3 YEARS WARRANTY

RoHS COMPLIANT

REACH COMPLIANT

Automation Datacom IPC

Industry Measurement Telecom

Automobile Boat Charger

Medical PV Railway

1600 VDC Isolation Voltage | 2 : 1 Input Range | NO Min. Load Required | OCP | SCP

PART NUMBER STRUCTURE

FKC03 - 48 S 05 - M1 SMD

Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Operating Temp. Options	Mounting Type Options
	12:9~18 **24:**18~36 **48:**36~75	**S:**Single	**33:**3.3 **05:**5 **12:**12 **15:**15	**□:** Standard -25~+100℃ With derating **M1:** -40~+105℃ +85℃ without derating **M2:** -40~+100℃ With derating	**□:** 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℃ 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
FKC03-12S33	9 ~ 18	3.3	500	10	75	2200
FKC03-12S05	9 ~ 18	5	500	10	76	1000
FKC03-12S12	9 ~ 18	12	250	10	80	220
FKC03-12S15	9 ~ 18	15	200	15	81	150
FKC03-12D05	9 ~ 18	±5	±250	15	78	±470
FKC03-12D12	9 ~ 18	±12	±125	15	80	±100
FKC03-12D15	9 ~ 18	±15	±100	20	82	±68
FKC03-24S33	18 ~ 36	3.3	500	10	72	2200
FKC03-24S05	18 ~ 36	5	500	10	74	1000
FKC03-24S12	18 ~ 36	12	250	15	78	220
FKC03-24S15	18 ~ 36	15	200	15	78	150
FKC03-24D05	18 ~ 36	±5	±250	15	74	±470
FKC03-24D12	18 ~ 36	±12	±125	20	77	±100
FKC03-24D15	18 ~ 36	±15	±100	20	77	±68
FKC03-48S33	36 ~ 75	3.3	500	5	74	2200
FKC03-48S05	36 ~ 75	5	500	10	74	1000
FKC03-48S12	36 ~ 75	12	250	10	79	220
FKC03-48S15	36 ~ 75	15	200	10	78	150
FKC03-48D05	36 ~ 75	±5	±250	10	73	±470
FKC03-48D12	36 ~ 75	±12	±125	10	79	±100
FKC03-48D15	36 ~ 75	±15	±100	10	77	±68

INPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range		12Vin(nom)	9	12	18	VDC
		24Vin(nom)	18	24	36	
		48Vin(nom)	36	48	75	
Start up time	Constant resistive load	Power up			350	ms
Input surge voltage	100 ms, max.	12Vin(nom)			36	VDC
		24Vin(nom)			50	
		48Vin(nom)			100	
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	-0.2		+0.2	%
		Dual	-1.0		+1.0	
Cross regulation	Asymmetrical load 25%/100% FL	Dual	-5.0		+5.0	%
Ripple and noise	20MHz bandwidth			50		mVp-p
Temperature coefficient			-0.02		+0.02	%/℃
Transient response recovery time	25% load step change			200		μs
Over load protection	% of Iout rated			180		%
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						300	pF
Switching frequency				270	300	330	kHz
Safety approvals	IEC /EN /UL 62368-1					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					7.289×10^6 hrs	

ENVIRONMENTAL SPECIFICATIONS

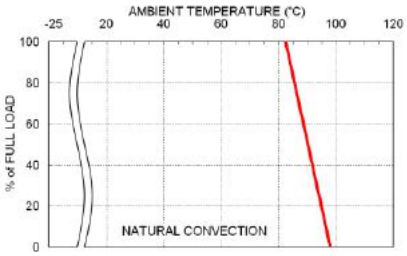
Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating ambient temperature	Standard	With derating	-25		+100	℃
	M1 Version	+85℃ without derating	-40		+105	
	M2 Version	With deraitng	-40		+100	
	*It's higher efficiency for M1 version. Therefore, it can be operated in a more extensive temperature range than standard and M2 version.					
Maximum case temperature	M1 Version				105	℃
	Others				100	
Storage temperature range			-55		+125	℃
Thermal impedance	Natural convection			20		℃/W
Thermal shock					MIL-STD-810F	
Vibration					MIL-STD-810F	
Relative humidity					5% to 95% RH	

EMC SPECIFICATIONS

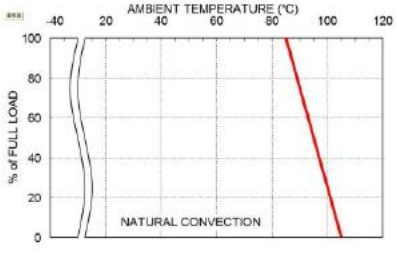
Parameter	Conditions		Level
EMI	EN55032	With external components	Class A，Class B
EMS	EN55024		
ESD	EN61000-4-2	Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A
Fast transient	EN61000-4-4	± 2kV With an external input filter capacitor (Nippon chemi-con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

