



## 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, automatic 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

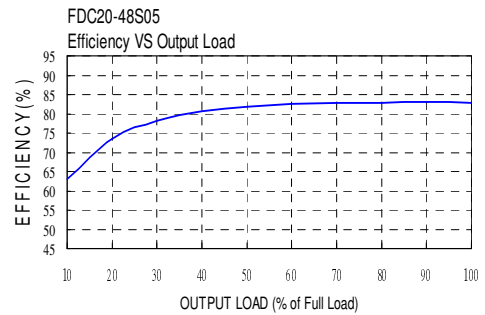
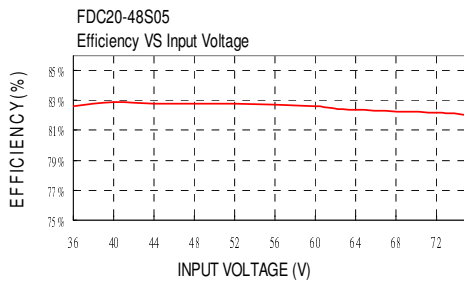
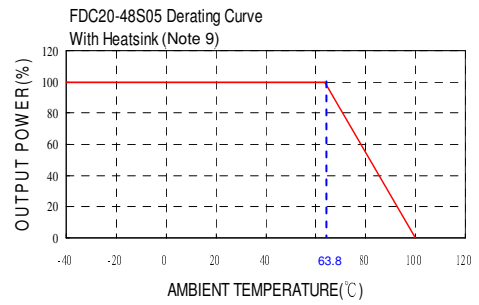
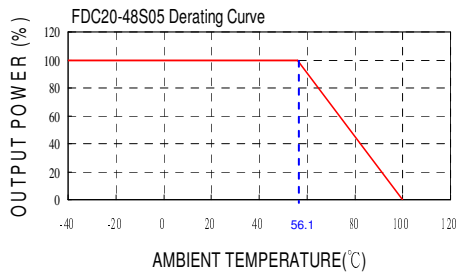
Model Number	Input Range	Output Voltage	Output Current		Output <sup>(2)</sup> Ripple & Noise	No load <sup>(3)</sup> Input Current	Eff <sup>(4)</sup> (%)	Capacitor <sup>(5)</sup> Load max
			Min. load	Full load				
FDC20-12S33	9 ~ 18 VDC	3.3 VDC	280mA	4000mA	75mVp-p	40mA	77	13000μF
FDC20-12S05	9 ~ 18 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.

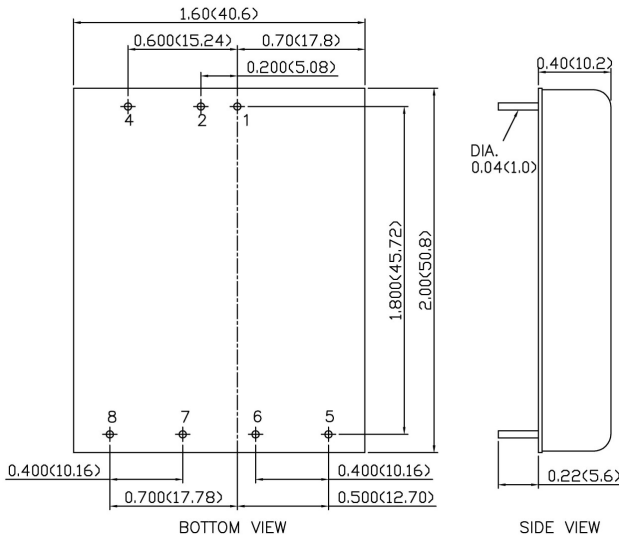
#### Note

- MIL-HDBK-217F @Ta=25 °C, Full load.
- Typical value at nominal input and full load. (20MHZ BW.)
- Typical value at nominal input and no load.
- Typical value at nominal input and full load.
- Test by minimum input and constant resistive load.
- 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.
- 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
- The CTRL pin voltage is referenced to -INPUT
- Heat-sink is optional and P/N: 7G-0011C-F and the operation temperature range please see curve.
- The FDC20 series standard module meets EN55022 Class A and Class B with external components.  
For more detail information, please contact with P-DUKE.
- 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.
- 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**



1. All dimensions in Inch (mm)  
Tolerance: X.XX±0.02 (X.X±0.5)  
X.XXX±0.01 (X.XX±0.25)
2. Pin pitch tolerance ±0.01 (0.25)
3. 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

