



# P-DUKE POWER

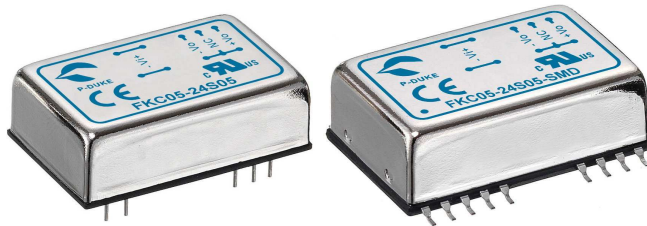
## FKC05 · FKC05W Series

DC-DC Converter  
Up to 5 Watts

**3**  
YEARS  
WARRANTY

ROHS  
COMPLIANT

REACH  
COMPLIANT



Automation



Datacom



IPC



Industry



Measurement



Telecom



Automobile



Boat



Charger



Medical



PV



Railway



**1600**  
VDC  
Isolation  
Voltage

**4 : 1**  
Wide  
Input  
Range

**2 : 1**  
Input  
Range

**NO**  
Min. Load  
Required

**OCP**

**SCP**

### PART NUMBER STRUCTURE

FKC05 -	48	S	05	W -	M2	SMD
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Operating Temp Option	Mounting Type Option
	12: 9~18 24: 18~36 48: 36~75	S:Single  D: Dual	33:3.3 05:5 12:12 15:15  05:±5 12:±12 15:±15	□:2:1	□: -25~+85°C With derating M1: -40~+85°C Without derating	□: DIP type SMD: SMD type
	24: 9~36 48: 18~75	S:Single  D: Dual	33:3.3 05:5 12:12 15:15  05:±5 12:±12 15:±15	W:4:1	□: -25~+85°C With derating M2: -40~+85°C With derating	□: 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
FKC05-12S33	9 ~ 18	3.3	1000	10	76	2200
FKC05-12S05	9 ~ 18	5	1000	10	78	1000
FKC05-12S12	9 ~ 18	12	470	10	82	220
FKC05-12S15	9 ~ 18	15	400	10	81	150
FKC05-12D05	9 ~ 18	±5	±500	15	78	±680
FKC05-12D12	9 ~ 18	±12	±230	20	81	±100
FKC05-12D15	9 ~ 18	±15	±190	15	84	±68
FKC05-24S33	18 ~ 36	3.3	1000	10	75	2200
FKC05-24S05	18 ~ 36	5	1000	15	77	1000
FKC05-24S12	18 ~ 36	12	470	15	81	220
FKC05-24S15	18 ~ 36	15	400	15	81	150
FKC05-24D05	18 ~ 36	±5	±500	15	80	±680
FKC05-24D12	18 ~ 36	±12	±230	20	84	±100
FKC05-24D15	18 ~ 36	±15	±190	20	81	±68
FKC05-48S33	36 ~ 75	3.3	1000	10	74	2200
FKC05-48S05	36 ~ 75	5	1000	10	77	1000
FKC05-48S12	36 ~ 75	12	470	10	82	220
FKC05-48S15	36 ~ 75	15	400	10	81	150
FKC05-48D05	36 ~ 75	±5	±500	10	78	±680
FKC05-48D12	36 ~ 75	±12	±230	5	82	±100
FKC05-48D15	36 ~ 75	±15	±190	10	83	±68
FKC05-24S33W	9 ~ 36	3.3	1000	10	76	2200
FKC05-24S05W	9 ~ 36	5	1000	15	79	1000
FKC05-24S12W	9 ~ 36	12	470	15	81	220
FKC05-24S15W	9 ~ 36	15	400	15	84	150
FKC05-24D05W	9 ~ 36	±5	±500	15	78	±680
FKC05-24D12W	9 ~ 36	±12	±230	20	82	±100
FKC05-24D15W	9 ~ 36	±15	±190	20	84	±68
FKC05-48S33W	18 ~ 75	3.3	1000	10	73	2200
FKC05-48S05W	18 ~ 75	5	1000	10	79	1000
FKC05-48S12W	18 ~ 75	12	470	10	80	220
FKC05-48S15W	18 ~ 75	15	400	10	82	150
FKC05-48D05W	18 ~ 75	±5	±500	10	76	±680
FKC05-48D12W	18 ~ 75	±12	±230	5	80	±100
FKC05-48D15W	18 ~ 75	±15	±190	10	80	±68

