



APPLICATIONS

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

FEATURES

- 40 WATTS MAXIMUM OUTPUT POWER
- OUTPUT CURRENT UP TO 8A
- STANDARD 2.00 X 2.00 X 0.40 INCH PACKAGE
- HIGH EFFICIENCY UP TO 90%
- 2:1 WIDE INPUT VOLTAGE RANGE
- SIX-SIDED CONTINUOUS SHIELD
- FIXED SWITCHING FREQUENCY
- OFFER SINGLE, DUAL, DUAL POSITIVE (TOTAL OUTPUT CURRENT 8A) AND TRIPLE OUTPUT
- UL60950-1, EN60950-1, & IEC60950-1 SAFETY APPROVALS
- CE MARKED
- COMPLIANT TO RoHS II & REACH

DESCRIPTION

The FEC40 series offer 40 watts of output power from a 2.00 x 2.00 x 0.40 inch package. The FEC40 series with 2:1 wide input voltage of 9~18VDC, 18~36VDC and 36~75VDC and features 1600VDC of isolation, short-circuit and over-voltage protection.

TECHNICAL SPECIFICATION

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

OUTPUT SPECIFICATIONS		
Output power		40 Watts, max.
Voltage accuracy	Single / Dual	± 1%
	Triple Main	± 1%
	Auxiliary	± 5%
Minimum load (Note 6)		See Table
Voltage adjustability (Note 7)	Single and Dual output only (not including Dual Positive and triple)	± 10%
Line regulation LL to HL at Full Load	Single/Dual	± 0.5%
	Triple main	± 1%
	Auxiliary	± 5%
Load regulation (Note 8)	Single	± 0.5%
	Dual	± 1%
	Triple Main	± 2%
	Auxiliary	± 5%
Load cross regulation (Note 9)	Triple(main)	± 1%
	Dual/Triple(auxiliary)	± 5%
Ripple and noise (Note 10)	20MHz bandwidth (Measured with a 0.1µF/50V MLCC)	See table
Temperature coefficient		±0.02% / °C, max.
Transient response recovery time	25% load step change	250µs
Over voltage protection Zener diode clamp	1.5VDC output	3.9VDC
	1.8VDC output	3.9VDC
	2.5VDC output	3.9VDC
	3.3VDC output	3.9VDC
	5VDC output	6.2VDC
	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 ⁹ ohms, min.
Isolation capacitance		1000pF, max.
Switching frequency (Note 11)		300kHz±10%
Safety approvals		IEC60950-1, UL60950-1, & EN60950-1
Case material		Nickel-coated copper
Base material		FR4 PCB
Potting material		Epoxy (UL94 V-0)
Dimensions		2.00 X 2.00 X 0.40 Inch (50.8 X 50.8 X 10.2 mm)
Weight		60g (2.11oz)
MTBF (Note 1)	MIL-HDBK-217F	9.224 x 10 ⁵ hrs
INPUT SPECIFICATIONS		
Input voltage range	12VDC nominal input	9 ~ 18VDC
	24VDC nominal input	18 ~ 36VDC
	48VDC nominal input	36 ~ 75VDC
Input filter		L-C type
Input surge voltage	12VDC input	36VDC 100mS, max.
	24VDC input	50VDC 100mS, max.
	48VDC input	100VDC 100mS, max.
Input reflected ripple current		40mA p-p
Start up time	Nominal input and constant resistive load	25ms
	Power up Remote ON/OFF	25ms
Start-up voltage	12VDC input	9VDC
	24VDC input	17.8VDC
	48VDC input	36VDC
Shutdown voltage	12VDC input	8VDC
	24VDC input	16VDC
	48VDC input	34VDC
Remote ON/OFF (Note 12) (Positive logic)	DC-DC ON	Open or 3.5V < Vr < 12V
	DC-DC OFF	Short or 0V < Vr < 1.2V
Input current of remote control pin	Nominal input	-0.5mA~+0.5mA
Remote off state input current	Nominal input	2.5mA
ENVIRONMENTAL SPECIFICATIONS		
Operating ambient temperature		-40°C ~ +85°C (with derating)
Maximum case temperature		+100°C
Storage temperature range		-55°C ~ +125°C
Over temperature protection		115°C
Thermal impedance (Note 13)	Natural convection	9.2°C/Watt
	Heat-sink with 20LFM	7.6°C/Watt
	Heat-sink with 500LFM	2.8°C/Watt
Thermal shock		MIL-STD-810F
Vibration		MIL-STD-810F
Relative humidity		5% to 95% RH
EMC CHARACTERISTICS		
EM I (Note 14)	EN55022	Class A, Class B
ESD	EN61000-4-2	Air ± 8kV
		Contact ± 6kV
Radiated immunity	EN61000-4-3	10 V/m Perf. Criteria A
Fast transient (Note 15)	EN61000-4-4	± 2kV Perf. Criteria B
