POWER MATE TECHNOLOGY CO.,LTD.

FEC40-SERIES

- **OFFER SINGLE, DUAL,DUAL POSITIVE(TOTAL OUTPUT CURRENT 8A) AND TRIPLE OUTPUT**
- **40 WATTS MAXIMUM OUTPUT POWER**
- **2:1 WIDE INPUT VOLTAGE RANGE**
- **INTERNATIONAL SAFETY STANDARD APPROVAL**
- **SIX-SIDED CONTINUOUS SHIELD**
- **HIGH EFFICIENCY UP TO 90%**
- **STANDARD 2" x 2" x 0.4" PACKAGE**
- **FIXED SWITCHING FREQUENCY**

UL E193009
TUV
CB
CE MARK
Patent No.144566

The FEC40 series offer 40 watts of output power from a 2 x 2 x 0.4 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, as well as six sided shielding. All models are particularly suited to telecommunications, industrial, mobile telecom and test equipment applications.

TECHNICAL SPECIFICATION

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

OUTPUT SPECIFICATIONS

Output power			40 Watts max
Voltage accuracy	FL and nominal Vin	Single / Dual Triple Main Auxiliary	± 1% ± 1% ± 5%
Voltage adjustability (Note 1)		Single output only	± 10%
Minimum load (Note 2)		Single and Dual Positive Dual and Triple	0% 10% of FL
Line regulation	LL to HL at Full Load	Single/Dual Triple(main) Triple(auxiliary)	± 0.5% ± 1% ± 5%
Load regulation (Note 3)	10% to 100% FL	Single Dual Triple Main Auxiliary	± 0.5% ± 1% ± 2% ± 5%
Load cross regulation (Note 4)		Triple(main) Dual/Triple(auxiliary)	± 1% ± 5%
Ripple and noise (Note 5)	20MHz bandwidth (Measured with a 104pF/50V MLCC)		See table
Temperature coefficient			±0.02% / ºC, max
Transient response recovery time	25% load step change		250uS
Over voltage protection Zener diode clamp	1.5V output 1.8V output 2.5V output 3.3V output 5V output 12V output 15V output		3.9V 3.9V 3.9V 3.9V 6.2V 15V 18V
Over load protection	% of FL at nominal input		150% max
Short circuit protection			Hiccup, automatics recovery

INPUT SPECIFICATIONS

Input voltage range	12V nominal inpu 24V nominal input 48V nominal input		9 – 18VDC 18 – 36VDC 36 – 75VDC
Under voltage lockout	12V input 24V input 48V input	DC-DC ON DC-DC OFF DC-DC ON DC-DC OFF DC-DC ON DC-DC OFF	9VDC 8VDC 17.8VDC 16VDC 36VDC 34VDC
Input filter			L-C type
Input voltage variation	dv/dt		5V/ms,max (Complies with ETS300 132 part 4.4)
Input surge voltage 100mS max	24V input 48V input		50VDC 100VDC
Input reflected ripple (Note 6)	Nominal Vin and full load		40mAp-p
Start up time	Nominal Vin and constant resistive load	Powe up Remote ON/OFF	25mS typ 25mS typ
Remote ON/OFF (Note 7)	DC-DC ON DC-DC OFF		Open or 3.5V < Vr < 12V Short or 0V < Vr < 1.2V
Remote off input current	Nominal Vin		2.5mA

GENERAL SPECIFICATIONS

Efficiency		See table
Isolation voltage	Input to Output Input(Output) to Case	1600VDC, min 1600VDC, min
Isolation resistance		10^9 ohms, min
Isolation capacitance		1000pF, max
Switching frequency (Note 8)		300KHz, typ
Approvals and standard		IEC60950-1, UL60950-1, EN60950-1
Case material		Nickel-coated copper
Base material		Non-conductive black FR4
Potting material		Epoxy (UL94-V0)
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 9)		1.398 x 10^6 hrs

ENVIRONMENTAL SPECIFICATIONS

Operating temperature range		-40ºC ~ +85ºC (with derating)
Maximum case temperature		+100ºC
Storage temperature range		-55ºC ~ +105ºC
Over temperature protection		115ºC, typ
Thermal impedance (Note 10)	Nature convection Heat-sink with 20LFM Heat-sink with 500LFM	9.2ºC/Watt 8.5ºC/Watt 2.8ºC/Watt
Thermal shock		MIL-STD-810D
Vibration		10~55Hz,10G, 30minutes along X,Y and Z
Relative humidity		5% to 95% RH

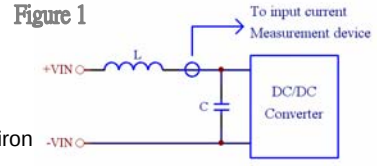
EMC CHARACTERISTICS (Note 11)

