



P-DUKE POWER

FKC12 Series

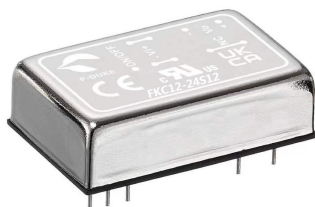
DC-DC Converter
Up to 12 Watts

3

YEARS
WARRANTY

ROHS
COMPLIANT

REACH
COMPLIANT



Automation



Datacom



IPC



Industry



Measurement



Telecom



Automobile



Boat



Charger



Medical



PV



Railway

UL US

CB

CE

UK
CA

1600
VDC
Isolation
Voltage

2 : 1
Input
Range

NO
Min. Load
Required

REMOTE
ON
OFF

OCP

SCP

UVP

PART NUMBER STRUCTURE

FKC12 - 48 S 05 - SMD

Series Name

Input
Voltage
(VDC)

Output
Quantity

Output
Voltage
(VDC)

Mounting Type
Options

12:9~18
24:18~36
48:36~75

S:Single

2P5:2.5
3P3:3.3
05:5.1
12:12
15:15

D: Dual

05:±5
12:±12
15:±15

□: DIP type
SMD: SMD type

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

Model Number	Input Range	Output Voltage	Output Current @Full Load	Input Current @No Load	Efficiency	Maximum Capacitor Load
	VDC	VDC	mA	mA	%	μF
FKC12-12S2P5	9 ~ 18	2.5	3500	50	82	2000
FKC12-12S3P3	9 ~ 18	3.3	3500	60	84	2000
FKC12-12S05	9 ~ 18	5.1	2400	53	86	2000
FKC12-12S12	9 ~ 18	12	1000	15	86	430
FKC12-12S15	9 ~ 18	15	800	17	86	300
FKC12-12D05	9 ~ 18	±5	±1200	24	82	±1250
FKC12-12D12	9 ~ 18	±12	±500	19	87	±200
FKC12-12D15	9 ~ 18	±15	±400	24	87	±120
FKC12-24S2P5	18 ~ 36	2.5	3500	36	83	2000
FKC12-24S3P3	18 ~ 36	3.3	3500	36	85	2000
FKC12-24S05	18 ~ 36	5.1	2400	35	87	2000
FKC12-24S12	18 ~ 36	12	1000	16	87	430
FKC12-24S15	18 ~ 36	15	800	17	87	300
FKC12-24D05	18 ~ 36	±5	±1200	15	83	±1250
FKC12-24D12	18 ~ 36	±12	±500	15	88	±200
FKC12-24D15	18 ~ 36	±15	±400	18	88	±120
FKC12-48S2P5	36 ~ 75	2.5	3500	10	83	2000
FKC12-48S3P3	36 ~ 75	3.3	3500	14	85	2000
FKC12-48S05	36 ~ 75	5.1	2400	23	87	2000
FKC12-48S12	36 ~ 75	12	1000	11	87	430
FKC12-48S15	36 ~ 75	15	800	5	87	300
FKC12-48D05	36 ~ 75	±5	±1200	6	83	±1250
FKC12-48D12	36 ~ 75	±12	±500	6	88	±200
FKC12-48D15	36 ~ 75	±15	±400	6	88	±120

INPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range	12Vin(nom) 24Vin(nom) 48Vin(nom)		9 18 36	12 24 48	18 36 75	VDC
Start up voltage	12Vin(nom) 24Vin(nom) 48Vin(nom)				9 18 36	VDC
Shutdown voltage	12Vin(nom) 24Vin(nom) 48Vin(nom)		7 15 32	8 16 33.5	8.8 17.5 35	VDC
Start up time	Constant resistive load	Power up Remote ON/OFF		450 5		ms
Input surge voltage	100 ms, max.	12Vin(nom) 24Vin(nom) 48Vin(nom)			36 50 100	VDC
Input filter			Pi type			
Remote ON/OFF	Referred to –Vin pin	Positive logic DC-DC ON DC-DC OFF Input current of Ctrl pin Remote off input current	-0.5	2.5	Open or 3.0 ~ 12VDC Short or 0 ~ 1.2VDC +0.5	mA mA

OUTPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Voltage accuracy			-1.2		+1.2	%
Line regulation	Low Line to High Line at Full Load	Single	-0.2		+0.2	%
		Dual	-0.5		+0.5	
Load regulation	No Load to Full Load	DIP type	Single 2.5Vout		+1.0	%
			Single others		+0.5	
			Dual		+1.0	
	SMD type		Single 2.5Vout		+1.0	
			Single others		+1.0	
			Dual		+1.0	
Cross regulation	Asymmetrical load 25%/100% FL	Dual	-5.0		+5.0	%
Ripple and noise	20MHz bandwidth			85		mVp-p
Temperature coefficient			-0.02		+0.02	%/°C
Transient response recovery time	25% load step change			250		µs
Over voltage protection	Single Output	2.5Vout		3.9		VDC
		3.3Vout		3.9		
		5.1Vout		6.2		
		12Vout		15		
		15Vout		18		
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	DIP type	Input to Output	1600		VDC
			Input (Output) to Case	1600		
		SMD type	Input to Output	1600		
			Input (Output) to Case	1000		
Isolation resistance	500VDC		1			GΩ
Isolation capacitance					1200	pF
Switching frequency			360	400	440	kHz
Safety approvals	IEC/ EN/ UL62368-1				UL:E193009 CB:UL(Demko)	
Case material					Nickel-coated copper	
Base material					Non-conductive black plastic	
Potting material					Epoxy (UL94 V-0)	
Weight					18g (0.62oz)	
MTBF	MIL-HDBK-217F				2.064 x 10 ⁶ hrs	

ENVIRONMENTAL SPECIFICATIONS

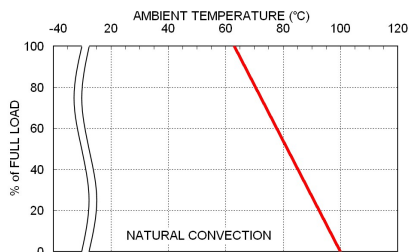
Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating ambient temperature	2.5Vout, 3.3Vout, ±5Vout	Without derating	-40		+61	°C
		With derating	+61		+100	
	Others	Without derating	-40		+66	
		With derating	+66		+100	
Maximum case temperature					100	°C
Storage temperature range			-55		+125	°C
Thermal impedance				20		°C/W
Thermal shock					MIL-STD-810F	
Vibration					MIL-STD-810F	
Relative humidity					5% to 95% RH	

EMC SPECIFICATIONS

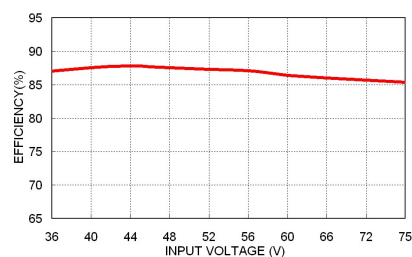
Parameter	Conditions		Level
EMI	EN55032	With external components	Class A + Class B
EMS	EN55024		
ESD	EN61000-4-2	Air $\pm 8\text{kV}$ and Contact $\pm 6\text{kV}$	Perf. Criteria A
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A
Fast transient	EN61000-4-4	$\pm 2\text{kV}$ With an external input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

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

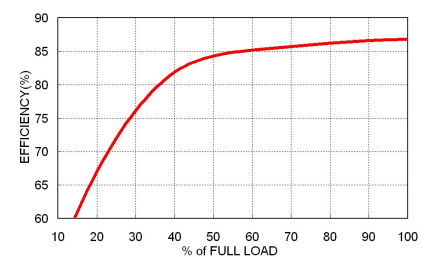
CHARACTERISTIC CURVE



FKC12-48S05 Derating Curve



FKC12-48S05 Efficiency vs. Input Voltage



FKC12-48S05 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.

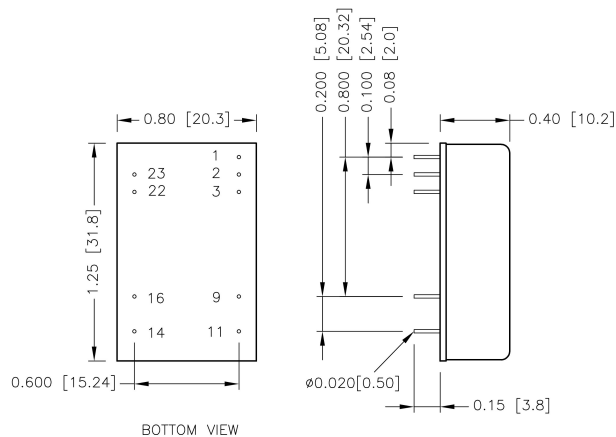
The input line fuse suggest as below :

Model	Fuse Rating (A)	Fuse Type
FKC12-12S□□、FKC12-12D□□	2.5	Slow-Blow
FKC12-24S□□、FKC12-24D□□	1.25	Slow-Blow
FKC12-48S□□、FKC12-48D□□	0.8	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