INPUT SPECIFICATIONS						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range	FKC05	12Vin(nom)	9	12	18	VDC
		24Vin(nom)	18	24	36	
	FKC05W	48Vin(nom)	36	48	75	
		24Vin(nom)	9	24	36	
Start up time	Constant resistive load	Power up			450	ms
Input surge voltage	100 ms, max.	12Vin(nom)			36	VDC
		24Vin(nom)			50	
		48Vin(nom)			100	
Input reflected ripple current				20		mAp-p
Input filter					Pi type	

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	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			50		mVp-p
Temperature coefficient			-0.02		+0.02	%/°C
Transient response recovery time	25% load step change			200		µs
Over load protection	% of Iout rated			170		%
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					300	pF
Switching frequency			270	300	330	kHz
Safety approvals	IEC/ UL/ EN60950-1				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				5.831 x 10 <sup>6</sup> hrs	

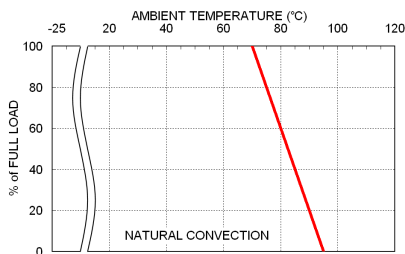
ENVIRONMENTAL SPECIFICATIONS						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating ambient temperature <sup>(1)</sup>	Standard	With derating	-25		+85	°C
		M1 Version	Without derating	-40	+85	
	M2 Version	With derating	-40		+85	
		*It's higher efficiency for M1 version. Therefore, it can be operated in a more extensive temperature range than standard and M2 version.				
Maximum case temperature		Standard type			100	°C
		M2 Version			100	
		M1 Version			105	
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

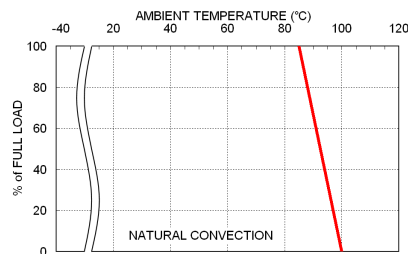
Parameter	Conditions	Level
EMI	EN55022 With external components	Class A · Class B
ESD	EN61000-4-2 Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 10 V/m	Perf. Criteria A
Fast transient	EN61000-4-4 ± 2kV With an external input filter capacitor (Nippon chemi-con KY series, 220µF/100V)	Perf. Criteria B
Surge	EN61000-4-5 ± 1kV With an external input filter capacitor (Nippon chemi-con KY series, 220µF/100V)	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

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

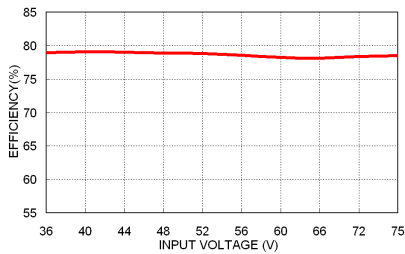
## CHARACTERISTIC CURVE



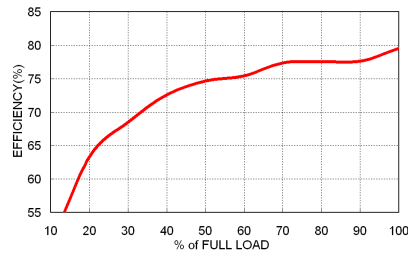
FKC05-48S05 Derating Curve



FKC05-48S05-M1 Derating Curve



FKC05-48S05 Efficiency vs. Input Voltage



FKC05-48S05 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 :

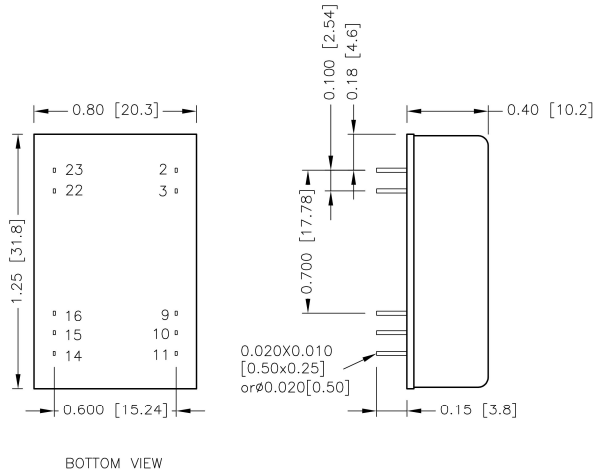
Model	Fuse Rating (A)	Fuse Type
FKC05-12S□□、FKC05-12D□□	1.25	Slow-Blow
FKC05-24S□□、FKC05-24D□□	0.63	Slow-Blow
FKC05-48S□□、FKC05-48D□□	0.315	Slow-Blow

