

FEC60 SERIES

DC-DC CONVERTER

2:1 WIDE INPUT RANGE
UP TO 60Watts



FEATURES

- NO MINIMUM LOAD REQUIRED
- 1600VDC INPUT TO OUTPUT ISOLATION
- STANDARD 2.00 X 2.00 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	UVP	OCP	SCP	OVP	OTP
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TECHNICAL SPECIFICATION

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

Model Number	Input Range VDC	Output Voltage VDC	Output Current @Full Load A	Input Current @ No Load mA	Efficiency %	Maximum Capacitor Load (1) µF
FEC60-24S3P3	18 ~ 36	3.3	14	100	89	36000
FEC60-24S05	18 ~ 36	5	12	130	90	20400
FEC60-24S12	18 ~ 36	12	5	50	90	3550
FEC60-24S15	18 ~ 36	15	4	50	90	2300
FEC60-24S24	18 ~ 36	24	2.5	50	89	885
FEC60-48S3P3	36 ~ 75	3.3	14	80	89	36000
FEC60-48S05	36 ~ 75	5	12	90	91	20400
FEC60-48S12	36 ~ 75	12	5	30	90	3550
FEC60-48S15	36 ~ 75	15	4	30	90	2300
FEC60-48S24	36 ~ 75	24	2.5	30	90	885

PART NUMBER STRUCTURE

FEC60	-	48	S	05	-	N	HS
Series Name		Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)		Remote Control Option	Assembly Option
		24: 18-36 48: 36-75	S: Single	3P3: 3.3 05: 5 12: 12 15: 15 24: 24		<input type="checkbox"/> : Positive logic N: Negative logic	<input type="checkbox"/> : None HS: Heat-sink HC: Heat-sink with Clamp

INPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit	
Operating input voltage range	24Vin(nom)		18	24	36	VDC	
	48Vin(nom)		36	48	75		
Input reflected ripple current	Nominal input and Full load		20			mAp-p	
Start-up voltage	24Vin(nom)					17	
	48Vin(nom)						34
Shutdown voltage	24Vin(nom)					15	
	48Vin(nom)						32
Start up time	Constant resistive load	Power up				20	
		Remote ON/OFF				20	
Input surge voltage	100 ms, max.	24Vin(nom)				50	
		48Vin(nom)				100	
Input filter	Pi type						
Remote ON/OFF	Referred to -Vin pin	Positive logic	DC-DC ON	Pi type			Open or 3 ~ 12VDC
		(Standard)	DC-DC OFF				
		Negative logic	DC-DC ON				
		(Option)	DC-DC OFF				
		Input current of Ctrl pin					
Remote off input current			4.0	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		-0.5		+0.5	%	
Voltage adjustability ⁽²⁾	24Vout		-10		+20	%	
	Others		-10		+10		
Ripple and noise	Measured by 20MHz bandwidth	3.3Vout, 5Vout				75	
		12Vout, 15Vout				100	
		24Vout				200	
Temperature coefficient			-0.02		+0.02	%/°C	
Transient response recovery time	25% load step change					250	
Over voltage protection	3.3Vout		3.7				5.4
	5Vout		5.6				7.0
	12Vout		13.8				17.5
	15Vout		16.8				20.5
	24Vout		30.0				33.0
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				
Case grounding	Connect case to -Vin with decoupling Y Cap						
Isolation resistance	500VDC		1				GΩ
Isolation capacitance						1500	
Switching frequency			270	300	330	kHz	
Safety approvals						UL60950-1 EN60950-1 IEC60950-1	
Case material						Nickel-coated copper	
Base material						FR4 PCB	
Potting material						Epoxy (UL94 V-0)	
Weight						60g (2.11oz)	
MTBF	MIL-HDBK-217F, Full load					4.089 x 10 ⁵ hrs	

ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	Without derating	-40		+40	°C
	With derating	+40		+110	
Maximum case temperature				+110	°C
Over temperature protection			+120		°C
Storage temperature range		-55		+125	°C
Thermal impedance	Natural convection (20LFM)	Without heat-sink	10.5		°C/W
		With heat-sink	8.4		
Thermal shock					MIL-STD-810F
Vibration					MIL-STD-810F
Relative humidity					5% to 95% RH