Conducted emissions	EN55022	Class A
Radiated emissions	EN55022	Class A
ESD	EN61000-4-2	Perf. Criteria B
Radiated immunity	EN61000-4-3	Perf. Criteria A
Fast transient	EN61000-4-4	Perf. Criteria B
Surge	EN61000-4-5	Perf. Criteria B
Conducted immunity	EN61000-4-6	Perf. Criteria A

Model Number	Input Range	Output Voltage	Output Current	Output Ripple & Noise	Input Current (13)	Eff (14) (%)	Capacitor (15) Load max
FEC40-12S1P5	9 – 18 VDC	1.5 VDC	8000mA	50mVp-p	1250mA	84	45000uF
FEC40-12S1P8	9 – 18 VDC	1.8 VDC	8000mA	50mVp-p	1538mA	82	37700uF
FEC40-12S2P5	9 – 18 VDC	2.5 VDC	8000mA	50mVp-p	2083mA	84	27000uF
FEC40-12S3P3	9 – 18 VDC	3.3 VDC	8000mA	50mVp-p	2683mA	86	21000uF
FEC40-12S05	9 – 18 VDC	5 VDC	8000mA	50mVp-p	4065mA	86	13600uF
FEC40-12S12	9 – 18 VDC	12 VDC	3333mA	75mVp-p	4065mA	86	2360uF
FEC40-12S15	9 – 18 VDC	15 VDC	2666mA	75mVp-p	4015mA	87	1510uF
FEC40-12D12	9 – 18 VDC	± 12 VDC	± 1800mA	120mVp-p	4444mA	85	± 1200uF
FEC40-12D15	9 – 18 VDC	± 15 VDC	± 1400mA	150mVp-p	4321mA	85	± 750uF
FEC40-12D3305	9 – 18 VDC	3.3 / 5 VDC	4A / 4A (total 8A) (12)	100mVp-p	3416mA	85	11000 / 6800uF
FEC40-12T3312	9 – 18 VDC	3.3 / ±12 VDC	6000mA / ±400mA	50 / 75mVp-p	3063mA	84	13000 / ±330uF
FEC40-12T3315	9 – 18 VDC	3.3 / ±15 VDC	6000mA / ±300mA	50 / 75mVp-p	3000mA	84	13000 / ±110uF
FEC40-12T0512	9 – 18 VDC	5 / ±12 VDC	6000mA / ±400mA	50 / 75mVp-p	4024mA	86	6800 / ±330uF
FEC40-12T0515	9 – 18 VDC	5 / ±15 VDC	6000mA / ±300mA	50 / 75mVp-p	3963mA	86	6800 / ±110uF
FEC40-24S1P5	18 – 36 VDC	1.5 VDC	8000mA	50mVp-p	649mA	81	45000uF
FEC40-24S1P8	18 – 36 VDC	1.8 VDC	8000mA	50mVp-p	759mA	83	37700uF
FEC40-24S2P5	18 – 36 VDC	2.5 VDC	8000mA	50mVp-p	1016mA	86	27000uF
FEC40-24S3P3	18 – 36 VDC	3.3 VDC	8000mA	50mVp-p	1325mA	87	21000uF
FEC40-24S05	18 – 36 VDC	5 VDC	8000mA	50mVp-p	1961mA	89	13600uF
FEC40-24S12	18 – 36 VDC	12 VDC	3333mA	75mVp-p	2048mA	88	2360uF
FEC40-24S15	18 – 36 VDC	15 VDC	2666mA	75mVp-p	1985mA	89	1510uF
FEC40-24D12	18 – 36 VDC	± 12 VDC	± 1800mA	120mVp-p	2169mA	87	± 1200uF
FEC40-24D15	18 – 36 VDC	± 15 VDC	± 1400mA	150mVp-p	2108mA	87	± 750uF
FEC40-24D3305	18 – 36 VDC	3.3 / 5 VDC	4A / 4A (total 8A) (12)	100mVp-p	1689mA	86	11000 / 6800uF
FEC40-24T3312	18 – 36 VDC	3.3 / ±12 VDC	6000mA / ±400mA	50 / 75mVp-p	1512mA	85	13000 / ±330uF
FEC40-24T3315	18 – 36 VDC	3.3 / ±15 VDC	6000mA / ±300mA	50 / 75mVp-p	1481mA	85	13000 / ±110uF
FEC40-24T0512	18 – 36 VDC	5 / ±12 VDC	6000mA / ±400mA	50 / 75mVp-p	1989mA	87	6800 / ±330uF
FEC40-24T0515	18 – 36 VDC	5 / ±15 VDC	6000mA / ±300mA	50 / 75mVp-p	1958mA	87	6800 / ±110uF
FEC40-48S1P5	36 – 75 VDC	1.5 VDC	8000mA	50mVp-p	321mA	82	45000uF
FEC40-48S1P8	36 – 75 VDC	1.8 VDC	8000mA	50mVp-p	375mA	84	37700uF
FEC40-48S2P5	36 – 75 VDC	2.5 VDC	8000mA	50mVp-p	508mA	86	27000uF
FEC40-48S3P3	36 – 75 VDC	3.3 VDC	8000mA	50mVp-p	655mA	88	21000uF
FEC40-48S05	36 – 75 VDC	5 VDC	8000mA	50mVp-p	969mA	90	13600uF
FEC40-48S12	36 – 75 VDC	12 VDC	3333mA	75mVp-p	1000mA	89	2360uF
FEC40-48S15	36 – 75 VDC	15 VDC	2666mA	75mVp-p	992mA	89	1510uF
FEC40-48D12	36 – 75 VDC	± 12 VDC	± 1800mA	120mVp-p	1084mA	87	± 1200uF
FEC40-48D15	36 – 75 VDC	± 15 VDC	± 1400mA	150mVp-p	1054mA	87	± 750uF
FEC40-48D3305	36 – 75 VDC	3.3 / 5 VDC	4A / 4A (total 8A) (12)	100mVp-p	823mA	88	11000 / 6800uF
FEC40-48T3312	36 – 75 VDC	3.3 / ±12 VDC	6000mA / ±400mA	50 / 75mVp-p	747mA	86	13000 / ±330uF
FEC40-48T3315	36 – 75 VDC	3.3 / ±15 VDC	6000mA / ±300mA	50 / 75mVp-p	732mA	86	13000 / ±110uF
FEC40-48T0512	36 – 75 VDC	5 / ±12 VDC	6000mA / ±400mA	50 / 75mVp-p	982mA	88	6800 / ±330uF
FEC40-48T0515	36 – 75 VDC	5 / ±15 VDC	6000mA / ±300mA	50 / 75mVp-p	967mA	88	6800 / ±110uF