Model	Fuse Rating (A)	Fuse Type
FKC05-24S□□W、FKC05-24D□□W	1.25	Slow-Blow
FKC05-48S□□W、FKC05-48D□□W	0.63	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**

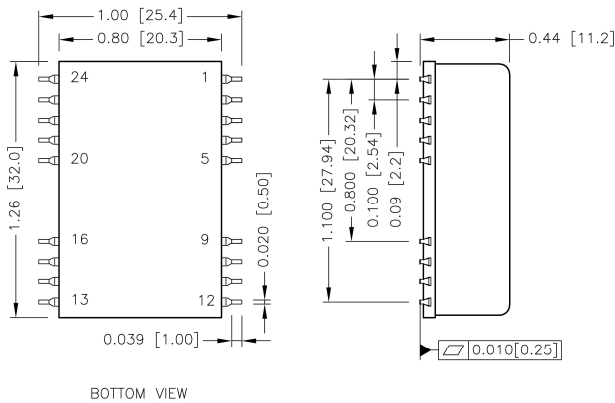


**PIN CONNECTION**

PIN	SINGLE	DUAL	PIN	SINGLE	DUAL
2	-Vin	-Vin	23	+Vin	+Vin
3	-Vin	-Vin	22	+Vin	+Vin
9	NC	Common	16	-Vout	Common
10	NC/*No Pin		15	NC/*No Pin	
11	NC	-Vout	14	+Vout	+Vout

\* There is no pin at Pin10 & Pin15 for FKC05-W DIP type.

**SMD type**



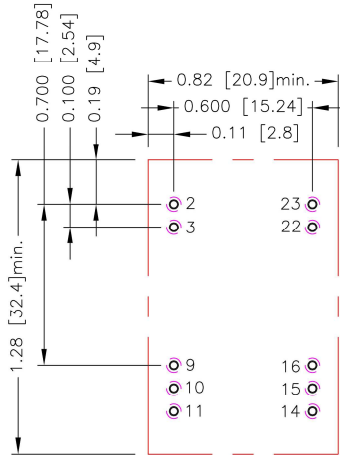
**PIN CONNECTION**

PIN	SINGLE	DUAL	PIN	SINGLE	DUAL
2	-Vin	-Vin	23	+Vin	+Vin
3	-Vin	-Vin	22	+Vin	+Vin
9	NC	Common	16	-Vout	Common
10	NC	NC	15	NC	NC
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 pitch tolerance ±0.01 (0.25)
4. Pin dimension tolerance ±0.004(0.1)

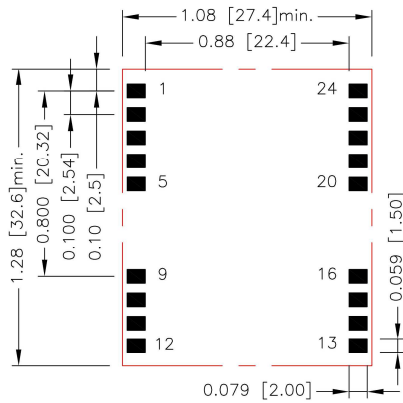
**RECOMMENDED PAD LAYOUT**

**DIP type**



All dimensions in inch[mm]  
 Pad size(lead free recommended)  
 Through hole 2.3.9.10.11.14.15.16.22.23:  $\varnothing 0.031[\varnothing 0.80]$   
 Top view pad 2.3.9.10.11.14.15.16.22.23:  $\varnothing 0.039[\varnothing 1.00]$   
 Bottom view pad 2.3.9.10.11.14.15.16.22.23:  $\varnothing 0.063[\varnothing 1.60]$

**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 case temperature.

The case temperature ( $T_c$ ) should be measured at the position as the figure below

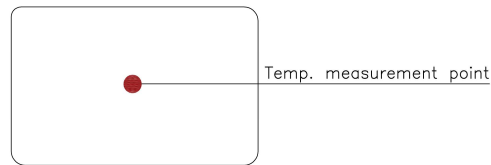
The temperature at this location should not exceed  $100^{\circ}\text{C}$ .

When operating, adequate cooling must be provided to maintain the power module case temperature at or below  $100^{\circ}\text{C}$ .

Although the maximum case temperature of the power modules is  $100^{\circ}\text{C}$ , you can limit this temperature to a lower value for extremely high reliability.

Optimum

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



TOP VIEW