



## APPLICATIONS

Wireless Network  
Telecom/Datacom  
Industry Control System  
Measurement Equipment  
Semiconductor Equipment

## FEATURES

- 20 WATTS OUTPUT POWER
- OUTPUT CURRENT UP TO 4A
- STANDARD 2.00 X 1.60 X 0.40 INCH PACKAGE
- HIGH EFFICIENCY UP TO 87%
- 2:1 AND 4:1 WIDE INPUT VOLTAGE RANGE
- SIX-SIDED CONTINUOUS SHIELD
- FIXED SWITCHING FREQUENCY
- UL60950-1, EN60950-1, & IEC60950-1 SAFETY APPROVALS
- CE MARKED
- COMPLIANT TO RoHS II & REACH

## DESCRIPTION

The FDC20 and FDC20W series offer 20 Watts of output power from a 2.00 x 1.60 x 0.40 inch package. The FDC20 series with 2:1 wide input voltage of 9~18VDC, 18~36VDC and 36~75VDC. The FDC20W series with 4:1 wide input voltage of 9~36VDC and 18~75VDC.

## TECHNICAL SPECIFICATION

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

OUTPUT SPECIFICATIONS			
Output power			20 Watts, max.
Voltage accuracy	Single & Dual		± 1%
	Triple 3.3V/5V		± 1%
	Auxiliary		± 5%
Minimum load (Note 6)			See Table
Voltage adjustability			± 10%
Line regulation	LL to HL at Full Load	Single (W)	± 0.2%
		Dual (W)	± 0.5%
		Triple 3.3V/5V	± 1%
		Auxiliary	± 5%
Load regulation	Min. Load to Full Load	Single	± 0.5%
		Dual	± 3%
		Triple 3.3V/5V	± 2%
		Auxiliary	± 5%
Cross regulation (Note 7)		Dual	± 5%
		Triple 3.3V/5V	± 2%
		Auxiliary	± 5%
Ripple and noise	20MHz bandwidth		See table
Temperature coefficient			±0.02% / °C, max.
Transient response recovery time	25% load step change	Single	250µs
		Dual	250µs
		Triple	500µs
Over voltage protection	3.3VDC output		3.9VDC
	5VDC output		6.2VDC
Zener diode clamp	12VDC output		15VDC
	15VDC output		18VDC
Over load protection	% of FL at nominal input		150%, max.
Short circuit protection			Continuous, automatics recovery
GENERAL SPECIFICATIONS			
Efficiency			See table
Isolation voltage	Input to Output	1600VDC, min. 1minute	
	Input(Output) to Case	1600VDC, min. 1minute	
Isolation resistance	500VDC		10 <sup>9</sup> ohms, min.
Isolation capacitance			300pF, max.
Switching frequency			300kHz±10%
Safety approvals			IEC60950-1, UL60950-1, & EN60950-1
Case material			Nickel-coated copper
Base material			Non-conductive black plastic
Potting material			Epoxy (UL94 V-0)
Dimensions			2.00 X 1.60 X 0.40 Inch (50.8 X 40.6 X 10.2 mm)
Weight			48g (1.69oz)
MTBF (Note 1)	MIL-HDBK-217F		1.922 x 10 <sup>6</sup> hrs

