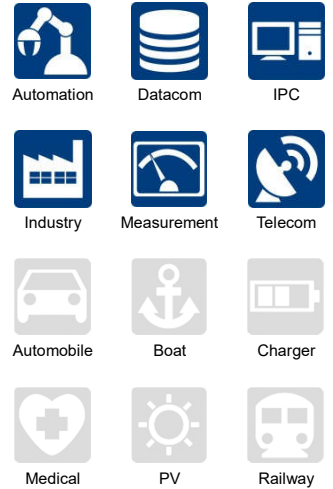


**3**  
YEARS  
WARRANTY

**ROHS**  
COMPLIANT

**REACH**  
COMPLIANT



**UL** US **CB** **CE**

1600 VDC Isolation Voltage | 4:1 Wide Input Range | 2:1 Input Range | 6 sided Shielding | NO Min. Load Required | REMOTE ON OFF | OCP | SCP

**PART NUMBER STRUCTURE**

FDC05 -	48	S	05	W -	M2	P	HC
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Operating Temp. Option	Remote On/Off Option	Assembly 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~+100°C With derating M1:-40~+105°C +85°C without derating M2:-40~+100°C With derating	□:No pin P:Positive logic N:Negative logic	□: None HC: Heat-sink with Clamp
	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~+100°C With derating M2:-40~+100°C With derating	□:No pin P:Positive logic N:Negative logic	□:None HC:Heat-sink with Clamp

**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
FDC05-12S33	9 ~ 18	3.3	1000	10	76	3700
FDC05-12S05	9 ~ 18	5	1000	10	79	1700
FDC05-12S12	9 ~ 18	12	470	10	81	290
FDC05-12S15	9 ~ 18	15	400	15	80	188
FDC05-12D05	9 ~ 18	±5	±500	20	79	±850
FDC05-12D12	9 ~ 18	±12	±230	15	81	±140
FDC05-12D15	9 ~ 18	±15	±190	20	82	±47
FDC05-24S33	18 ~ 36	3.3	1000	15	73	3700
FDC05-24S05	18 ~ 36	5	1000	15	78	1700
FDC05-24S12	18 ~ 36	12	470	10	81	290
FDC05-24S15	18 ~ 36	15	400	20	81	188
FDC05-24D05	18 ~ 36	±5	±500	15	79	±850
FDC05-24D12	18 ~ 36	±12	±230	20	82	±140
FDC05-24D15	18 ~ 36	±15	±190	20	81	±47
FDC05-48S33	36 ~ 75	3.3	1000	5	73	3700
FDC05-48S05	36 ~ 75	5	1000	10	76	1700
FDC05-48S12	36 ~ 75	12	470	10	82	290
FDC05-48S15	36 ~ 75	15	400	10	82	188
FDC05-48D05	36 ~ 75	±5	±500	10	78	±850
FDC05-48D12	36 ~ 75	±12	±230	10	81	±140
FDC05-48D15	36 ~ 75	±15	±190	10	81	±47
FDC05-24S33W	9 ~ 36	3.3	1000	5	77	3700
FDC05-24S05W	9 ~ 36	5	1000	5	80	1700
FDC05-24S12W	9 ~ 36	12	470	5	82	290
FDC05-24S15W	9 ~ 36	15	400	5	81	188
FDC05-24D05W	9 ~ 36	±5	±500	5	80	±850
FDC05-24D12W	9 ~ 36	±12	±230	5	82	±140
FDC05-24D15W	9 ~ 36	±15	±190	10	83	±47
FDC05-48S33W	18 ~ 75	3.3	1000	5	73	3700
FDC05-48S05W	18 ~ 75	5	1000	10	76	1700
FDC05-48S12W	18 ~ 75	12	470	10	82	290
FDC05-48S15W	18 ~ 75	15	400	10	81	188
FDC05-48D05W	18 ~ 75	±5	±500	5	78	±850
FDC05-48D12W	18 ~ 75	±12	±230	10	81	±140
FDC05-48D15W	18 ~ 75	±15	±190	10	81	±47

## INPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range	FDC05 series	12Vin(nom)	9	12	18	VDC
		24Vin(nom)	18	24	36	
		48Vin(nom)	36	48	75	
	FDC05W series	24Vin(nom)	9	24	36	VDC
		48Vin(nom)	18	48	75	
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 filter			Pi type			
Remote ON/OFF (Option)	Referred to -Vin pin	Positive logic	DC-DC ON	Open or 3.5 ~ 12VDC		mA
			DC-DC OFF	Short or 0 ~ 1.2VDC		
		Negative logic	DC-DC ON	Short or 0 ~ 1.2VDC		
			DC-DC OFF	Open or 3.5 ~ 12VDC		
		Input current of Ctrl pin	-0.5		+1.0	
		Remote off input current		2.5		

## 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	Measured by 20MHz bandwidth			50		mVp-p
Temperature coefficient			-0.02		+0.02	%/°C
Transient response recovery time	25% load step change	Single		200		µs
	FL to 1/2 FL ±1% error band	Dual				
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	Input to Output	1600			VDC
		Input (Output) to Case	1600			
Isolation resistance	500VDC		1			GΩ
Isolation capacitance					300	pF
Switching frequency		FDC05 series	270	300	330	kHz
		FDC05W series	180	200	220	
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			27g (0.95oz)			
MTBF	MIL-HDBK-217F, Full load		7.066 x 10 <sup>6</sup> hrs			

## ENVIRONMENTAL SPECIFICATIONS

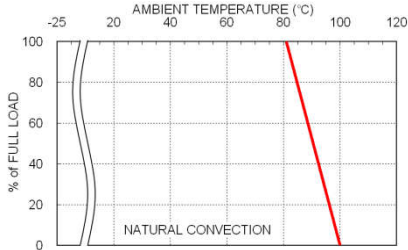
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	Standard	-25		+100	°C
	M1 Version	-40		+105	
	M2 Version	-40		+100	
*M1 version is more efficient; therefore, it can be operated in a more extensive temperature range than standard and M2 version.					
Maximum case temperature	M1 Version			+105	°C
	Others			+100	
Storage temperature range		-55		+125	°C
Thermal impedance	Without heat-sink		12		°C/W
	With heat-sink		10		
Thermal shock					MIL-STD-810F
Vibration					MIL-STD-810F
Relative humidity					5% to 95% RH

## EMC SPECIFICATIONS

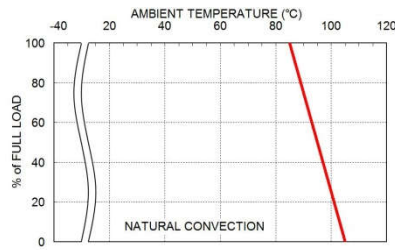
Parameter	Conditions	Level
EMI	EN55032 With external components	Class A, Class B
ESD	EN61000-4-2 Air ± 8kV and Contact ± 6kV	Perf. Criteria B
Radiated immunity	EN61000-4-3 10 V/m	Perf. Criteria A
Fast transient	EN61000-4-4 ± 2kV	Perf. Criteria B
Surge	EN61000-4-5 ± 1kV	Perf. Criteria B
	With an external 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.

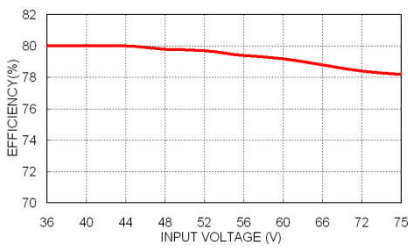
**CHARACTERISTIC CURVE**



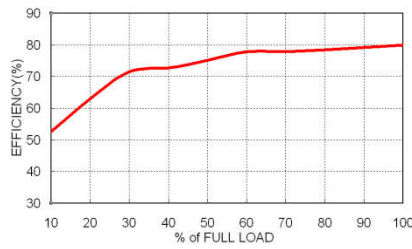
FDC05-48S05 Derating Curve



FDC05-48S05 Derating Curve With Heat-sink



FDC05-48S05 Efficiency vs. Input Voltage



FDC05-48S05 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.

