

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
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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	Output Voltage	Output Current @ Full Load		Input Current @ No Load	Efficiency	Maximum Capacitor Load (2)
	VDC	VDC	Min. Load (1) mA	Full Load mA	mA	%	μF
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

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

FDC20	-	48	S	05	W	-	HS
Series name		Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range		Assembly Option
		24: 9~36 48: 18~75	S: Single	33: 3.3 05: 5 12: 12 15: 15	4:1		□: None HS: Heat-sink HC: Heat-sink & Clamp
			D: Dual	05: ±5 12: ±12 15: ±15			

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	
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 Short or 0 ~ 1.2VDC		
			DC-DC OFF			
		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 Triple: 3.3Vout, 5Vout Triple: 12Vout, 15Vout	-1.0 -1.0 -5.0		+1.0 +1.0 +5.0	%
Line regulation	Low Line to High Line at Full Load Single Dual Triple: 3.3Vout, 5Vout Triple: 12Vout, 15Vout	-0.2 -0.5 -1.0 -5.0		+0.2 +0.5 +1.0 +5.0	%
Load regulation	Min. Load to Full Load Single Dual Triple: 3.3Vout, 5Vout Triple: 12Vout, 15Vout	-0.5 -3.0 -2.0 -5.0		+0.5 +3.0 +2.0 +5.0	%
Cross regulation	Dual: Asymmetrical load 25%/100% FL Triple: Main output:(3.3Vout, 5Vout) 100% load, auxiliary 100%, other auxiliary 25% to 100% load. Dual Triple: 3.3Vout, 5Vout Triple: 12Vout, 15Vout	-5.0 -2.0 -5.0		+5.0 +2.0 +5.0	%
Voltage adjustability		-10		+10	%
Ripple and noise	Measured by 20MHz bandwidth Single Dual Triple: 3.3Vout, 5Vout Triple: 12Vout 15Vout		75 100 50 120 150		mVp-p
Temperature coefficient		-0.02		+0.02	%/°C
Transient response recovery time	25% load step change Single / Dual Triple		250 500		µs
Over voltage protection	Zener diode clamp 3.3Vout 5Vout 12Vout 15Vout		3.9 6.2 15 18		VDC
Over load protection	% of lout rated			150	%
Short circuit protection					Continuous, automatic recovery

GENERAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation voltage	1 minute Input to Output Input (Output) to Case	1600 1600			VDC
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) Without heat-sink With heat-sink		10 8.24		°C/W
Thermal shock					MIL-STD-810F
Vibration					MIL-STD-810F
Relative humidity					5% to 95% RH

EMC SPECIFICATIONS

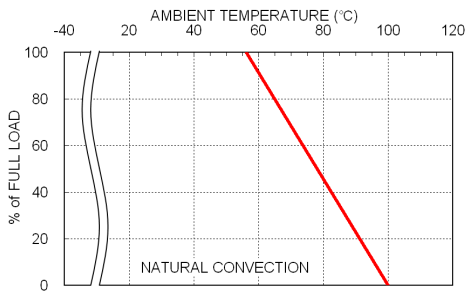
Parameter	Conditions	Level
EMI ⁽³⁾	EN55022	Class A, Class B
ESD	EN61000-4-2 Air ± 8kV and Contact ± 6kV	Perf. Criteria B
Radiated immunity	EN61000-4-3 10 V/m	Perf. Criteria A
Fast transient ⁽⁴⁾	EN61000-4-4 ± 2kV	Perf. Criteria B
Surge ⁽⁴⁾	EN61000-4-5 ± 1kV	Perf. Criteria B
Conducted immunity	EN61000-4-6 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:

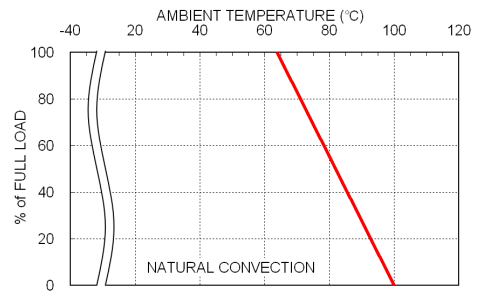
1. The output requires a minimum loading on the output to maintain specified regulation. Operation under no-load condition will not damage these devices, however they may not meet all listed specification.
2. Test by minimum input and constant resistive load.
3. The standard module meets EN55022 Class 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.

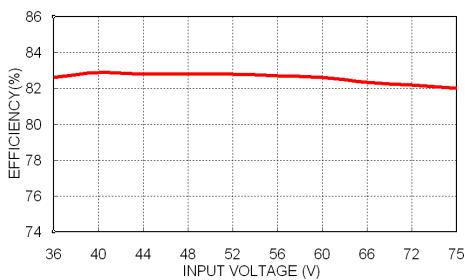
CHARACTERISTIC CURVE



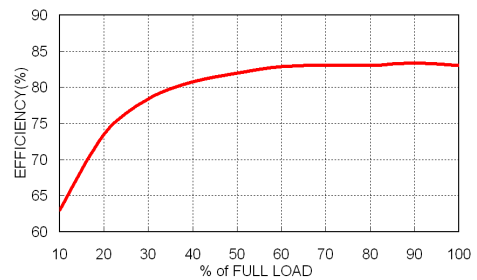
FDC20-48S05 Derating Curve



FDC20-48S05 Derating Curve With Heat-sink

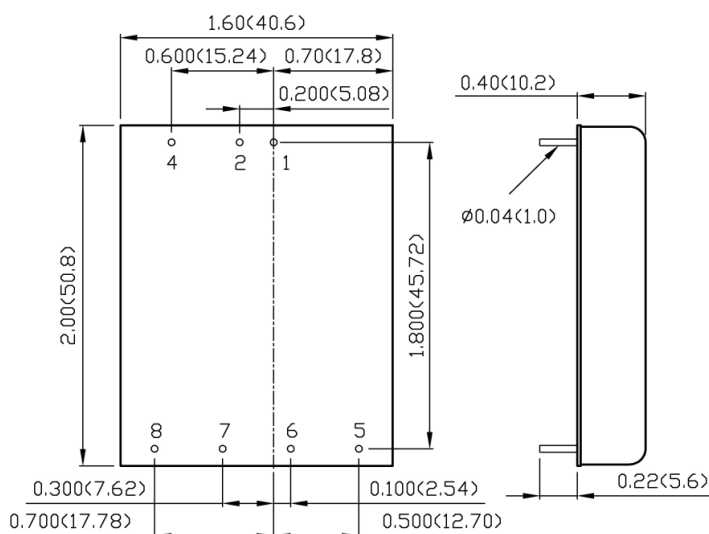


FDC20-48S05 Efficiency vs. Input Voltage



FDC20-48S05 Efficiency vs. Output Load

MECHANICAL DRAWING



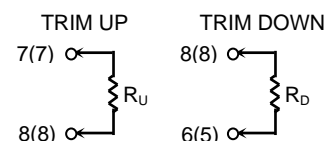
BOTTOM VIEW

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.x \pm 0.5)
x.xxx \pm 0.01 (x.xx \pm 0.25)
3. Pin pitch tolerance \pm 0.01 (0.25)
4. Pin dimension tolerance \pm 0.004 (0.1)