

FDC20 SERIES

FDC20W

DC-DC CONVERTER



2:1 & 4:1 WIDE INPUT RANGE
UP TO 20 WATTS



FEATURES

- 1600VDC INPUT TO OUTPUT ISOLATION
- STANDARD 2.00 X 1.60 X 0.40 INCH
- SIX-SIDED CONTINUOUS SHIELD
- UL60950-1, EN60950-1, & IEC60950-1 SAFETY APPROVALS
- CE MARKED
- COMPLIANT TO RoHS II & REACH

APPLICATIONS

- WIRELESS NETWORK
- TELECOM/DATACOM
- INDUSTRY CONTROL SYSTEM
- DISTRIBUTED POWER ARCHITECTURES
- SEMICONDUCTOR EQUIPMENT

1600VDC
ISOLATION

REMOTE
CONTROL

OCP

SCP

OVP

TECHNICAL SPECIFICATION

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

Model Number	Input Range VDC	Output Voltage VDC	Output Current @ Full Load		Input Current @ No Load mA	Efficiency %	Maximum Capacitor Load (2) µF
			Min. Load (1) mA	Full Load mA			
FDC20-12S33	9 ~ 18	3.3	280	4000	40	77	13000
FDC20-12S05	9 ~ 18	5	280	4000	15	80	6800
FDC20-12S12	9 ~ 18	12	134	1670	40	83	2200
FDC20-12S15	9 ~ 18	15	106	1330	20	84	755
FDC20-12D05	9 ~ 18	±5	±140	± 2000	15	82	±3400
FDC20-12D12	9 ~ 18	±12	±67	± 833	35	83	±680
FDC20-12D15	9 ~ 18	±15	±53	± 666	35	83	±450
FDC20-12T3312	9 ~ 18	3.3 / ±12	300 / ±30	3000 / ±300	20	79	4700 / ±220
FDC20-12T3315	9 ~ 18	3.3 / ±15	300 / ±25	3000 / ±250	35	79	4700 / ±220
FDC20-12T0512	9 ~ 18	5 / ±12	200 / ±30	2000 / ±300	20	80	4700 / ±220
FDC20-12T0515	9 ~ 18	5 / ±15	200 / ±25	2000 / ±250	40	80	4700 / ±220
FDC20-24S33	18 ~ 36	3.3	280	4000	10	79	13000
FDC20-24S05	18 ~ 36	5	280	4000	10	81	6800
FDC20-24S12	18 ~ 36	12	134	1670	10	86	2200
FDC20-24S15	18 ~ 36	15	106	1330	15	86	755
FDC20-24D05	18 ~ 36	±5	±140	± 2000	20	85	±3400
FDC20-24D12	18 ~ 36	±12	±67	± 833	25	86	±680
FDC20-24D15	18 ~ 36	±15	±53	± 666	30	86	±450
FDC20-24T3312	18 ~ 36	3.3 / ±12	300 / ±30	3000 / ±300	20	82	4700 / ±220
FDC20-24T3315	18 ~ 36	3.3 / ±15	300 / ±25	3000 / ±250	20	79	4700 / ±220
FDC20-24T0512	18 ~ 36	5 / ±12	200 / ±30	2000 / ±300	25	83	4700 / ±220
FDC20-24T0515	18 ~ 36	5 / ±15	200 / ±25	2000 / ±250	10	83	4700 / ±220
FDC20-48S33	36 ~ 75	3.3	280	4000	10	79	13000
FDC20-48S05	36 ~ 75	5	280	4000	10	82	6800
FDC20-48S12	36 ~ 75	12	134	1670	15	86	2200
FDC20-48S15	36 ~ 75	15	106	1330	25	86	755
FDC20-48D05	36 ~ 75	±5	±140	± 2000	15	85	±3400
FDC20-48D12	36 ~ 75	±12	±67	± 833	15	87	±680
FDC20-48D15	36 ~ 75	±15	±53	± 666	20	87	±450
FDC20-48T3312	36 ~ 75	3.3 / ±12	300 / ±30	3000 / ±300	10	82	4700 / ±220
FDC20-48T3315	36 ~ 75	3.3 / ±15	300 / ±25	3000 / ±250	10	82	4700 / ±220
FDC20-48T0512	36 ~ 75	5 / ±12	200 / ±30	2000 / ±300	15	84	4700 / ±220
FDC20-48T0515	36 ~ 75	5 / ±15	200 / ±25	2000 / ±250	15	84	4700 / ±220

