P-DUKE POWER

FEC30W 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

cULus CB CE

1600 VDC Isolation Voltage | 4 : 1 Wide Input Range | 6 sided Shielding | NO Min. Load Required | REMOTE ON OFF | OCP | OTP | OVP | SCP | UVP

PART NUMBER STRUCTURE

FEC30 - 48 S 05 W - N HC

Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Remote On/Off Option	Assembly Option
	24:10~40 **48:**18~75	**S:**Single	**1P5:**1.5 **1P8:**1.8 **2P5:**2.5 **3P3:**3.3 **05:**5 **12:**12 **15:**15	**4:1**	□:Positive logic **N:**Negative logic	□: None **HC:** Heat-sink with Clamp
		D:Dual	**12:**±12 **15:**±15			

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P-DUKE POWER

FEC30W Series

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

Model Number	Input Range VDC	Output Voltage VDC	Output Current @Full Load A	Input Current @ No Load mA	Efficiency %	Maximum Capacitor Load μF
FEC30-24S1P5W	10 ~ 40	1.5	8	35	80	65000
FEC30-24S1P8W	10 ~ 40	1.8	8	35	83	65000
FEC30-24S2P5W	10 ~ 40	2.5	8	40	85	33000
FEC30-24S3P3W	10 ~ 40	3.3	6	50	87	19500
FEC30-24S05W	10 ~ 40	5	6	65	87	10200
FEC30-24S12W	10 ~ 40	12	2.5	65	87	3300
FEC30-24S15W	10 ~ 40	15	2	70	88	1100
FEC30-24D12W	10 ~ 40	±12	±1.25	30	84	±1000
FEC30-24D15W	10 ~ 40	±15	±1	35	85	±680
FEC30-48S1P5W	18 ~ 75	1.5	8	20	80	65000
FEC30-48S1P8W	18 ~ 75	1.8	8	20	83	65000
FEC30-48S2P5W	18 ~ 75	2.5	8	25	86	33000
FEC30-48S3P3W	18 ~ 75	3.3	6	30	87	19500
FEC30-48S05W	18 ~ 75	5	6	30	88	10200
FEC30-48S12W	18 ~ 75	12	2.5	35	87	3300
FEC30-48S15W	18 ~ 75	15	2	45	88	1100
FEC30-48D12W	18 ~ 75	±12	±1.25	25	85	±1000
FEC30-48D15W	18 ~ 75	±15	±1	25	86	±680

INPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range		24Vin(nom) 48Vin(nom)	10 18	24 48	40 75	VDC
Start up voltage		24Vin(nom) 48Vin(nom)			10 18	VDC
Shutdown voltage		24Vin(nom) 48Vin(nom)	7 15	8 16	8.8 17.5	VDC
Start up time	Constant resistive load	Power up Remote ON/OFF		10 10		ms
Input surge voltage	100 ms, max.	24Vin(nom) 48Vin(nom)			50 100	VDC
Input filter				L-C type		
Remote ON/OFF	Referred to –Vin pin	Positive logic (Standard) DC-DC ON DC-DC OFF Negative logic (Option) DC-DC ON DC-DC OFF Input current of Ctrl pin Remote off input current		Open or 3 ~ 12VDC Short or 0 ~ 1.2VDC Short or 0 ~ 1.2VDC Open or 3 ~ 12VDC -0.5 3.0	+0.5	 mA mA

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P-DUKE POWER

FEC30W Series

OUTPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Voltage accuracy			-1.0		+1.0	%
Line regulation	Low Line to High Line at Full Load		-0.5		+0.5	%
Load regulation	No Load to Full Load	Single Dual	-0.5 -1.0		+0.5 +1.0	%
Cross regulation	Asymmetrical load 25%/100% FL	Dual	-5.0		+5.0	%
Voltage adjustability			-10		+10	%
Ripple and noise	20MHz bandwidth With a 0.1μF/50V MLCC	Others 5Vout 12Vout, 15Vout		60 75 100		mVp-p
Temperature coefficient			-0.02		+0.02	%/℃
Transient response recovery time	25% load step change			250		μs
Over voltage protection	Zener diode clamp	1.5Vout 1.8Vout 2.5Vout 3.3Vout 5Vout 12Vout 15Vout		3.9 3.9 3.9 3.9 6.2 15 18		VDC
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 Input (Output) to Case	1600 1600			VDC
Isolation resistance	500VDC		1			GΩ
Isolation capacitance					1000	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						FR4 PCB
Potting material						Epoxy (UL94 V-0)
Weight						48g (1.69oz)
MTBF	MIL-HDBK-217F, Full load					7.598 x 10^5 hrs

ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating ambient temperature		With derating	-40		+85	℃
Maximum case temperature					+100	℃
Over temperature protection				+115		℃
Storage temperature range			-55		+125	℃
Thermal impedance		Without heat-sink With heat-sink		10 8.24		℃/W
Thermal shock						MIL-STD-810F
Vibration						MIL-STD-810F
Relative humidity						5% to 95% RH

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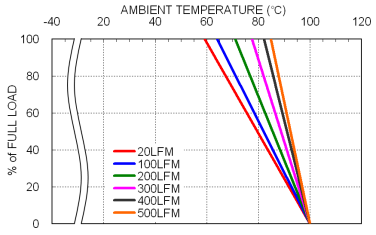
FEC30W Series

EMC SPECIFICATIONS

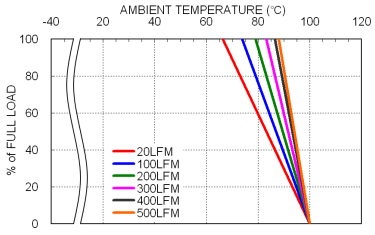
Parameter	Conditions		Level
EMI	EN55032	With external components	Class A, Class B
ESD	EN61000-4-2	Air ± 8kV and Contact ± 6kV	Perf. Criteria B
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A
Fast transient	EN61000-4-4	±2kV With an external input filter capacitor (Nippon chemi-con KY series, 220μF/100V)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

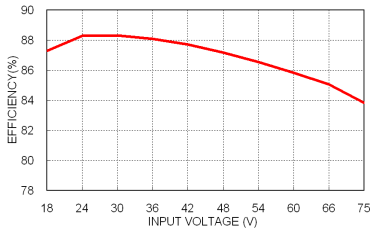
CHARACTERISTIC CURVE



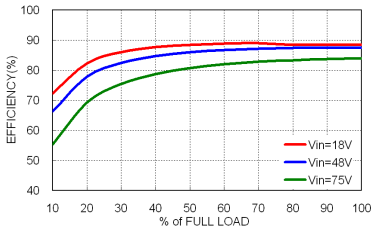
FEC30-48S05W Derating Curve



FEC30-48S05W Derating Curve With Heat-sink



FEC30-48S05W Efficiency vs. Input Voltage



FEC30-48S05W 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
FEC30-24S□□W、FEC30-24D□□W	6.3	Slow-Blow
FEC30-48S□□W、FEC30-48D□□W	3.15	Slow-Blow

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

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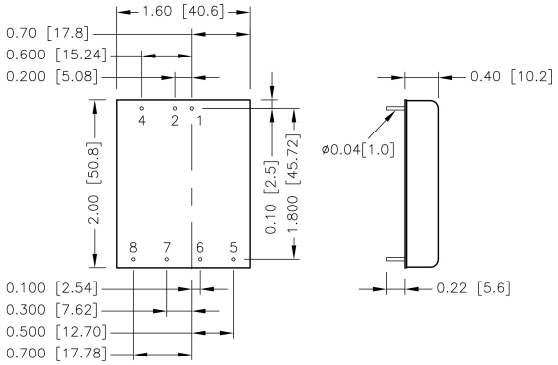
P-DUKE POWER

FEC30W Series

MECHANICAL DRAWING



BOTTOM VIEW

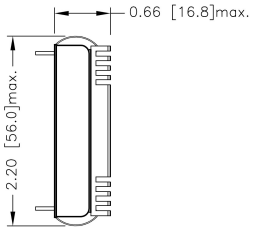
PIN CONNECTION

PIN	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
4	Ctrl	Ctrl
5	No pin	+Vout
6	+Vout	Common
7	-Vout	-Vout
8	Trim	Trim

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]

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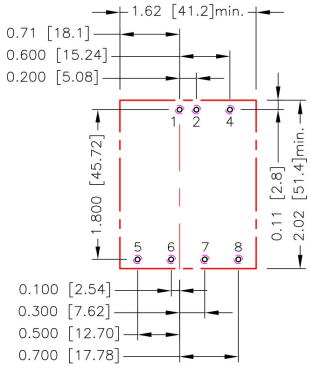
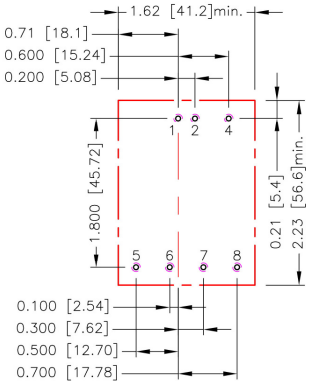
FEC30W Series

