

# FED20 SERIES

DC-DC CONVERTER

2:1 WIDE INPUT RANGE  
UP TO 20Watts



## FEATURES

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

## APPLICATIONS

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

1600VDC ISOLATION	REMOTE CONTROL	OCP	SCP	OVP
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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	mA	mA	%	µF
FED20-12S1P5	9 ~ 18	1.5	6000	70	78	65000
FED20-12S1P8	9 ~ 18	1.8	6000	75	79	65000
FED20-12S2P5	9 ~ 18	2.5	6000	80	83	33000
FED20-12S3P3	9 ~ 18	3.3	5000	115	85	13000
FED20-12S05	9 ~ 18	5	4000	75	87	6800
FED20-12S12	9 ~ 18	12	1670	90	86	2200
FED20-12S15	9 ~ 18	15	1330	35	86	755
FED20-12D12	9 ~ 18	±12	±833	45	86	±680
FED20-12D15	9 ~ 18	±15	±667	50	86	±450
FED20-24S1P5	18 ~ 36	1.5	6000	35	80	65000
FED20-24S1P8	18 ~ 36	1.8	6000	45	81	65000
FED20-24S2P5	18 ~ 36	2.5	6000	40	84	33000
FED20-24S3P3	18 ~ 36	3.3	5000	30	86	13000
FED20-24S05	18 ~ 36	5	4000	35	89	6800
FED20-24S12	18 ~ 36	12	1670	55	87	2200
FED20-24S15	18 ~ 36	15	1330	40	87	755
FED20-24D12	18 ~ 36	±12	±833	30	87	±680
FED20-24D15	18 ~ 36	±15	±667	30	88	±450
FED20-48S1P5	36 ~ 75	1.5	6000	15	80	65000
FED20-48S1P8	36 ~ 75	1.8	6000	20	82	65000
FED20-48S2P5	36 ~ 75	2.5	6000	30	84	33000
FED20-48S3P3	36 ~ 75	3.3	5000	15	87	13000
FED20-48S05	36 ~ 75	5	4000	20	89	6800
FED20-48S12	36 ~ 75	12	1670	35	88	2200
FED20-48S15	36 ~ 75	15	1330	50	87	755
FED20-48D12	36 ~ 75	±12	±833	20	88	±680
FED20-48D15	36 ~ 75	±15	±667	20	88	±450

## PART NUMBER STRUCTURE

FED20 - 48 S 05 - N HS

Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Remote Control Option	Assembly Option
	12: 9~18 24: 18~36 48: 36~75	S: Single	1P5: 1.5 1P8: 1.8 2P5: 2.5 3P3: 3.3 05: 5 12: 12 15: 15	<input type="checkbox"/> Positive logic <input checked="" type="checkbox"/> Negative logic	<input type="checkbox"/> None HS: Heat-sink HC: Heat-sink with Clamp
		D: Dual	12: ±12 15: ±15		

## 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	
Input reflected ripple current	Nominal input and Full load		20			mAp-p
Start up time	Constant resistive load	Power up	10			ms
		Remote ON/OFF	10			
Input surge voltage	100 ms, max.	12Vin(nom)	36			VDC
		24Vin(nom)				
		48Vin(nom)				
Input filter			L-C type			
Remote ON/OFF	Referred to -Vin pin	Positive logic	Open or 3 ~ 12VDC			mA
		DC-DC ON	Short or 0 ~ 1.2VDC			
		(Standard) DC-DC OFF	Short or 0 ~ 1.2VDC			
		Negative logic	Open or 3 ~ 12VDC			
		(Option) DC-DC OFF				
Input current of Ctrl pin			-0.5	+0.5		mA
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		%
Load regulation	No Load to Full Load		-0.5	+0.5		%
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 With a 0.1µF/50V MLCC	Single	60			mVp-p
		Others	75			
		5Vout, 12Vout, 15Vout	100			
Temperature coefficient			-0.02	+0.02		%/°C
Transient response recovery time	25% load step change		250			µs
Over voltage protection	Zener diode clamp	1.5Vout	3.9			VDC
		1.8Vout	3.9			
		2.5Vout	3.9			
		3.3Vout	3.9			
		5Vout	6.2			
		12Vout	15			
		15Vout	18			
Over load protection	% of lout 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			
Isolation resistance	500VDC		1			GΩ
Isolation capacitance			1000			pF
Switching frequency			450	500	550	kHz
Safety approvals			UL60950-1 EN60950-1 IEC60950-1			
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		1.583 x 10 <sup>6</sup>			hrs

## ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating ambient temperature	With derating		-40	+100		°C
Maximum case temperature			+100			°C
Storage temperature range			-55	+125		°C
Thermal impedance	Vertical direction by natural convection (20LFM)	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

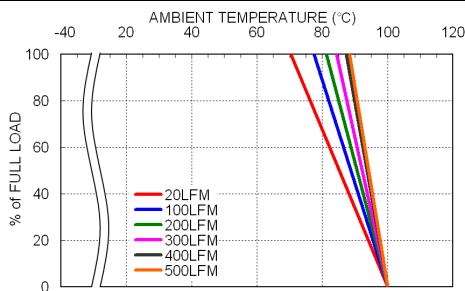
Parameter	Conditions		Level
EMI <sup>(2)</sup>	EN55022		Class A, Class B
ESD	EN61000-4-2	Air $\pm 8kV$ and Contact $\pm 6kV$	Perf. Criteria B
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A
Fast transient <sup>(3)</sup>	EN61000-4-4	$\pm 2kV$	Perf. Criteria A
Surge <sup>(3)</sup>	EN61000-4-5	$\pm 1kV$	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

### Note:

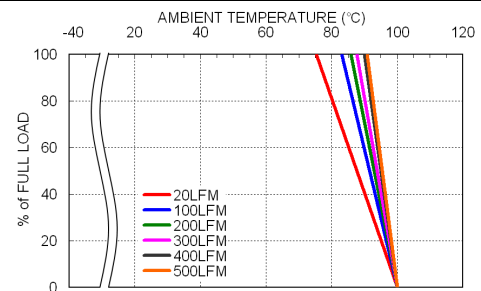
1. Test by minimum input and constant resistive load.
2. The standard module meet EN55022 Class A and Class B with external components. For further information, please contact with P-DUKE.
3. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The filter capacitor Power Mate suggest: Nippon chemi-con KY series, 220 $\mu$ F/100V.

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

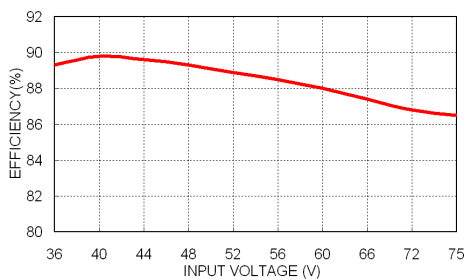
## CHARACTERISTIC CURVE



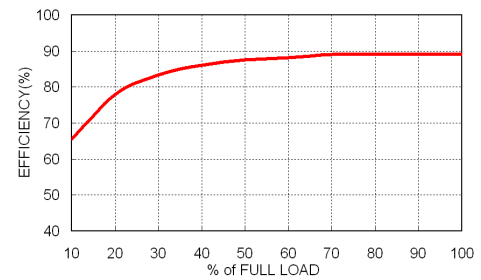
FED20-48S05 Derating Curve



FED20-48S05 Derating Curve With Heat-sink

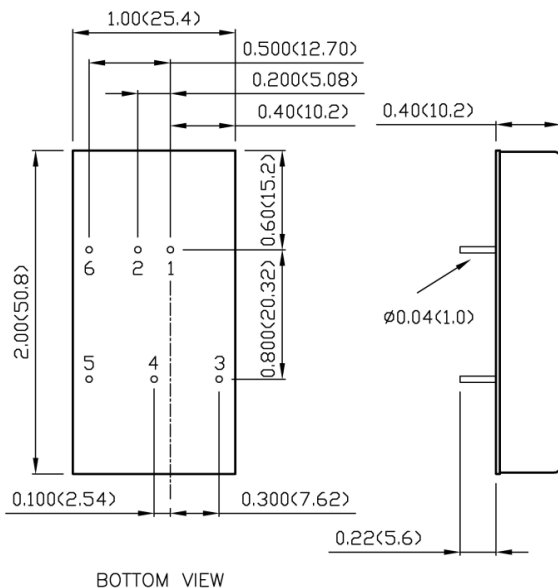


FED20-48S05 Efficiency vs. Input Voltage



FED20-48S05 Efficiency vs. Output Load

## MECHANICAL DRAWING



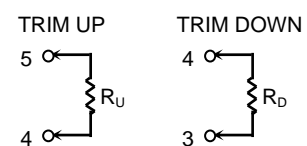
BOTTOM VIEW

### PIN CONNECTION

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

### EXTERNAL OUTPUT TRIMMING

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



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  $\pm$ 0.01 (0.25)
4. Pin dimension tolerance  $\pm$ 0.004(0.1)