Vout		15		
		15Vout		18		
Over load protection	% of Iout rated			150		%
Short circuit protection				Continuous, automatics recovery		

GENERAL SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Isolation voltage	1 minute	Input to Output	1600			VDC
		Input(Output) to Case	1600			
Case grounding						Connect case to -Vin with decoupling Y Cap
Isolation resistance	500VDC		1			GΩ
Isolation capacitance					1500	pF
Switching frequency			387	430	473	kHz
Safety approvals	IEC/ EN/ UL62368-1					UL:E193009 CB:UL(Demko)
Case material						Nickel-coated copper
Base material						FR4 PCB
Potting material						Epoxy (UL94 V-0)
Weight						30.5g (1.07oz)
MTBF	MIL-HDBK-217F, Full load					1.453 x 10^6 hrs

ENVIRONMENTAL SPECIFICATIONS

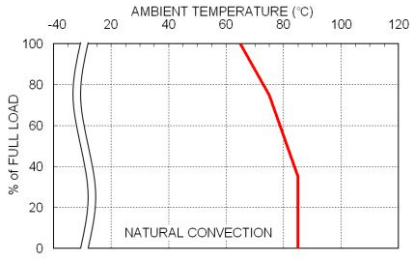
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	Without derating With derating	-40 +50		+50 +85	℃
Maximum case temperature				105	℃
Over temperature protection			115		℃
Storage temperature range		-55		+125	℃
Thermal impedance	Without heat-sink With heat-sink		12 10		℃/W
Thermal shock				MIL-STD-810F	
Vibration				MIL-STD-810F	
Relative humidity				5% to 95% RH	

EMC SPECIFICATIONS

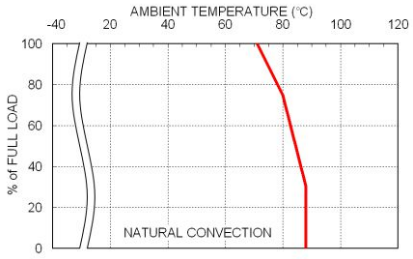
Parameter	Conditions		Level
EMI	EN55032	With external components	Class A, Class B
EMS	EN55035		
ESD	EN61000-4-2	Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A
Fast transient	EN61000-4-4	± 2kV	Perf. Criteria A
	12VDC input 24VDC input	With an external input filter capacitor (Nippon chemi-con KY series, 330μF/50V)	
	48VDC input	With an external input filter capacitor (Nippon chemi-con KY series, 220μF/100V)	
Surge	EN61000-4-5	± 1kV	Perf. Criteria A
	12VDC input 24VDC input	With an external input filter capacitor (Nippon chemi-con KY series, 330μF/50V)	
	48VDC input	With an external input filter capacitor (Nippon chemi-con KY series, 220μF/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.

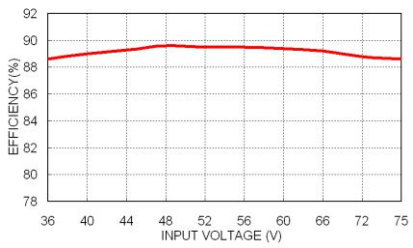
CHARACTERISTIC CURVE



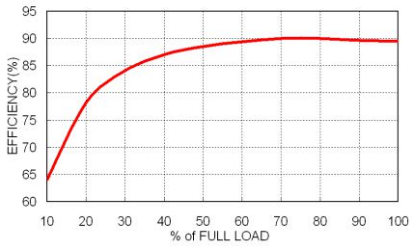
FED30-48S05 Derating Curve



FED30-48S05 Derating Curve With Heat-sink



FED30-48S05 Efficiency vs. Input Voltage



FED30-48S05 Efficiency vs. Output Load

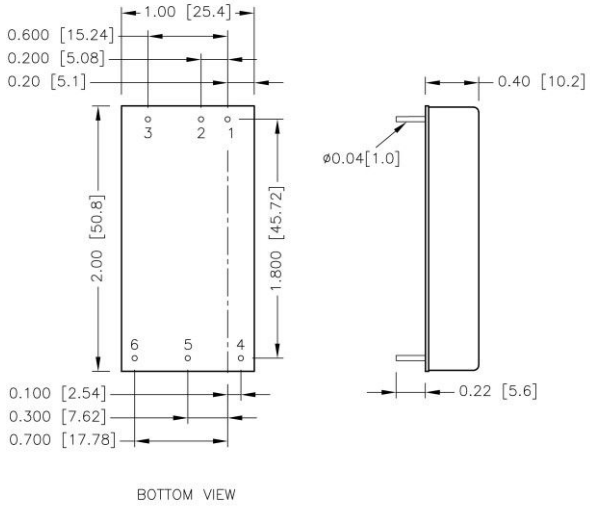
FUSE CONSIDERATION

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
FED30-12S□□、FED30-12D□□	6.3	Slow-Blow
FED30-24S□□、FED30-24D□□	3.15	Slow-Blow
FED30-48S□□、FED30-48D□□	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



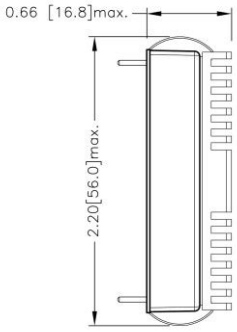
PIN CONNECTION

PIN	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	Ctrl	Ctrl
4	+Vout	+Vout
5	-Vout	Common
6	Trim	-Vout

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 dimension tolerance ±0.004[0.10]

HEAT-SINK OPTIONS

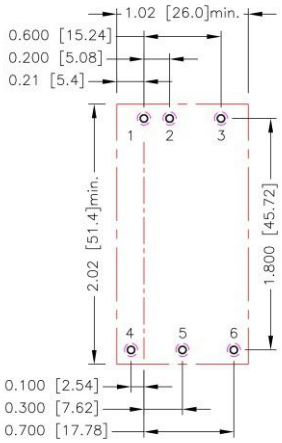
-HC (Heat-sink with clamps)