Surge (Note 15)	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 ⁽²⁾ Ripple & Noise	No load ⁽³⁾ Input Current	Eff ⁽⁴⁾ (%)	Capacitor ⁽⁵⁾ Load max
			Min. load	Full load				
FEC40-12S1P5	9 ~ 18 VDC	1.5 VDC	0mA	8000mA	50mVp-p	110mA	84	45000µF
FEC40-12S1P8	9 ~ 18 VDC	1.8 VDC	0mA	8000mA	50mVp-p	110mA	82	37700µF
FEC40-12S2P5	9 ~ 18 VDC	2.5 VDC	0mA	8000mA	50mVp-p	110mA	84	27000µF
FEC40-12S3P3	9 ~ 18 VDC	3.3 VDC	0mA	8000mA	50mVp-p	175mA	86	21000µF
FEC40-12S05	9 ~ 18 VDC	5 VDC	0mA	8000mA	50mVp-p	225mA	86	13600µF
FEC40-12S12	9 ~ 18 VDC	12 VDC	0mA	3333mA	75mVp-p	255mA	86	2360µF
FEC40-12S15	9 ~ 18 VDC	15 VDC	0mA	2666mA	75mVp-p	310mA	87	1510µF
FEC40-12D12	9 ~ 18 VDC	± 12 VDC	± 144mA	± 1800mA	120mVp-p	30mA	85	± 1200µF
FEC40-12D15	9 ~ 18 VDC	± 15 VDC	± 112mA	± 1400mA	150mVp-p	35mA	85	± 750µF
FEC40-12D3305	9 ~ 18 VDC	3.3 / 5 VDC	0mA	4A / 4A (total 8A) ⁽¹⁶⁾	100mVp-p	325mA	85	11000 / 6800µF
FEC40-12T3312	9 ~ 18 VDC	3.3 / ±12 VDC	600mA / ±40mA	6000mA / ±400mA	50 / 75mVp-p	215mA	84	13000 / ±330µF
FEC40-12T3315	9 ~ 18 VDC	3.3 / ±15 VDC	600mA / ±30mA	6000mA / ±300mA	50 / 75mVp-p	230mA	84	13000 / ±110µF
FEC40-12T0512	9 ~ 18 VDC	5 / ±12 VDC	600mA / ±40mA	6000mA / ±400mA	50 / 75mVp-p	280mA	86	6800 / ±330µF
FEC40-12T0515	9 ~ 18 VDC	5 / ±15 VDC	600mA / ±30mA	6000mA / ±300mA	50 / 75mVp-p	255mA	86	6800 / ±110µF
FEC40-24S1P5	18 ~ 36 VDC	1.5 VDC	0mA	8000mA	50mVp-p	40mA	81	45000µF
FEC40-24S1P8	18 ~ 36 VDC	1.8 VDC	0mA	8000mA	50mVp-p	40mA	83	37700µF
FEC40-24S2P5	18 ~ 36 VDC	2.5 VDC	0mA	8000mA	50mVp-p	40mA	86	27000µF
FEC40-24S3P3	18 ~ 36 VDC	3.3 VDC	0mA	8000mA	50mVp-p	60mA	87	21000µF
FEC40-24S05	18 ~ 36 VDC	5 VDC	0mA	8000mA	50mVp-p	80mA	89	13600µF
FEC40-24S12	18 ~ 36 VDC	12 VDC	0mA	3333mA	75mVp-p	70mA	88	2360µF
FEC40-24S15	18 ~ 36 VDC	15 VDC	0mA	2666mA	75mVp-p	85mA	89	1510µF
FEC40-24D12	18 ~ 36 VDC	± 12 VDC	± 144mA	± 1800mA	120mVp-p	20mA	87	± 1200µF
FEC40-24D15	18 ~ 36 VDC	± 15 VDC	± 112mA	± 1400mA	150mVp-p	20mA	87	± 750µF
FEC40-24D3305	18 ~ 36 VDC	3.3 / 5 VDC	0mA	4A / 4A (total 8A) ⁽¹⁶⁾	100mVp-p	80mA	86	11000 / 6800µF
FEC40-24T3312	18 ~ 36 VDC	3.3 / ±12 VDC	600mA / ±40mA	6000mA / ±400mA	50 / 75mVp-p	65mA	85	13000 / ±330µF
FEC40-24T3315	18 ~ 36 VDC	3.3 / ±15 VDC	600mA / ±30mA	6000mA / ±300mA	50 / 75mVp-p	65mA	85	13000 / ±110µF
FEC40-24T0512	18 ~ 36 VDC	5 / ±12 VDC	600mA / ±40mA	6000mA / ±400mA	50 / 75mVp-p	60mA	87	6800 / ±330µF
FEC40-24T0515	18 ~ 36 VDC	5 / ±15 VDC	600mA / ±30mA	6000mA / ±300mA	50 / 75mVp-p	75mA	87	6800 / ±110µF
FEC40-48S1P5	36 ~ 75 VDC	1.5 VDC	0mA	8000mA	50mVp-p	25mA	82	45000µF
FEC40-48S1P8	36 ~ 75 VDC	1.8 VDC	0mA	8000mA	50mVp-p	25mA	84	37700µF
FEC40-48S2P5	36 ~ 75 VDC	2.5 VDC	0mA	8000mA	50mVp-p	25mA	86	27000µF
FEC40-48S3P3	36 ~ 75 VDC	3.3 VDC	0mA	8000mA	50mVp-p	35mA	88	21000µF
FEC40-48S05	36 ~ 75 VDC	5 VDC	0mA	8000mA	50mVp-p	40mA	90	13600µF
FEC40-48S12	36 ~ 75 VDC	12 VDC	0mA	3333mA	75mVp-p	50Ma	89	2360µF
FEC40-48S15	36 ~ 75 VDC	15 VDC	0mA	2666mA	75mVp-p	50mA	89	1510µF
FEC40-48D12	36 ~ 75 VDC	± 12 VDC	± 144mA	± 1800mA	120mVp-p	15mA	87	± 1200µF
FEC40-48D15	36 ~ 75 VDC	± 15 VDC	± 112mA	± 1400mA	150mVp-p	15mA	87	± 750µF
FEC40-48D3305	36 ~ 75 VDC	3.3 / 5 VDC	0mA	4A / 4A (total 8A) ⁽¹⁶⁾	100mVp-p	45mA	88	11000 / 6800µF
FEC40-48T3312	36 ~ 75 VDC	3.3 / ±12 VDC	600mA / ±40mA	6000mA / ±400mA	50 / 75mVp-p	35mA	86	13000 / ±330µF
FEC40-48T3315	36 ~ 75 VDC	3.3 / ±15 VDC	600mA / ±30mA	6000mA / ±300mA	50 / 75mVp-p	35mA	86	13000 / ±110µF
FEC40-48T0512	36 ~ 75 VDC	5 / ±12 VDC	600mA / ±40mA	6000mA / ±400mA	50 / 75mVp-p	30mA	88	6800 / ±330µF
FEC40-48T0515	36 ~ 75 VDC	5 / ±15 VDC	600mA / ±30mA	6000mA / ±300mA	50 / 75mVp-p	40mA	88	6800 / ±110µF