INPUT SPECIFICATIONS			
Input voltage range	FDC20	12VDC nominal input	9 ~ 18VDC
		24VDC nominal input	18 ~ 36VDC
	FDC20W	48VDC nominal input	36 ~ 75VDC
		24VDC nominal input	9 ~ 36VDC
		48VDC nominal input	18 ~ 75VDC
Input filter			Pi type
Input surge voltage	12VDC input		36VDC 100ms, max.
	24VDC input		50VDC 100ms, max.
	48VDC input		100VDC 100ms, max.
Input reflected ripple current			25mA/p-p
Start up time	Nominal input and constant resistive load	Power up	20ms
Remote ON/OFF (Note 8)	DC-DC ON		Open or 3.5V < Vr < 12V
(Positive logic)	DC-DC OFF		Short or 0V < Vr < 1.2V
Input current of remote control pin	Nominal input		-0.5~1.0mA
Remote off state input current	Nominal input		20mA
ENVIRONMENTAL SPECIFICATIONS			
Operating ambient temperature			-40°C ~ +85°C (with derating)
Maximum case temperature			+100°C
Storage temperature range			-55°C ~ +125°C
Thermal impedance (Note 9)	Natural convection		10°C/watt
	Natural convection with heat-sink		8.24°C/watt
Thermal shock			MIL-STD-810F
Vibration			MIL-STD-810F
Relative humidity			5% to 95% RH
EMC CHARACTERISTICS			
EMI (Note 10)	EN55022		Class A, Class B
ESD	EN61000-4-2	Air	± 8kV Perf. Criteria B
		Contact	± 6kV Perf. Criteria B
Radiated immunity	EN61000-4-3		10 V/m Perf. Criteria A
Fast transient (Note 11)	EN61000-4-4		± 2kV Perf. Criteria B
Surge (Note 11)	EN61000-4-5		± 1kV Perf. Criteria B
Conducted immunity	EN61000-4-6		10 Vr.m.s Perf. Criteria A