RECOMMENDED PAD LAYOUT

Standard



-HC

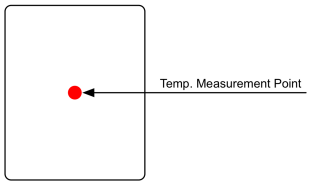


All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 1.2.4.5.6.7.8:Φ0.051[1.30]
Top view pad 1.2.4.5.6.7.8:Φ0.064[1.63]
Bottom view pad 1.2.4.5.6.7.8:Φ0.102[2.60]

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 100℃.
When Operating, adequate cooling must be provided to maintain the test point temperature at or below 100℃.
Although the maximum point Temperature of the power modules is 100℃, 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

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P-DUKE POWER

FEC30W Series

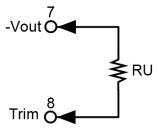
OUTPUT VOLTAGE ADJUSTMENT

Output voltage is adjustable for 10% trim up or -10% trim down of nominal output voltage by connecting an external resistor between the Trim pin and +Vout or -Vout pins.
With an external resistor between the Trim and +Vout pin, the output voltage set point decreases.
With an external resistor between the Trim and -Vout pin, the output voltage set point increases.
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

Single Output



□□S1P5W

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	1.515	1.53	1.545	1.56	1.575	1.59	1.605	1.62	1.635	1.65
RU	(kΩ)	4.578	2.605	1.227	0.808	0.557	0.389	0.27	0.18	0.11	0.054

□□S1P8W

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	1.818	1.836	1.854	1.872	1.89	1.908	1.926	1.944	1.962	1.98
RU	(kΩ)	11.639	5.205	3.06	1.988	1.344	0.915	0.609	0.379	0.2	0.057

□□S2P5W

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	2.525	2.55	2.575	2.6	2.625	2.65	2.675	2.7	2.725	2.75
RU	(kΩ)	37.076	16.675	9.874	6.474	4.434	3.074	2.102	1.374	0.807	0.354

□□S3P3W

△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

□□S05W

△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

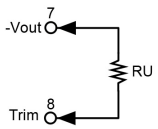
□□S12W

△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)	367.910	165.950	98.636	64.977	44.782	31.318	21.701	14.488	8.879	4.391

□□S15W

△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)	404.180	180.590	106.060	68.796	46.437	31.531	20.883	12.898	6.687	1.718

Dual Output



□□D12W

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	±12.12	±12.24	±12.36	±12.48	±12.6	±12.72	±12.84	±12.96	±13.08	±13.2
RU	(kΩ)	218.21	98.105	58.07	38.052	26.042	18.035	12.316	8.026	4.69	2.021

□□D15W

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	±15.15	±15.3	±15.45	±15.6	±15.75	±15.9	±16.05	±16.2	±16.35	±16.5
RU	(kΩ)	268.29	120.64	71.429	46.822	32.058	22.215	15.184	9.911	5.81	2.529

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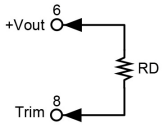
P-DUKE POWER

FEC30W Series

OUTPUT VOLTAGE ADJUSTMENT

Trim-down

Single Output



□□S1P5W

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	1.485	1.47	1.455	1.44	1.425	1.41	1.395	1.38	1.365	1.35
RD	(kΩ)	5.704	2.571	1.527	1.005	0.692	0.483	0.334	0.222	0.135	0.065

□□S1P8W

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	1.782	1.764	1.746	1.728	1.71	1.692	1.674	1.656	1.638	1.62
RD	(kΩ)	14.66	6.57	3.874	2.525	1.716	1.177	0.792	0.503	0.278	0.098

□□S2P5W

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	2.475	2.45	2.425	2.4	2.375	2.35	2.325	2.3	2.275	2.25
RD	(kΩ)	49.641	22.481	13.428	8.902	6.186	4.375	3.082	2.112	1.358	0.754

□□S3P3W

△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

□□S05W

△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

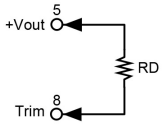
□□S12W

△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)	460.990	207.950	123.600	81.423	56.118	39.249	27.199	18.162	11.132	5.509

□□S15W

△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)	499.820	223.410	131.270	85.204	57.563	39.136	25.974	16.102	8.424	2.282

Dual Output



□□D12W

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	±11.88	±11.76	±11.64	±11.52	±11.4	±11.28	±11.16	±11.04	±10.92	±10.8
RD	(kΩ)	273.44	123.02	72.874	47.803	32.76	22.732	15.568	10.196	6.017	2.675

□□D15W

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	±14.85	±14.7	±14.55	±14.4	±14.25	±14.1	±13.95	±13.8	±13.65	±13.5
RD	(kΩ)	337.71	152.02	90.126	59.178	40.609	28.23	19.387	12.756	7.598	3.471

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Angst+Pfister Sensors and Power

Angst+Pfister
Sensors and Power

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