Model Number	Input Range VDC	Output Voltage VDC	Output Current @ Full Load		Input Current @ No Load mA	Efficiency %	Maximum Capacitor Load (2) µF
			Min. Load (1) mA	Full Load mA			
FDC20-24S33W	9 ~ 36	3.3	280	4000	20	76	13000
FDC20-24S05W	9 ~ 36	5	280	4000	10	79	6800
FDC20-24S12W	9 ~ 36	12	134	1670	20	81	2200
FDC20-24S15W	9 ~ 36	15	106	1330	20	81	755
FDC20-24D05W	9 ~ 36	±5	±140	± 2000	15	79	±3400
FDC20-24D12W	9 ~ 36	±12	±67	± 833	20	82	±680
FDC20-24D15W	9 ~ 36	±15	±53	± 666	25	82	±450
FDC20-48S33W	18 ~ 75	3.3	280	4000	15	77	13000
FDC20-48S05W	18 ~ 75	5	280	4000	10	80	6800
FDC20-48S12W	18 ~ 75	12	134	1670	10	82	2200
FDC20-48S15W	18 ~ 75	15	106	1330	10	82	755
FDC20-48D05W	18 ~ 75	±5	±140	± 2000	10	81	±3400
FDC20-48D12W	18 ~ 75	±12	±67	± 833	15	83	±680
FDC20-48D15W	18 ~ 75	±15	±53	± 666	20	83	±450

PART NUMBER STRUCTURE

Series name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Assembly Option
FDC20 - 48 S 05 - HS	12: 9~18 24: 18~36 48: 36~75	S: Single D: Dual T: Triple	33: 3.3 05: 5 12: 12 15: 15 05: ±5 12: ±12 15: ±15 3312: 3.3 / ±12 3315: 3.3 / ±15 0512: 5 / ±12 0515: 5 / ±15	□: None HS: Heat-sink HC: Heat-sink & Clamp
FDC20 - 48 S 05 W - HS	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	□: None HS: Heat-sink HC: Heat-sink & Clamp

INPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range	FDC20 series	12Vin(nom)	9	12	18	VDC
		24Vin(nom)	18	24	36	
		48Vin(nom)	36	48	75	
	FDC20W series	24Vin(nom)	9	24	36	VDC
		48Vin(nom)	18	48	75	VDC
Input reflected ripple current				25		mAp-p
Start up time	Constant resistive load	Power up		20		ms
Input surge voltage	100 ms, max.	12Vin(nom)			36	VDC
		24Vin(nom)			50	
		48Vin(nom)			100	
Input filter				Pi type		
Remote ON/OFF	Referred to -Vin pin	Positive logic DC-DC ON		Open or 3.5 ~ 12VDC		
		DC-DC OFF		Short or 0 ~ 1.2VDC		
		Input current of Ctrl pin	-0.5		+1.0	mA
		Remote off input current		20		mA

OUTPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit		
Voltage accuracy	Single / Dual		-1.0		+1.0	%		
	Triple: 3.3Vout, 5Vout		-1.0		+1.0			
	Triple: 12Vout, 15Vout		-5.0		+5.0			
Line regulation	Low Line to High Line at Full Load		Single		+0.2	%		
			Dual	-0.5	+0.5			
			Triple: 3.3Vout, 5Vout	-1.0	+1.0			
			Triple: 12Vout, 15Vout	-5.0	+5.0			
Load regulation	Min. Load to Full Load		Single		+0.5	%		
			Dual	-3.0	+3.0			
			Triple: 3.3Vout, 5Vout	-2.0	+2.0			
			Triple: 12Vout, 15Vout	-5.0	+5.0			
Cross regulation	Dual: Asymmetrical load 25%/100% FL		Dual		+5.0	%		
	Triple: Main output:(3.3Vout, 5Vout) 100% load, auxiliary 100%, other auxiliary 25% to 100% load.		Triple: 3.3Vout, 5Vout		+2.0			
			Triple: 12Vout, 15Vout		+5.0			
Voltage adjustability					-10	+	10	%
Ripple and noise	Measured by 20MHz bandwidth		Single	75		mVp-p		
			Dual	100				
			Triple: 3.3Vout, 5Vout	50				
			Triple: 12Vout 15Vout	120 150				
Temperature coefficient			-0.02		+0.02	%/°C		
Transient response recovery time	25% load step change	Single / Dual		250		µs		
Over voltage protection	Zener diode clamp		3.3Vout		3.9	VDC		
			5Vout		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	Input to Output	1600			VDC
		Input (Output) to Case	1600			
Isolation resistance	500VDC		1			GΩ
Isolation capacitance					300	pF
Switching frequency			270	300	330	kHz
Safety approvals						UL60950-1 EN60950-1 IEC60950-1
Case material						Nickel-coated copper
Base material						Non-conductive black plastic
Potting material						Epoxy (UL94 V-0)
Weight						48g (1.69oz)
MTBF	MIL-HDBK-217F, Full load					1.922 x 10 ⁶ hrs

ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating ambient temperature	With derating		-40		+85	°C
Maximum case temperature					+100	°C
Storage temperature range			-55		+125	°C
Thermal impedance	Vertical direction by natural convection (20LFM)			10		°C/W
	Without heat-sink With heat-sink			8.24		
Thermal shock						MIL-STD-810F
Vibration						MIL-STD-810F
Relative humidity						5% to 95% RH

