



# 3

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WARRANTY

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Automation



Datacom



IPC



Industry



Measurement



Telecom



Automobile



Boat



Charger



Medical



PV



Railway

UL US CB CE UK CA

1600  
VDC  
Isolation  
Voltage

4 : 1  
Wide  
Input  
Range

NO  
Min. Load  
Required

REMOTE  
ON  
OFF

OCP

SCP

UVP

### PART NUMBER STRUCTURE

FKC12 -	48	S	05	W	-	SMD
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range		Mounting Type Options
	24:9~36 48:18~75	S:Single	3P3:3.3 05:5.1 12:12 15:15	4 : 1		□: DIP type SMD: SMD type
		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	Output Voltage	Output Current @Full Load	Input Current @No Load	Efficiency	Maximum Capacitor Load
	VDC	VDC	mA	mA	%	μF
FKC12-24S3P3W	9 ~ 36	3.3	3500	55	84	2000
FKC12-24S05W	9 ~ 36	5.1	2400	55	87	2000
FKC12-24S12W	9 ~ 36	12	1000	13	87	430
FKC12-24S15W	9 ~ 36	15	800	11	87	300
FKC12-24D05W	9 ~ 36	±5	±1200	15	84	±1250
FKC12-24D12W	9 ~ 36	±12	±500	12	87	±200
FKC12-24D15W	9 ~ 36	±15	±400	20	87	±120
FKC12-48S3P3W	18 ~ 75	3.3	3500	17	84	2000
FKC12-48S05W	18 ~ 75	5.1	2400	20	87	2000
FKC12-48S12W	18 ~ 75	12	1000	6	87	430
FKC12-48S15W	18 ~ 75	15	800	6	88	300
FKC12-48D05W	18 ~ 75	±5	±1200	7	85	±1250
FKC12-48D12W	18 ~ 75	±12	±500	7	87	±200
FKC12-48D15W	18 ~ 75	±15	±400	7	87	±120

**INPUT SPECIFICATIONS**

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range	24Vin(nom)	48Vin(nom)	9	24	36	VDC
Start up voltage	24Vin(nom)	48Vin(nom)	18	48	75	VDC
Shutdown voltage	24Vin(nom)	48Vin(nom)	7	8	8.8	VDC
Start up time	Constant resistive load	Power up Remote ON/OFF	15	450 5	17.5	ms
Input surge voltage	100 ms, max.	24Vin(nom) 48Vin(nom)			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		-0.2		+0.2	%
Load regulation	No Load to Full Load	DIP type Single Dual SMD type Single Dual	-0.5 -1.0 -1.0 -1.0		+0.5 +1.0 +1.0 +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		3.3Vout 5.1Vout 12Vout 15Vout		3.9 6.2 15 18		VDC
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	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						1500	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						2.087 x 10 <sup>6</sup> hrs

## ENVIRONMENTAL SPECIFICATIONS

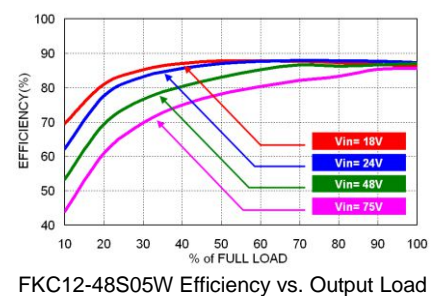
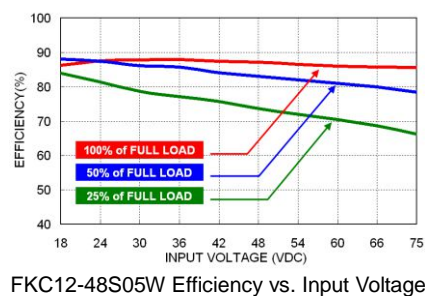
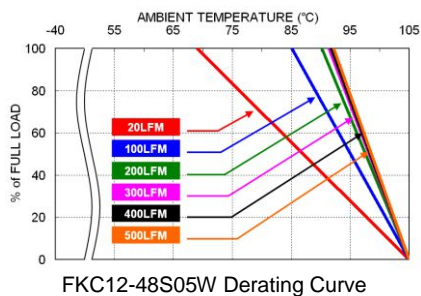
Parameter	Conditions			Min.	Typ.	Max.	Unit
Operating ambient temperature	3.3Vout, ±5Vout	Without derating	Without derating	-40		+61	°C
			With derating	+61		+105	
	Others	Without derating	-40		+69		
		With derating	+69		+105		
Maximum case temperature						105	°C
Storage temperature range				-55		+125	°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	EN55035		
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	EN61000-4-4	± 2kV	Perf. Criteria A
		With an external input filter capacitor (Nippon chemi-con KY series, 220µF/100V.)	
Surge	EN61000-4-5	± 1kV	Perf. Criteria A
		With an external input filter capacitor (Nippon chemi-con KY series, 220µF/100V.)	
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