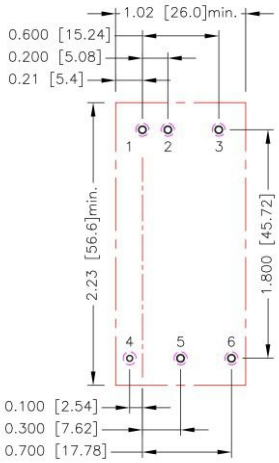
* All dimensions in inch [mm]

RECOMMENDED PAD LAYOUT

Standard



-HC

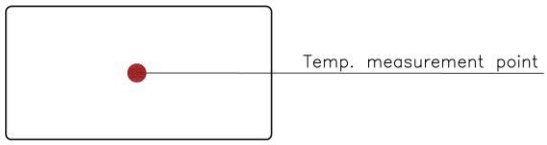


All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 1.2.3.4.5.6: Φ0.051[1.30]
Top view pad 1.2.3.4.5.6: Φ0.064[1.63]
Bottom view pad 1.2.3.4.5.6: Φ0.102[2.60]

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 “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

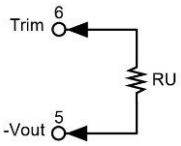
OUTPUT VOLTAGE ADJUSTMENT

Output voltage set point adjustment allows the user to increase or decrease the output voltage set point of the module.
This is accomplished by connecting an external resistor between the Trim pin and either the +Vout or -Vout pins.
With an external resistor between the Trim and -Vout, the output voltage set point increases.
With an external resistor between the Trim and +Vout, the output voltage set point decreases.
The external Trim resistor needs to be at least 1/16W of rated power.

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method shown below.

Trim-up



□□S1P5

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	1.515	1.530	1.545	1.560	1.575	1.590	1.605	1.620	1.635	1.650
RU	(kΩ)	4.578	2.065	1.227	0.808	0.557	0.389	0.270	0.180	0.110	0.054

□□S2P5

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	2.525	2.550	2.575	2.600	2.625	2.650	2.675	2.700	2.725	2.750
RU	(kΩ)	37.076	16.675	9.874	6.474	4.434	3.074	2.102	1.374	0.807	0.354

□□S3P3

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.630
RU	(kΩ)	57.930	26.165	15.577	10.283	7.106	4.988	3.476	2.341	1.459	0.753

□□S05

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	5.050	5.100	5.150	5.200	5.250	5.300	5.350	5.400	5.450	5.500
RU	(kΩ)	36.570	16.580	9.917	6.585	4.586	3.253	2.302	1.588	1.032	0.588

□□S5P1

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	5.151	5.202	5.253	5.304	5.355	5.406	5.457	5.508	5.559	5.610
RU	(kΩ)	38.135	17.368	10.446	6.985	4.908	3.524	2.535	1.793	1.217	0.755

□□S12

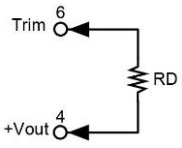
△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	12.120	12.240	12.360	12.480	12.600	12.720	12.840	12.960	13.080	13.200
RU	(kΩ)	367.908	165.954	98.636	64.977	44.782	31.318	21.701	14.488	8.879	4.391

□□S15

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	15.150	15.300	15.450	15.600	15.750	15.900	16.050	16.200	16.350	16.500
RU	(kΩ)	404.184	180.592	106.061	68.796	46.437	31.531	20.883	12.898	6.687	1.718

OUTPUT VOLTAGE ADJUSTMENT(CONTINUED)

Trim-down



□□S1P5

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	1.485	1.470	1.455	1.440	1.425	1.410	1.395	1.380	1.365	1.350
RD	(kΩ)	5.704	2.571	1.527	1.005	0.692	0.483	0.334	0.222	0.135	0.065

□□S2P5

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	2.475	2.450	2.425	2.400	2.375	2.350	2.325	2.300	2.275	2.250
RD	(kΩ)	49.641	22.481	13.428	8.902	6.186	4.375	3.082	2.112	1.358	0.754

□□S3P3

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	3.267	3.234	3.201	3.168	3.135	3.102	3.069	3.036	3.003	2.970
RD	(kΩ)	69.470	31.235	18.490	12.117	8.294	5.745	3.924	2.559	1.497	0.647

□□S05

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	4.950	4.900	4.850	4.800	4.750	4.700	4.650	4.600	4.550	4.500
RD	(kΩ)	45.533	20.612	12.306	8.152	5.660	3.999	2.812	1.922	1.230	0.676

□□S5P1

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	5.049	4.998	4.947	4.896	4.845	4.794	4.743	4.692	4.641	4.590
RD	(kΩ)	47.191	21.431	12.844	8.551	5.975	4.258	3.031	2.111	1.396	0.823

□□S12

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	11.880	11.760	11.640	11.520	11.400	11.280	11.160	11.040	10.920	10.800
RD	(kΩ)	460.992	207.946	123.597	81.423	56.118	39.249	27.199	18.162	11.132	5.509

□□S15

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	14.850	14.700	14.550	14.400	14.250	14.100	13.950	13.800	13.650	13.500
RD	(kΩ)	499.816	223.408	131.272	85.204	57.563	39.136	25.974	16.102	8.424	2.282

P-DUKE

P-DUKE Technology Co., Ltd.

Tel +886-4-2359-0668
Fax +886-4-2359-1337
Email sale@pduke.com
Web www.pduke.com
Add No. 36, 22nd Rd., Taichung Industrial Park, Taichung, Taiwan, R.O.C.