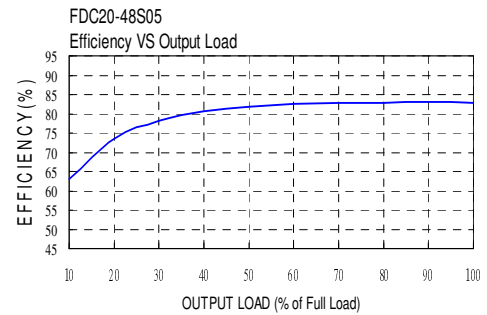
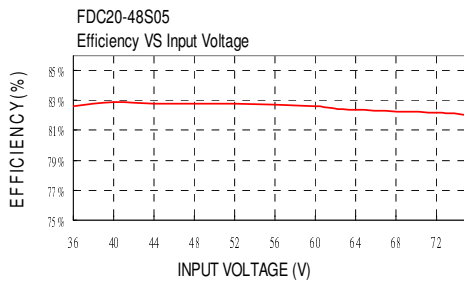
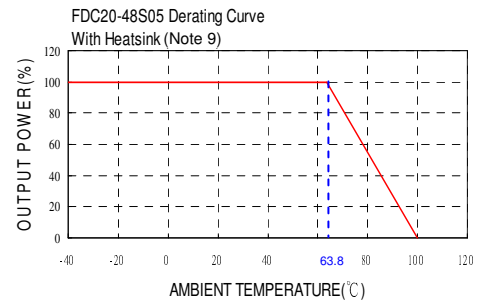
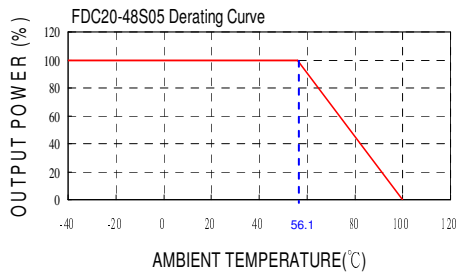
Model Number	Input Range	Output Voltage	Output Current		Output <sup>(2)</sup> Ripple & Noise	No load <sup>(3)</sup> Input Current	Eff <sup>(4)</sup> (%)	Capacitor <sup>(5)</sup> Load max
			Min. load	Full load				
FDC20-12S33	9 ~ 18 VDC	3.3 VDC	280mA	4000mA	75mVp-p	40mA	77	13000μF
FDC20-12S05	9 ~ 18 VDC	5 VDC	280mA	4000mA	75mVp-p	15mA	80	6800μF
FDC20-12S12	9 ~ 18 VDC	12 VDC	134mA	1670mA	75mVp-p	40mA	83	2200μF
FDC20-12S15	9 ~ 18 VDC	15 VDC	106mA	1330mA	75mVp-p	20mA	84	755μF
FDC20-12D05	9 ~ 18 VDC	± 5 VDC	± 140mA	± 2000mA	100mVp-p	15mA	82	± 3400μF
FDC20-12D12	9 ~ 18 VDC	± 12 VDC	± 67mA	± 833mA	100mVp-p	35mA	83	± 680μF
FDC20-12D15	9 ~ 18 VDC	± 15 VDC	± 53mA	± 666mA	100mVp-p	35mA	83	± 450μF
FDC20-12T3312	9 ~ 18 VDC	3.3 / ± 12 VDC	300 / ± 30mA	3000 / ± 300mA	50 / ± 120mVp-p	20mA	79	4700 / ± 220μF
FDC20-12T3315	9 ~ 18 VDC	3.3 / ± 15 VDC	300 / ± 25mA	3000 / ± 250mA	50 / ± 150mVp-p	35mA	79	4700 / ± 220μF
FDC20-12T0512	9 ~ 18 VDC	5 / ± 12 VDC	200 / ± 30mA	2000 / ± 300mA	50 / ± 120mVp-p	20mA	80	4700 / ± 220μF
FDC20-12T0515	9 ~ 18 VDC	5 / ± 15 VDC	200 / ± 25mA	2000 / ± 250mA	50 / ± 150mVp-p	40mA	80	4700 / ± 220μF
FDC20-24S33 (W)	18 ~ 36 (9 ~ 36) VDC	3.3 VDC	280mA	4000mA	75mVp-p	10(20)mA	79 (76)	13000μF
FDC20-24S05 (W)	18 ~ 36 (9 ~ 36) VDC	5 VDC	280mA	4000mA	75mVp-p	10(10)mA	81 (79)	6800μF
FDC20-24S12 (W)	18 ~ 36 (9 ~ 36) VDC	12 VDC	134mA	1670mA	75mVp-p	10(20)mA	86 (81)	2200μF
FDC20-24S15 (W)	18 ~ 36 (9 ~ 36) VDC	15 VDC	106mA	1330mA	75mVp-p	15(20)mA	86 (81)	755μF
FDC20-24D05 (W)	18 ~ 36 (9 ~ 36) VDC	± 5 VDC	± 140mA	± 2000mA	100mVp-p	20(15)mA	85 (79)	± 3400μF
FDC20-24D12 (W)	18 ~ 36 (9 ~ 36) VDC	± 12 VDC	± 67mA	± 833mA	100mVp-p	25(20)mA	86 (82)	± 680μF
FDC20-24D15 (W)	18 ~ 36 (9 ~ 36) VDC	± 15 VDC	± 53mA	± 666mA	100mVp-p	30(25)mA	86 (82)	± 450μF
FDC20-24T3312	18 ~ 36 VDC	3.3 / ± 12 VDC	300 / ± 30mA	3000 / ± 300mA	50 / ± 120mVp-p	20mA	82	4700 / ± 220μF
FDC20-24T3315	18 ~ 36 VDC	3.3 / ± 15 VDC	300 / ± 25mA	3000 / ± 250mA	50 / ± 150mVp-p	20mA	79	4700 / ± 220μF
FDC20-24T0512	18 ~ 36 VDC	5 / ± 12 VDC	200 / ± 30mA	2000 / ± 300mA	50 / ± 120mVp-p	25mA	83	4700 / ± 220μF
FDC20-24T0515	18 ~ 36 VDC	5 / ± 15 VDC	200 / ± 25mA	2000 / ± 250mA	50 / ± 150mVp-p	10mA	83	4700 / ± 220μF
FDC20-48S33 (W)	36 ~ 75 (18 ~ 75) VDC	3.3 VDC	280mA	4000mA	75mVp-p	10(15)mA	79 (77)	13000μF
FDC20-48S05 (W)	36 ~ 75 (18 ~ 75) VDC	5 VDC	280mA	4000mA	75mVp-p	10(10)mA	82 (80)	6800μF
FDC20-48S12 (W)	36 ~ 75 (18 ~ 75) VDC	12 VDC	134mA	1670mA	75mVp-p	15(10)mA	86 (82)	2200μF
FDC20-48S15 (W)	36 ~ 75 (18 ~ 75) VDC	15 VDC	106mA	1330mA	75mVp-p	25(10)mA	86 (82)	755μF
FDC20-48D05 (W)	36 ~ 75 (18 ~ 75) VDC	± 5 VDC	± 140mA	± 2000mA	100mVp-p	15(10)mA	85 (81)	± 3400μF
FDC20-48D12 (W)	36 ~ 75 (18 ~ 75) VDC	± 12 VDC	± 67mA	± 833mA	100mVp-p	15(15)mA	87 (83)	± 680μF
FDC20-48D15 (W)	36 ~ 75 (18 ~ 75) VDC	± 15 VDC	± 53mA	± 666mA	100mVp-p	20(20)mA	87 (83)	± 450μF
FDC20-48T3312	36 ~ 75 VDC	3.3 / ± 12 VDC	300 / ± 30mA	3000 / ± 300mA	50 / ± 120mVp-p	10mA	82	4700 / ± 220μF
FDC20-48T3315	36 ~ 75 VDC	3.3 / ± 15 VDC	300 / ± 25mA	3000 / ± 250mA	50 / ± 150mVp-p	10mA	82	4700 / ± 220μF
FDC20-48T0512	36 ~ 75 VDC	5 / ± 12 VDC	200 / ± 30mA	2000 / ± 300mA	50 / ± 120mVp-p	15mA	84	4700 / ± 220μF
FDC20-48T0515	36 ~ 75 VDC	5 / ± 15 VDC	200 / ± 25mA	2000 / ± 250mA	50 / ± 150mVp-p	15mA	84	4700 / ± 220μF