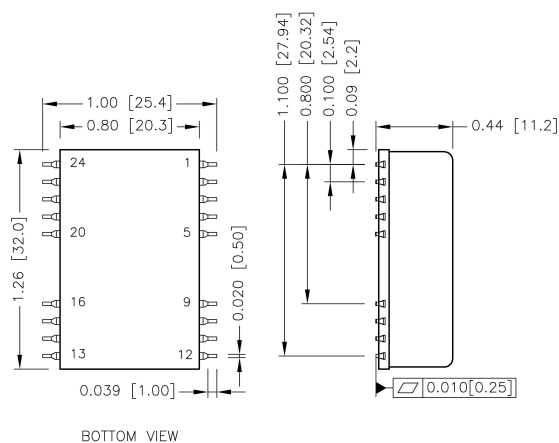
DIP type



PIN CONNECTION

PIN	SINGLE	DUAL	PIN	SINGLE	DUAL
1	Ctrl	Ctrl	23	+Vin	+Vin
2	-Vin	-Vin	22	+Vin	+Vin
3	-Vin	-Vin			
9	NC	Common	16	-Vout	Common
11	NC	-Vout	14	+Vout	+Vout

SMD type



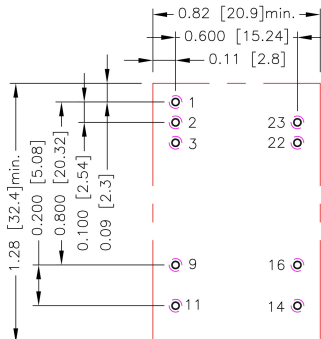
PIN CONNECTION

PIN	SINGLE	DUAL	PIN	SINGLE	DUAL
1	Ctrl	Ctrl	23	+Vin	+Vin
2	-Vin	-Vin	22	+Vin	+Vin
3	-Vin	-Vin			
9	NC	Common	16	-Vout	Common
11	NC	-Vout	14	+Vout	+Vout
Others	NC	NC			

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 dimension tolerance ±0.004[0.10]

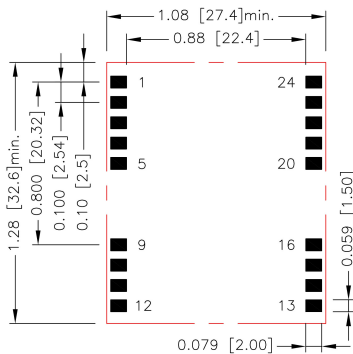
RECOMMENDED PAD LAYOUT

DIP type



All dimensions in inch[mm]
 Pad size(lead free recommended)
 Through hole 1.2.3.9.11.14.16.22.23: $\Phi 0.031$ [0.80]
 Top view pad 1.2.3.9.11.14.16.22.23: $\Phi 0.039$ [1.00]
 Bottom view pad 1.2.3.9.11.14.16.22.23: $\Phi 0.063$ [1.60]

SMD type



All dimensions in inch[mm]
 Pad size(lead free recommended)
 Top view pad: 0.079x0.059[2.00x1.50]

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.

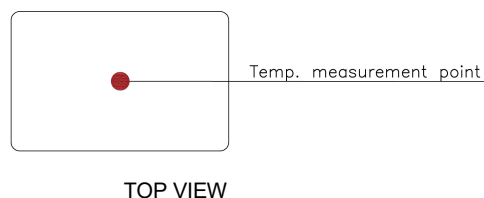
Proper cooling can be verified by measuring the point as the figure below.

The temperature at this location should not exceed "Maximum case temperature".

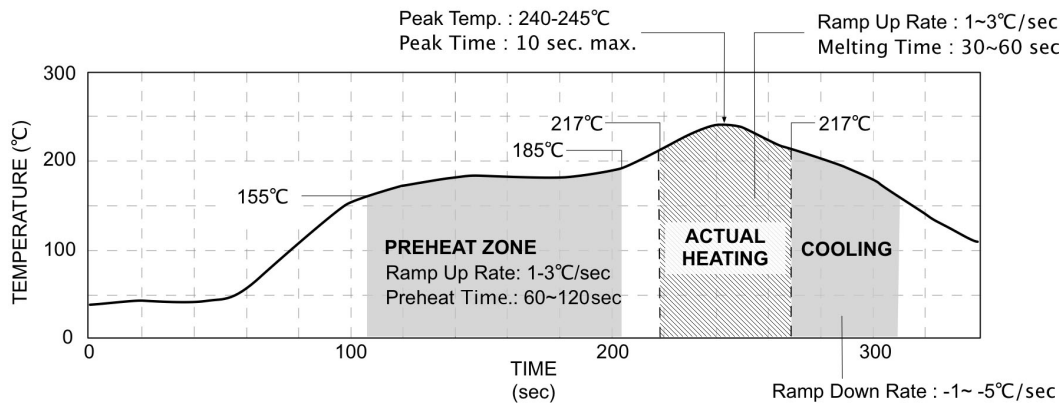
When Operating, adequate cooling must be provided to maintain the test point temperature at or below "Maximum case temperature".

You can limit this Temperature to a lower value for extremely high reliability.

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



LEAD FREE REFLOW PROFILE For SMD Type



*The curves define the maximum peak reflow temperature permissible measured on pin1 or Vin pin.