



3

YEARS
WARRANTY

ROHS
COMPLIANT

REACH
COMPLIANT



Automation



Datacom



IPC



Industry



Measurement



Telecom



Automobile



Boat



Charger



Medical



PV



Railway

c us CB CE UK CA

1600
VDC
Isolation
Voltage

4 : 1
Wide
Input
Range

6
sided
Shielding

NO
Min. Load
Required

REMOTE
ON
OFF

OCP

OVP

SCP

UVP

PART NUMBER STRUCTURE

FEC15 -	48	S	05	W -	M3	P	HC
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Operating Temp. Options	Remote On/Off Options	Assembly Options
	24:9-36 48:18-75	S:Single	3P3:3.3 05:5 5P1:5.1 12:12 15:15	4:1	☐ :Standard -40~+105°C With derating M3:M3 Version -55~+105°C With derating	☐ :No pin P:Positive logic N:Negative logic	☐ : None HC: Heat-sink with Clamp
		D:Dual	05:±5 12:±12 15:±15				

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

Model Number	Input Range VDC	Output Voltage VDC	Output Current @Full Load mA	Input Current @No Load mA	Efficiency %	Maximum Capacitor Load μF
FEC15-24S3P3W	9 ~ 36	3.3	4500	50	86	14700
FEC15-24S05W	9 ~ 36	5	3000	65	87	7200
FEC15-24S5P1W	9 ~ 36	5.1	3000	65	87	7200
FEC15-24S12W	9 ~ 36	12	1250	22	87	1250
FEC15-24S15W	9 ~ 36	15	1000	22	87	800
FEC15-24D05W	9 ~ 36	±5	±1500	55	87	±3600
FEC15-24D12W	9 ~ 36	±12	±625	30	88	±625
FEC15-24D15W	9 ~ 36	±15	±500	30	88	±400
FEC15-48S3P3W	18 ~ 75	3.3	4500	35	86	14700
FEC15-48S05W	18 ~ 75	5	3000	35	88	7200
FEC15-48S5P1W	18 ~ 75	5.1	3000	35	88	7200
FEC15-48S12W	18 ~ 75	12	1250	15	87	1250
FEC15-48S15W	18 ~ 75	15	1000	15	87	800
FEC15-48D05W	18 ~ 75	±5	±1500	35	88	±3600
FEC15-48D12W	18 ~ 75	±12	±625	17	88	±625
FEC15-48D15W	18 ~ 75	±15	±500	17	88	±400

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)	7 14.5	8 16	8.8 17.5	VDC
Start up time	Constant resistive load Power up		20		ms
Input surge voltage	100 ms, max. 24Vin(nom) 48Vin(nom)			50 100	VDC
Input filter				Pi type	
Remote ON/OFF (Option)	Referred to –Vin pin	Positive logic Negative logic	DC-DC ON DC-DC OFF DC-DC ON DC-DC OFF	Open or 3 ~ 12VDC Short or 0 ~ 1.2VDC Short or 0 ~ 1.2VDC Open or 3 ~ 12VDC	
		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	Single Dual	-0.2 -0.5		+0.2 +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	%
Ripple and noise	20MHz bandwidth With a 0.1 μ F/50V MLCC	Single Dual		50 75 75		mVp-p
Temperature coefficient			-0.02		+0.02	%/°C
Transient response recovery time	25% load step change			250		μ s
Over voltage protection	Zener diode clamp	3.3Vout 5Vout, 5.1Vout 12Vout 15Vout		3.9 6.2 15 18		VDC
Over load protection	% of Iout rated			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
Case grounding					Connect case to -Vin with decoupling Y Cap	
Isolation resistance	500VDC		1			G Ω
Isolation capacitance					1500	pF
Switching frequency			360	400	440	kHz
Safety approvals	IEC /EN/ UL 62368-1				UL:E193009 CB: UL(Demko)	
Case material					Nickel-coated copper	
Base material					FR4 PCB	
Potting material					Epoxy (UL94 V-0)	
Weight					27g (0.95oz)	
MTBF	MIL-HDBK-217F, Full load				2.430 x 10 ⁶ hrs	

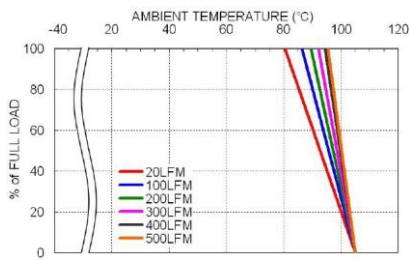
ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating ambient temperature	Standard M3	With derating With derating	-40 -55		+105 +105	°C
Maximum case temperature					105	°C
Storage temperature range			-55		+125	°C
Thermal impedance		Without heat-sink With heat-sink		12 10		°C/W
Thermal shock					MIL-STD-810F	
Vibration					MIL-STD-810F	
Relative humidity					5% to 95% RH	

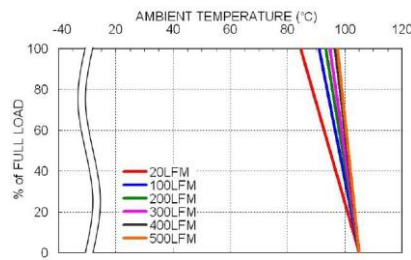
EMC SPECIFICATIONS			
Parameter	Conditions		Level
EMI	EN55032	With external components	Class A, Class B
EMS	EN55024		
ESD	EN61000-4-2	Air $\pm 8\text{kV}$ and Contact $\pm 6\text{kV}$	Perf. Criteria B
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A
Fast transient	EN61000-4-4	$\pm 2\text{kV}$	Perf. Criteria B
With an external input filter capacitor (Nippon chemi-con KY series, 220 $\mu\text{F}/100\text{V}$)			
Surge	EN61000-4-5	$\pm 1\text{kV}$	Perf. Criteria A
With an external input filter capacitor (Nippon chemi-con KY series, 220 $\mu\text{F}/100\text{V}$)			
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.

