



FEC15 SERIES

DC-DC CONVERTER

2:1 WIDE INPUT RANGE
UP TO 15Watts



FEATURES

- 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
-------------------	----------------	-----	-----	-----

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 (2)
	VDC	VDC	Min. Load (1) mA	Full Load mA	mA	%	µF
FEC15-12S33	9 ~ 18	3.3	0	4000	30	79	10200
FEC15-12S05	9 ~ 18	5	15	3000	25	82	7050
FEC15-12S12	9 ~ 18	12	0	1250	25	86	1035
FEC15-12S15	9 ~ 18	15	0	1000	20	86	705
FEC15-12D05	9 ~ 18	±5	0	±1500	20	83	±1020
FEC15-12D12	9 ~ 18	±12	0	±625	30	86	±495
FEC15-12D15	9 ~ 18	±15	±10	±500	35	84	±165
FEC15-24S33	18 ~ 36	3.3	0	4000	15	80	10200
FEC15-24S05	18 ~ 36	5	15	3000	10	84	7050
FEC15-24S12	18 ~ 36	12	0	1250	20	85	1035
FEC15-24S15	18 ~ 36	15	10	1000	15	85	705
FEC15-24D05	18 ~ 36	±5	0	±1500	15	84	±1020
FEC15-24D12	18 ~ 36	±12	0	±625	25	86	±495
FEC15-24D15	18 ~ 36	±15	0	±500	25	86	±165
FEC15-48S33	36 ~ 75	3.3	0	4000	10	81	10200
FEC15-48S05	36 ~ 75	5	0	3000	20	83	7050
FEC15-48S12	36 ~ 75	12	10	1250	15	87	1035
FEC15-48S15	36 ~ 75	15	0	1000	15	86	705
FEC15-48D05	36 ~ 75	±5	0	±1500	10	85	±1020
FEC15-48D12	36 ~ 75	±12	0	±625	15	88	±495
FEC15-48D15	36 ~ 75	±15	0	±500	15	87	±165

PART NUMBER STRUCTURE

FEC15	-	48	S	05	-	P	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 D: Dual	3P3: 3.3 05: 5 12: 12 15: 15 05: ±5 12: ±12 15: ±15	P: Positive logic N: Negative logic	□: None HS: Heat-sink HC: Heat-sink with Clamp		

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		20		ms
Input surge voltage	100 ms, max.	12Vin(nom)			36	VDC
		24Vin(nom)			50	
		48Vin(nom)			100	
Input filter				Pi type		
Remote ON/OFF (Option)	Referred to -Vin pin	Positive logic	DC-DC ON	Open or 3.5 ~ 12VDC		
			DC-DC OFF	Short or 0 ~ 1.2VDC		
		Negative logic	DC-DC ON	Short or 0 ~ 1.2VDC		
			DC-DC OFF	Open or 3.5 ~ 12VDC		
		Input current of Ctrl pin	-0.5		+1.0	mA
		Remote off input current		20		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		-0.5		+0.5	%
Load regulation	Min. 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	%
Ripple and noise	Measured by 20MHz bandwidth	Single		50		mVp-p
		Dual		75		
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		3.9		VDC
		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					300	pF
Switching frequency		Single	450	500	550	kHz
		Dual	270	300	330	
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					2.318 x 10 ⁶ 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

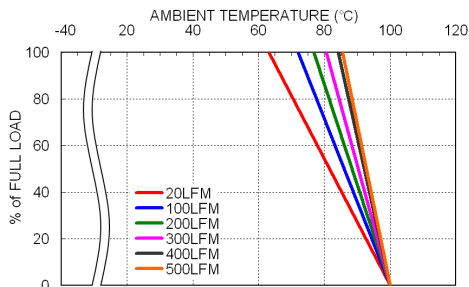
EMC SPECIFICATIONS

Parameter	Conditions		Level
EMI (3)	EN55022		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 (4)	EN61000-4-4	± 2kV	Perf. Criteria B
Surge (4)	EN61000-4-5	± 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

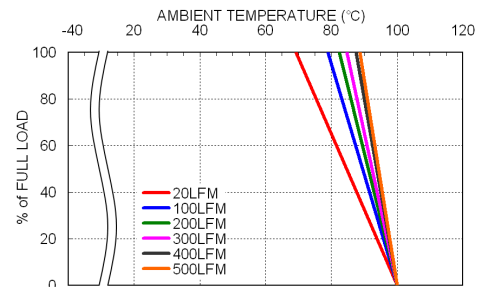
- Note:**
- The output requires a minimum loading on the output to maintain specified regulation. Operation under no-load condition will not damage these devices, however they may not meet all listed specification.
 - Test by minimum input and constant resistive load.
 - The standard module meet EN55022 Class A and Class B with external components. For further information, please contact with P-DUKE.
 - 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, 220µF/100V.

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

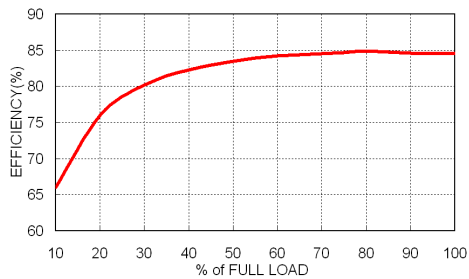
CHARACTERISTIC CURVE



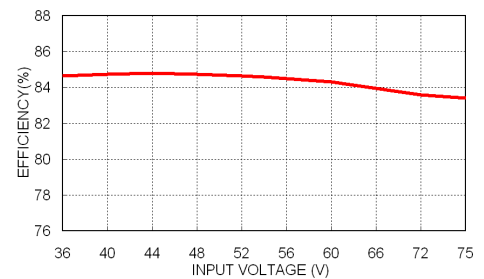
FEC15-48S05 Derating Curve



FEC15-48S05 Derating Curve With Heat-sink

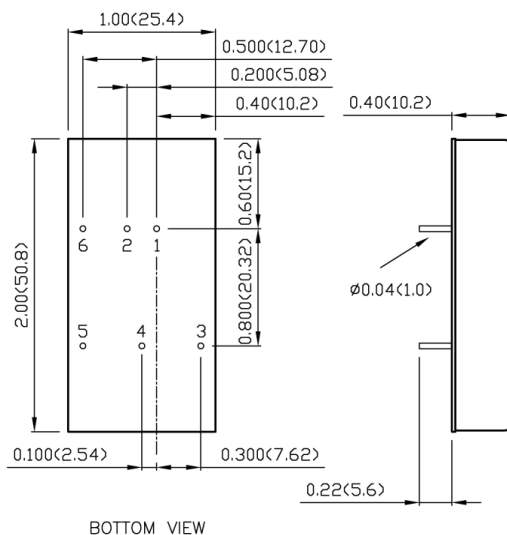


FEC15-48S05 Efficiency vs. Input Voltage



FEC15-48S05 Efficiency vs. Output Load

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)

- All dimensions in inch (mm)
- Tolerance :x.xx±0.02 (x.x±0.5)
x.xxx±0.01 (x.xx±0.25)
- Pin pitch tolerance ±0.01 (0.25)
- Pin dimension tolerance ±0.004(0.1)