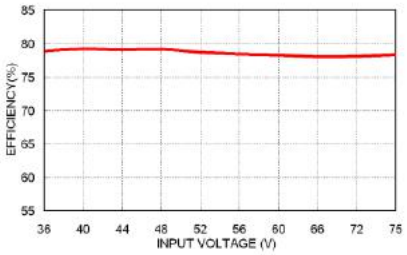
CHARACTERISTIC CURVE



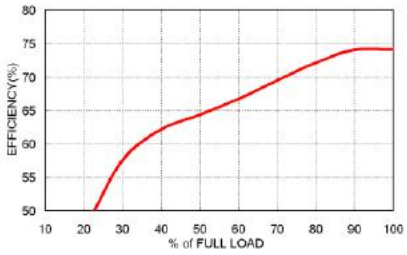
FKC03-48S05 Derating Curve



FKC03-48S05-M1 Derating Curve



FKC03-48S05 Efficiency vs. Input Voltage



FKC03-48S05 Efficiency vs. Output Load

FUSE CONSIDERATION

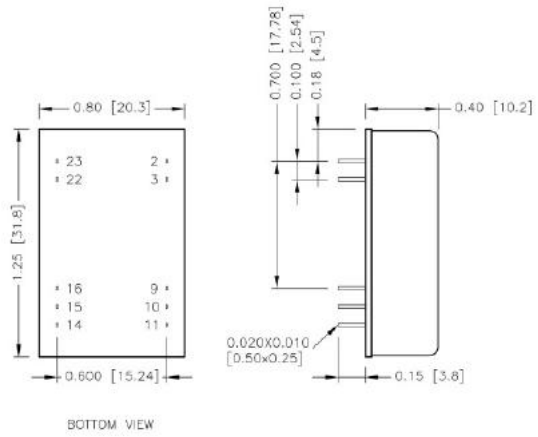
This power module is not internally fused. An input line fuse must always be used.
This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.
To maximum flexibility, internal fusing 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
FKC03-12S□□、FKC03-12D□□	0.8	Slow-Blow
FKC03-24S□□、FKC03-24D□□	0.5	Slow-Blow
FKC03-48S□□、FKC03-48D□□	0.315	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

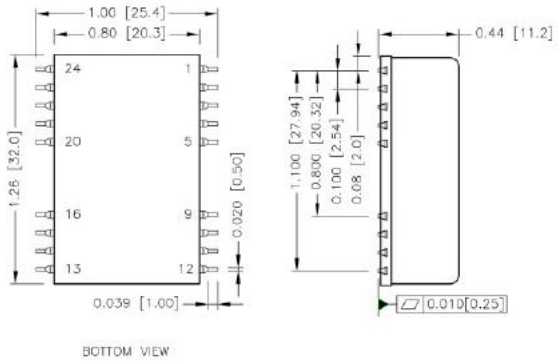
DIP type



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	NC	15	NC	NC
11	NC	-Vout	14	+Vout	+Vout

SMD type



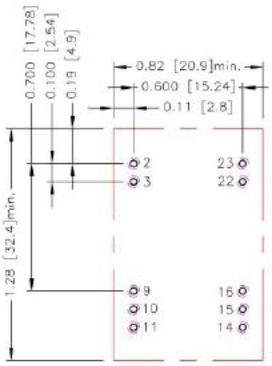
PIN CONNECTION

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 dimension tolerance ±0.004[0.10]

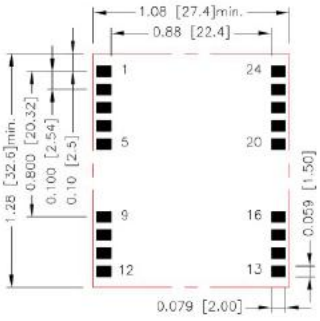
RECOMMENDED PAD LAYOUT

DIP type



All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 2.3.9.10.11.14.15.16.22.23: Φ0.031[0.80]
Top view pad 2.3.9.10.11.14.15.16.22.23: Φ0.039[1.00]
Bottom view pad 2.3.9.10.11.14.15.16.22.23: Φ0.063[1.60]

SMD type

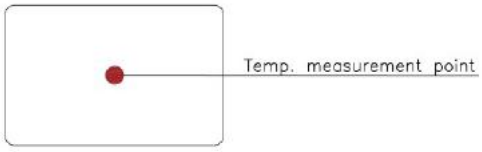


All dimensions in inch[mm]
Pad size(lead free recommended)
Top view pad:0.079x0.059[2.00x1.50]

THERMAL CONSIDERATIONS

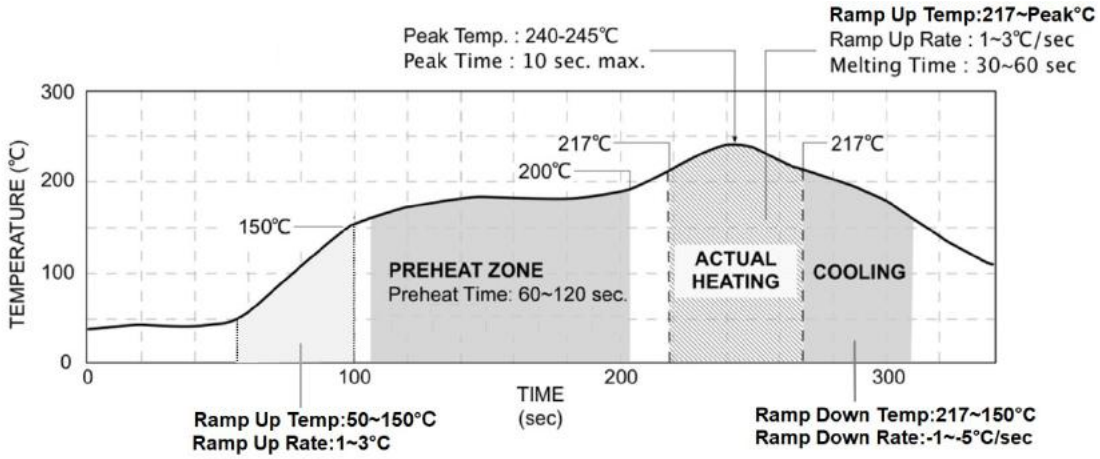
The power module operates in a variety of thermal environments.
However, sufficient cooling should be provided to help ensure reliable operation of the unit.
Heat is removed by conduction, convection, and radiation to the surrounding environment.
Proper cooling can be verified by measuring the point as the figure below.
The 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).



TOP VIEW

LEAD FREE REFLOW PROFILE For SMD Type



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

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