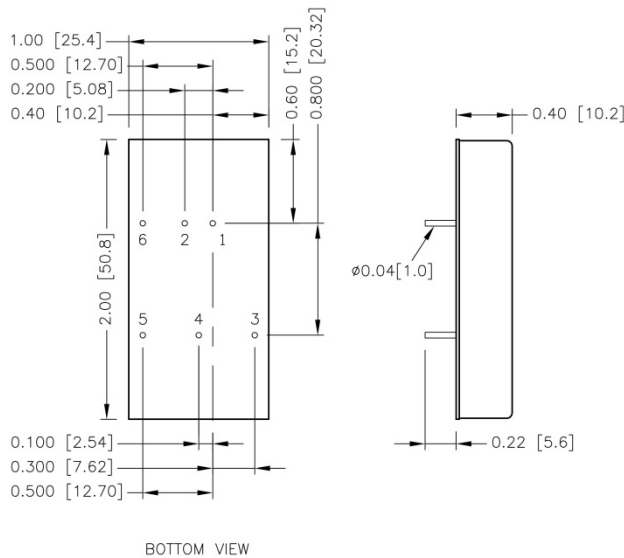
The input line fuse suggest as below :

Model	Fuse Rating (A)	Fuse Type
FDC05-12S□□、FDC05-12D□□	1.25	Slow-Blow
FDC05-24S□□、FDC05-24D□□	0.63	Slow-Blow
FDC05-48S□□、FDC05-48D□□	0.315	Slow-Blow

Model	Fuse Rating (A)	Fuse Type
FDC05-24S□□W、FDC05-24D□□W	1.25	Slow-Blow
FDC05-48S□□W、FDC05-48D□□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



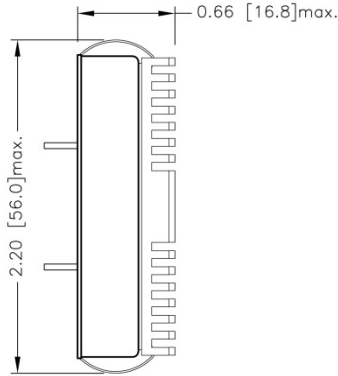
## PIN CONNECTION

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

- 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]

**HEAT-SINK OPTIONS**

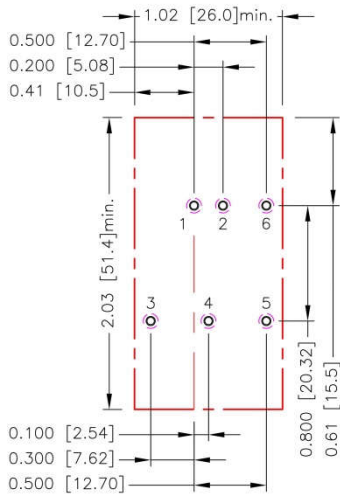
-HC (Heat-sink with clamps)



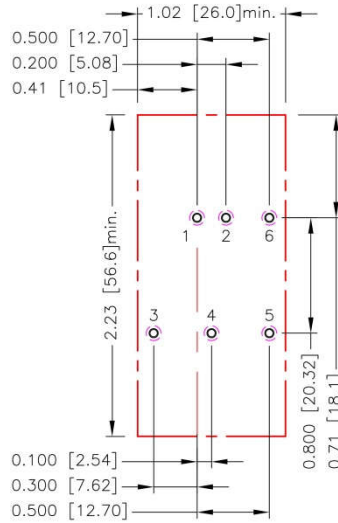
\* All dimensions in inch [mm]

**RECOMMENDED PAD LAYOUT**

**Standard**



**-HC**



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

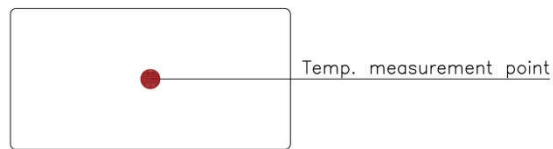
The case temperature ( $T_c$ ) should be measured at the position as the figure below.

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