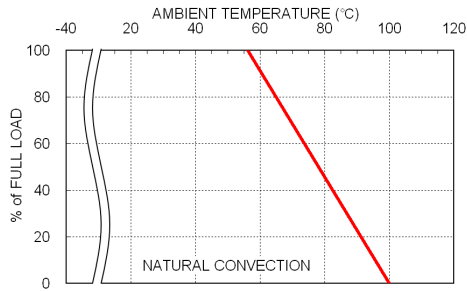
EMC SPECIFICATIONS

Parameter	Conditions		Level		
EMI (3)	EN55022		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 (4)	EN61000-4-4	± 2kV	Perf. Criteria B		
Surge (4)	EN61000-4-5	± 1kV	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		

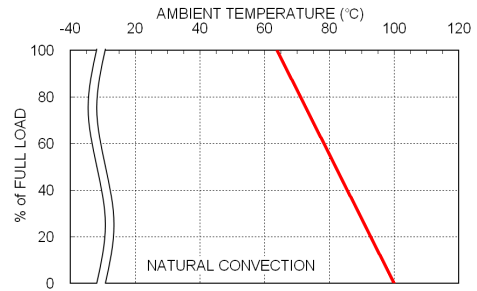
Note:

1. The output requires a minimum loading on the output to maintain specified regulation. Operation under no-load condition will not damage these devices, however they may not meet all listed specification.
2. Test by minimum input and constant resistive load.
3. The standard module meets EN55022 Class A and Class B with external components. For further information, please contact with P-DUKE.
4. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The filter capacitor Power Mate suggest: Nippon chemi-con KY series, 220 μ F/100V.

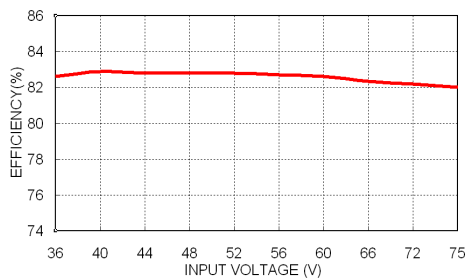
CAUTION: This power module is not internally fused. An input line fuse must always be used.

CHARACTERISTIC CURVE


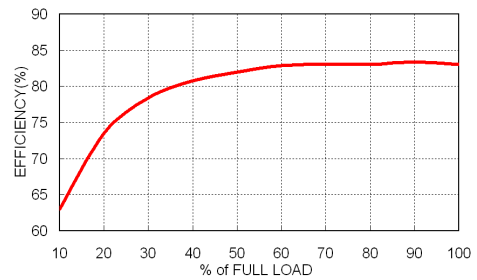
FDC20-48S05 Derating Curve



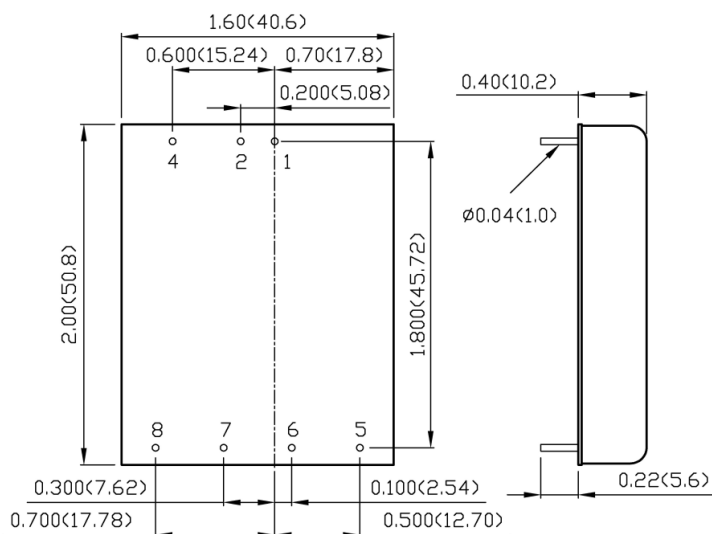
FDC20-48S05 Derating Curve With Heat-sink



FDC20-48S05 Efficiency vs. Input Voltage



FDC20-48S05 Efficiency vs. Output Load

MECHANICAL DRAWING


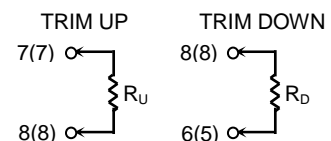
BOTTOM VIEW

PIN CONNECTION

PIN	SINGLE	DUAL	TRIPLE
1	+Vin	+Vin	+Vin
2	-Vin	-Vin	-Vin
4	Ctrl	Ctrl	Ctrl
5	No pin	+Vout	+Aux
6	+Vout	Common	+Vout
7	-Vout	-Vout	Common
8	Trim	Trim	-Aux

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method shown below.
 () for dual output trim.



1. All dimensions in inch (mm)
2. Tolerance : $x.xx \pm 0.02$ ($x.xx \pm 0.5$)
 $x.xxx \pm 0.01$ ($x.xx \pm 0.25$)
3. Pin pitch tolerance ± 0.01 (0.25)
4. Pin dimension tolerance ± 0.004 (0.1)