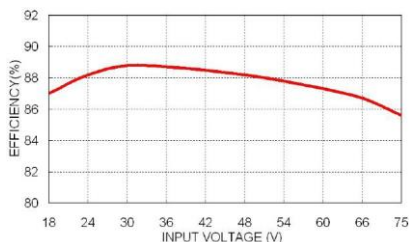
CHARACTERISTIC CURVE



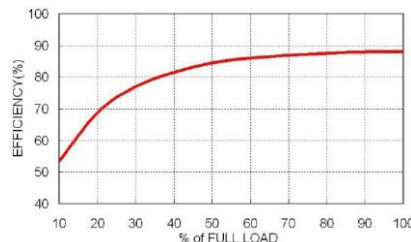
FEC15-48S05W Derating Curve



FEC15-48S05W Derating Curve With Heat-sink



FEC15-48S05W Efficiency vs. Input Voltage



FEC15-48S05W 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.

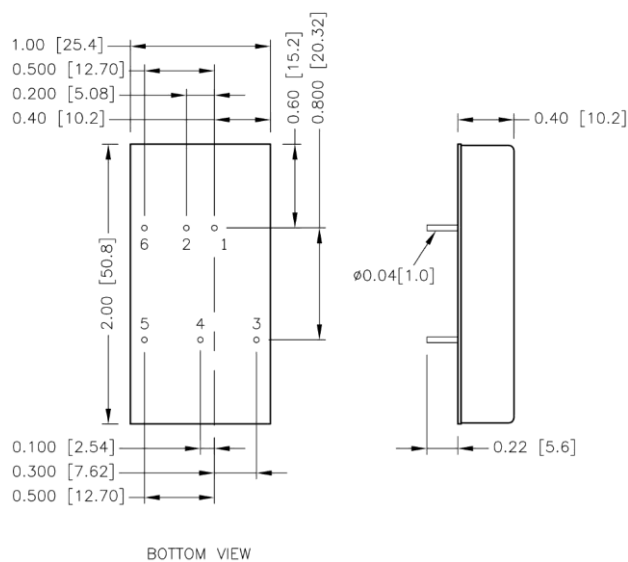
To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.

The input line fuse suggest as below :

Model	Fuse Rating (A)	Fuse Type
FEC15-24S□□W, FEC15-24D□□W	3.15	Slow-Blow
FEC15-48S□□W, FEC15-48D□□W	1.6	Slow-Blow

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

MECHANICAL DRAWING



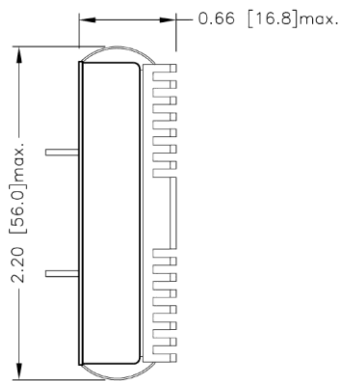
PIN CONNECTION

PIN	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	No pin	Common
5	-Vout	-Vout
6	Ctrl(Optional)	Ctrl(Optional)

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

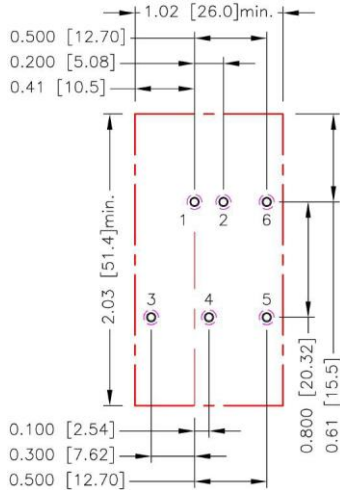
-HC (Heat-sink with clamps)



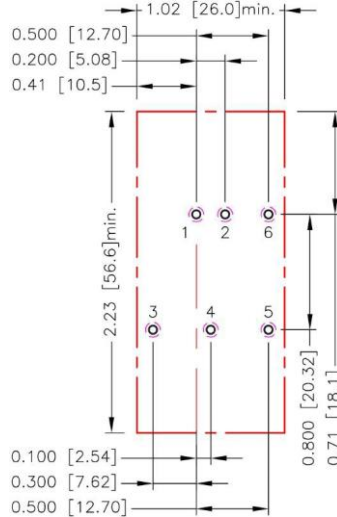
* All dimensions in inch [mm]

RECOMMENDED PAD LAYOUT

Standard



-HC



All dimensions in inch[mm]
 Pad size(lead free recommended)
 Through hole 1.2.3.4.5.6: $\varnothing 0.051[1.30]$
 Top view pad 1.2.3.4.5.6: $\varnothing 0.064[1.63]$
 Bottom view pad 1.2.3.4.5.6: $\varnothing 0.102[2.60]$

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 case temperature (Tc) should be measured at the position as the figure below. The temperature at this location should not exceed "Maximum case temperature". When Operating, adequate cooling must be provided to maintain the test point temperature at or below "Maximum case temperature". You can limit this Temperature to a lower value for extremely high reliability.

- Thermal test condition with vertical direction by natural convection (20LFM).