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 minimum loading on the output to maintain specified regulation. Operation in no-load condition will not damage these devices, however they may not meet all listed specification.
7. For the single output: Maximum output deviation is 10% inclusive of remote sense and trim. If remote sense is not being used, the +SENSE should be connected to its corresponding +OUTPUT and likewise the -SENSE should be connected to its corresponding -OUTPUT.
8. Load regulation for triple output:
Main output(V1):10 to 100% with 10% to 100% balanced on auxiliaries.
Auxiliary outputs(V2 and V3):10% to 100% balanced on all outputs.
9. Cross regulation for dual output: asymmetrical load 25% / 100% FL.
Cross regulation for triple output:
Main output 100% load, auxiliary 100%, other auxiliary 25% to 100%.
Auxiliary outputs(V2 and V3):main output 100% load, auxiliary 100%, other auxiliary 25% to 100% or main output 25%,auxiliary 25%,other auxiliary 25% to 100%.
10. The models of FEC40-XXD3305 are specified with a 1µF ceramic output capacitors.
11. Switching frequency for dual output: master (5VDC output) 300kHz slave (3.3VDC output) 500kHz
12. The CTRL pin voltage is referenced to -INPUT.
13. Heat-sink is optional and P/N : 7G-0026C-F.
14. The FEC40 series standard module meets EN55022 Class A and Class B with external components. For more detail information, please contact with P-DUKE.
15. 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, 220µF/100V.
16. Any condition of dual output (3.3VDC output / 5VDC output) rated lout current, not to exceed 8A of total output currents. The product safety approval pending.

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