## 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.

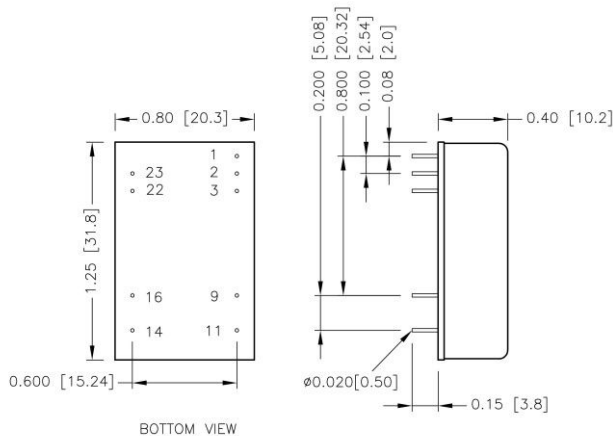
The input line fuse suggest as below :

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

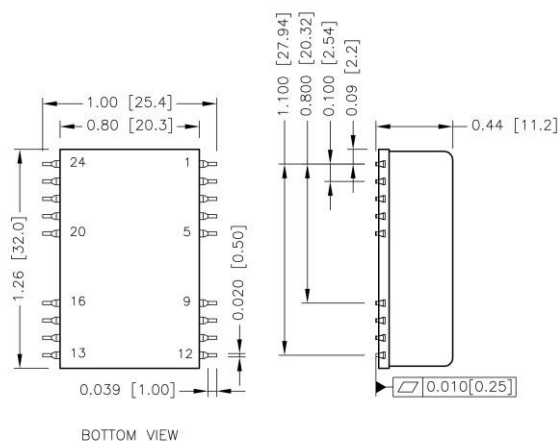
### DIP type



### PIN CONNECTION

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

### SMD type



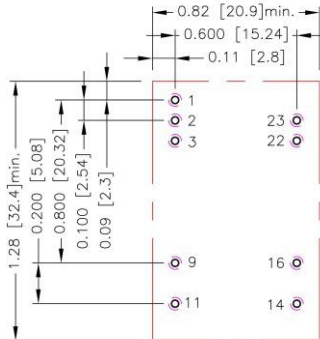
### PIN CONNECTION

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

- All dimensions in inch [mm]
- Tolerance :x.xx±0.02 [x.x±0.5]  
x.xxx±0.01 [x.xx±0.25]
- Pin dimension tolerance ±0.004[0.10]

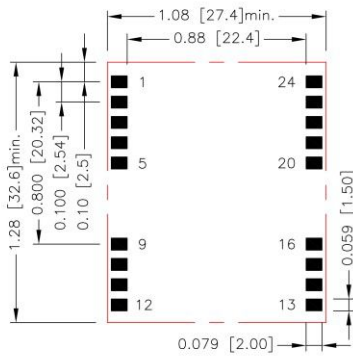
## RECOMMENDED PAD LAYOUT

### 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.

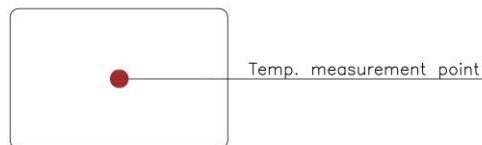
Proper cooling can be verified by measuring the point as the figure below.

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".

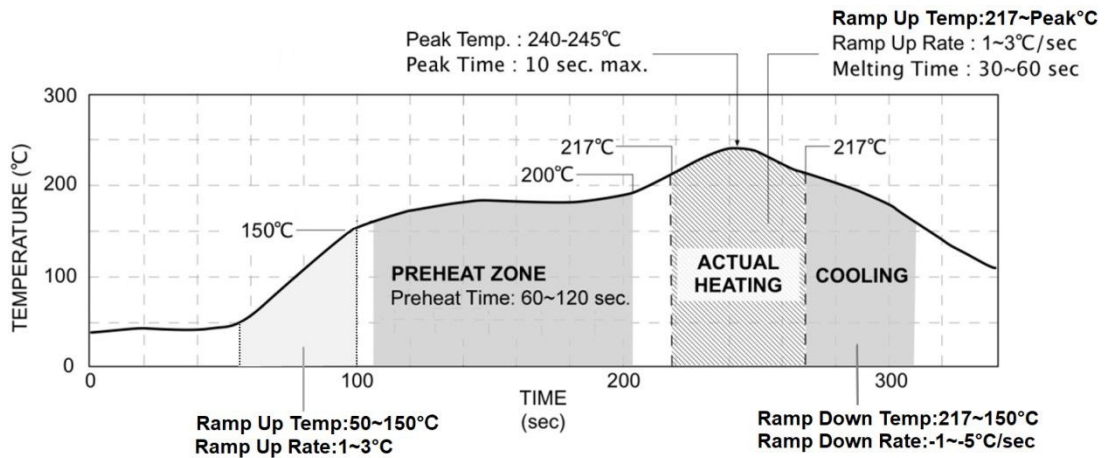
You can limit this temperature to a lower value for extremely high reliability.

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



TOP VIEW

**LEAD FREE REFLOW PROFILE For SMD Type**



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