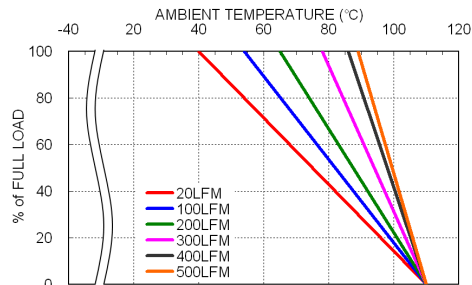
EMC SPECIFICATIONS

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

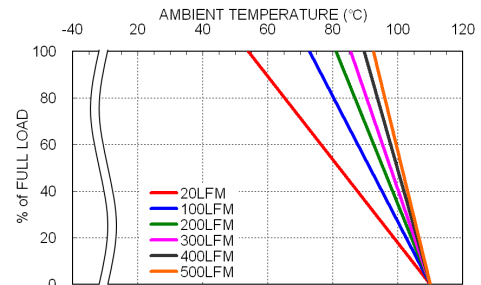
Note:

1. Test by minimum input and constant resistive load.
2. 24Vout maximum output deviation is +20%,-10% inclusive of remote sense and trim. Others maximum output deviation is 10% inclusive of remote sense and trim. If remote sense is not being used, the +Sense should be connected to its corresponding +Vout and likewise the -Sense should be connected to its corresponding -Vout.
3. The standard module meets EN55022 Class A and Class B with external components. For further information, please contact with P-DUKE.
4. 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.

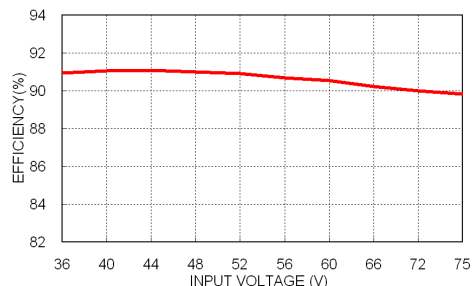
CAUTION: This power module is not internally fused. An input line fuse must always be used.

CHARACTERISTIC CURVE


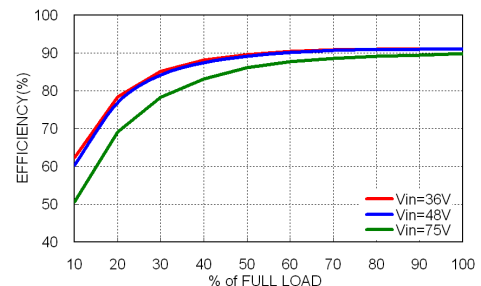
FEC60-48S05 Derating Curve



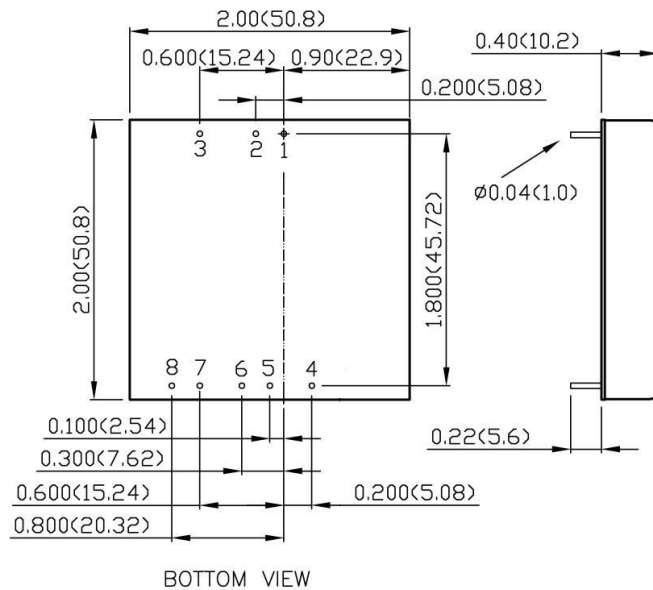
FEC60-48S05 Derating Curve With Heat-sink



FEC60-48S05 Efficiency vs. Input Voltage



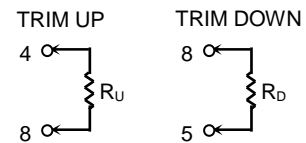
FEC60-48S05 Efficiency vs. Output Load

MECHANICAL DRAWING

PIN CONNECTION

PIN	SINGLE
1	+Vin
2	-Vin
3	Ctrl
4	-Sense ⁽²⁾
5	+Sense ⁽²⁾
6	+Vout
7	-Vout
8	Trim

EXTERNAL OUTPUT TRIMMING

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



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(0.1)