<sup>(12)</sup> FDC20-24D3305 and FDC20-48D3305, Output 3.3V(3A)/5V(2A), Detail Spec. Contact Factory.

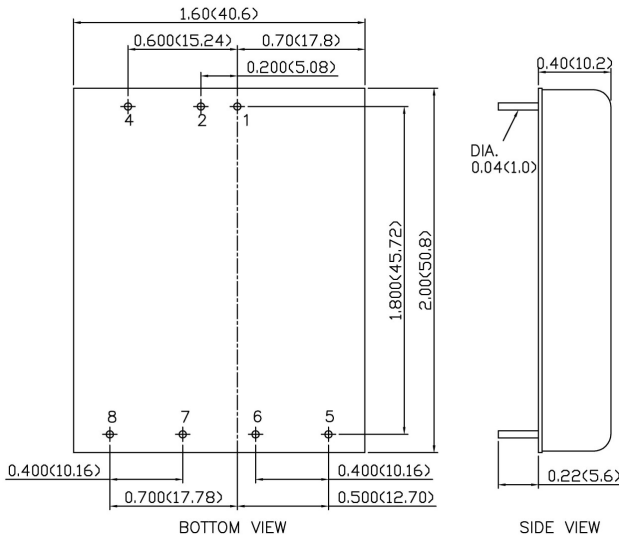
**Note**

1. MIL-HDBK-217F @Ta=25 °C, Full load.
2. Typical value at nominal input and full load. (20MHZ BW.)
3. Typical value at nominal input and no load.
4. Typical value at nominal input and full load.
5. Test by minimum input and constant resistive load.
6. 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.
7. Cross regulation : Dual output—Asymmetrical load 25% to 100% full load  
Triple output – 3.3VDC output / 5VDC output 100% load and one of auxiliary 100% load, other auxiliary load change from 25% to 100% load
8. The CTRL pin voltage is referenced to -INPUT
9. Heat-sink is optional and P/N: 7G-0011C-F and the operation temperature range please see curve.
10. The FDC20 series standard module meets EN55022 Class A and Class B with external components.  
For more detail information, please contact with P-DUKE.
11. 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 μF/100V.
12. The FDC20-24D3305 and FDC20-48D3305 are safety approval pending.

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



**MECHANICAL DRAWING**



- All dimensions in Inch (mm)  
Tolerance: X.XX±0.02 (X.X±0.5)  
X.XXX±0.01 (X.XX±0.25)
- Pin pitch tolerance ±0.01 (0.25)
- Pin dimension tolerance ±0.004 (0.1)

PIN CONNECTION			
PIN	SINGLE	DUAL	TRIPLE
1	+INPUT	+INPUT	+INPUT
2	-INPUT	-INPUT	-INPUT
4	CTRL	CTRL	CTRL
5	NO PIN	+OUTPUT	+ AUXILIARY
6	+OUTPUT	COMMON	+3.3V / +5V
7	-OUTPUT	-OUTPUT	COMMON
8	TRIM	TRIM	- AUXILIARY

