

FED60W SERIES

DC-DC CONVERTER

4:1 ULTRA WIDE INPUT RANGE
UP TO 60Watts



FEATURES

- NO MINIMUM LOAD REQUIRED
- 1600VDC INPUT TO OUTPUT ISOLATION
- STANDARD 2.00 X 1.00 X 0.40 INCH
- SIX-SIDED CONTINUOUS SHIELD
- SAFETY MEETS UL60950-1, EN60950-1, IEC60950-1, & EN50155
- CE MARKED
- COMPLIANT TO RoHS II & REACH

APPLICATIONS

- WIRELESS NETWORK
- TELECOM/DATACOM
- INDUSTRY CONTROL SYSTEM
- DISTRIBUTED POWER ARCHITECTURES
- SEMICONDUCTOR EQUIPMENT

1600VDC ISOLATION	REMOTE CONTROL	UVP	OCP	SCP	OVP	OTP	LOW STANDBY POWER
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TECHNICAL SPECIFICATION

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

Model Number	Input Range	Output Voltage	Output Current @Full Load	Input Current @ No Load	Efficiency	Maximum Capacitor Load (1)
	VDC	VDC	A	mA	%	μF
FED60-24S3P3W	9 ~ 36	3.3	12	10	90	32000
FED60-24S05W	9 ~ 36	5	12	10	92	30000
FED60-24S12W	9 ~ 36	12	5	10	92	5850
FED60-24S15W	9 ~ 36	15	4	10	92	3900
FED60-24S24W	9 ~ 36	24	2.5	10	92	2000
FED60-24D12W	9 ~ 36	±12	±2.5	10	91	±3900
FED60-24D15W	9 ~ 36	±15	±2	10	91	±2400
FED60-24D24W	9 ~ 36	±24	±1.25	10	91	±1000
FED60-48S3P3W	18 ~ 75	3.3	12	10	90	32000
FED60-48S05W	18 ~ 75	5	12	10	92	30000
FED60-48S12W	18 ~ 75	12	5	10	92	5850
FED60-48S15W	18 ~ 75	15	4	10	92	3900
FED60-48S24W	18 ~ 75	24	2.5	10	91	2000
FED60-48D12W	18 ~ 75	±12	±2.5	10	91	±3900
FED60-48D15W	18 ~ 75	±15	±2	10	91	±2400
FED60-48D24W	18 ~ 75	±24	±1.25	10	91	±1000

PART NUMBER STRUCTURE

Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Remote Control options	Heat-sink
FED60 - 48 S 05 W - N HS	24: 9~36 48: 18~75	S: Single	3P3: 3.3 05: 5 12: 12 15: 15 24: 24	4:1	□: Positive logic N: Negative logic	□: No Heat-sink HS Heat-sink HC Heat-sink with Clamp
		D: Dual	12: ±12 15: ±15 24: ±24			

INPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range		24Vin(nom) 48Vin(nom)	9 18	24 48	36 75	VDC
Start-up voltage		24Vin(nom) 48Vin(nom)			9 18	VDC
Shutdown voltage		24Vin(nom) 48Vin(nom)		8 16		VDC
Start up time	Constant resistive load	Power up Remote ON/OFF		60 60		ms
Input surge voltage	1 second, max.	24Vin(nom) 48Vin(nom)			50 100	VDC
Input filter					Pi 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	-0.5	Open or 3 ~ 12VDC Short or 0 ~ 1.2VDC Short or 0 ~ 1.2VDC Open or 3 ~ 12VDC 3	0.5	mA 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 Dual	-0.5 -1.0		+0.5 +1.0	%
Cross regulation	Asymmetrical load 25%/100% FL	Dual	-5.0		+5.0	%
Voltage adjustability	Single output	3.3Vout, 5Vout, 12Vout 15Vout, 24Vout	-10 -10		+10 +20	%
Ripple and noise	Measured by 20MHz bandwidth With a 10μF/25V X7R MLCC With a 10μF/25V X7R MLCC With a 4.7μF/50V X7R MLCC	3.3Vout, 5Vout 12Vout, 15Vout 24Vout		75 100 150	100 125 200	mVp-p
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 5Vout 12Vout 15Vout 24Vout		3.9 6.2 15 20 30		VDC
Over load protection	% of Iout rated; Hiccup mode			150		%
Short circuit protection					Continuous, automatic 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					2200	pF
Switching frequency			225	250	275	kHz
Safety meets			UL60950-1, EN60950-1, IEC60950-1			
Case material			Copper			
Base material			FR4 PCB			
Potting material			Silicone (UL94 V-0)			
Weight			33g (1.16oz)			
MTBF	MIL-HDBK-217F, Full load.		8.582 x 10 ⁵ hrs			

ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating ambient temperature		With Derating	-40		+105	°C
Maximum case temperature					+105	°C
Over temperature protection				+115		°C
Storage temperature range			-55		+125	°C
Thermal impedance	Vertical direction by natural convection (20LFM)	Without Heat-sink With Heat-sink		10.8 10.3		°C/W
Thermal shock						MIL-STD-810F
Vibration						MIL-STD-810F
Relative humidity						5% to 95% RH

EMC SPECIFICATIONS

Parameter	Conditions	Level
EMI ⁽²⁾	EN55022	Class A
ESD	EN61000-4-2 Air ± 8kV and Contact ± 6kV	Perf. Criteria A

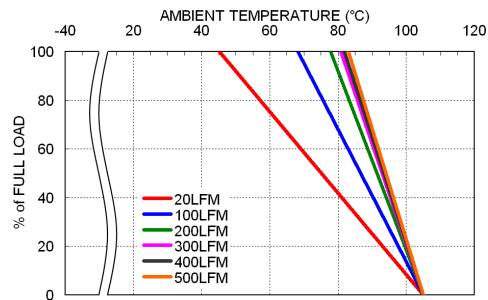
Radiated immunity	EN61000-4-3	20 V/m	Perf. Criteria A
Fast transient ⁽³⁾	EN61000-4-4	± 2kV	Perf. Criteria A
Surge ⁽³⁾	EN61000-4-5	± 2kV	Perf. Criteria A
Conducted immunity	EN61000-4-6	10 Vr.m.s	Perf. Criteria A

Note:

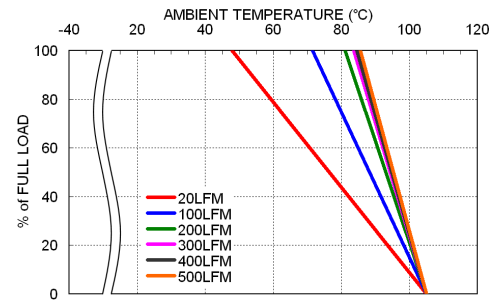
1. Test by minimum input and constant resistive load.
2. The standard module meets EMI Class A or Class B with external components. For further information, please contact with P-DUKE.
3. The external input components are required if the module has to meet EN61000-4-4, EN61000-4-5.
The FED60-24□□□W recommended an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS (SMDJ58A, 58V, 3000Watt peak pulse power) to connect in parallel.
The FED60-48□□□W recommended an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS (SMDJ120A, 120V, 3000Watt peak pulse power) to connect in parallel.

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

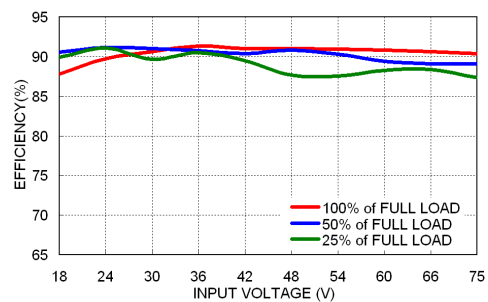
CHARACTERISTIC CURVE



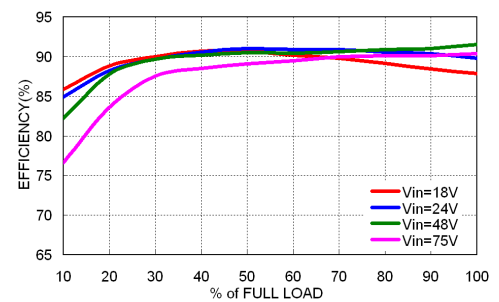
FED60-48S12W Derating Curve



FED60-48S12W Derating Curve with Heat-sink



FED60-48S12W Efficiency VS Input Voltage



FED60-48S12W Efficiency VS Output Load

MECHANICAL DRAWING



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

TRIM UP

TRIM DOWN

- 2014/04/30