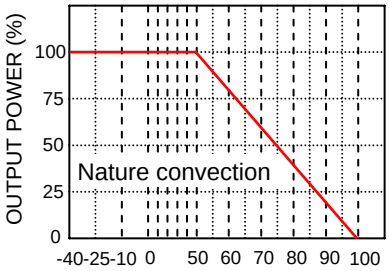
Note

1. Maximum output deviation is 10% inclusive of remote sense and trim. If remote sense is not being used, the +Vsense should be connected to its corresponding +OUTPUT and likewise the sense should be connected to its corresponding –OUTPUT.
2. The dual and triple output required a minimum 10% 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
3. 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.
4. Cross regulation for dual output: asymmetrical load 25% / 100% FL
   Cross regulation for triple output:
   Main output 100% load, auxiliary 100%,other auxiliary25% 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%.
5. The models of FEC40-XXD3305 are specified with a 1uF ceramic output capacitors.
6. Please add an external filter at converter input terminals when measuring input reflected ripple, as Figure 1. L : Simulated source impedance of 12uH. C: Nippon chemi-con KMF series, 220 μF/100V

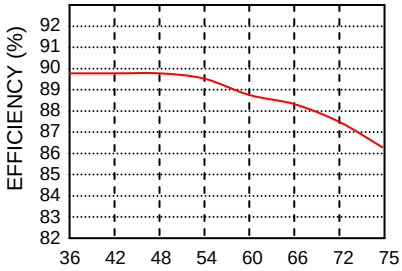


7. The ON/OFF control pin voltage is referenced to negative input.
8. Switching frequency for dual output:
   master (5Vo) 300KHz slave (3.3Vo) 500KHz
9. BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40ºC. (Ground fixed and controlled environ
10. Heat sink is optional and P/N：7G-0026A.
11. An external filter capacitor is required for EMC testing. The capacitor should be capable of handing 1A ripple current for 12V/24V/48V models. Power mate suggest: Nippon chemi-con KMF series, 220 μF/100V, ESR 90mΩ.
12. Any condition of dual output (3.3V/5V) rated Iout current, not to exceed 8A of total output currents. The product safety approval pending..
13. Maximum value at nominal input voltage and full load.
14. Typical value at nominal input voltage and full load.
15. Test by minimum Vin and constant resistive load.

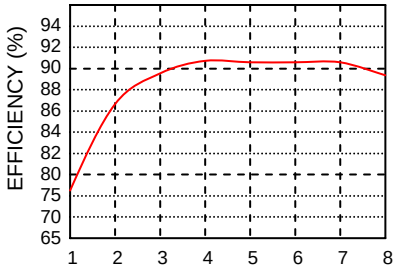
FEC40-48S05
Derating Curve

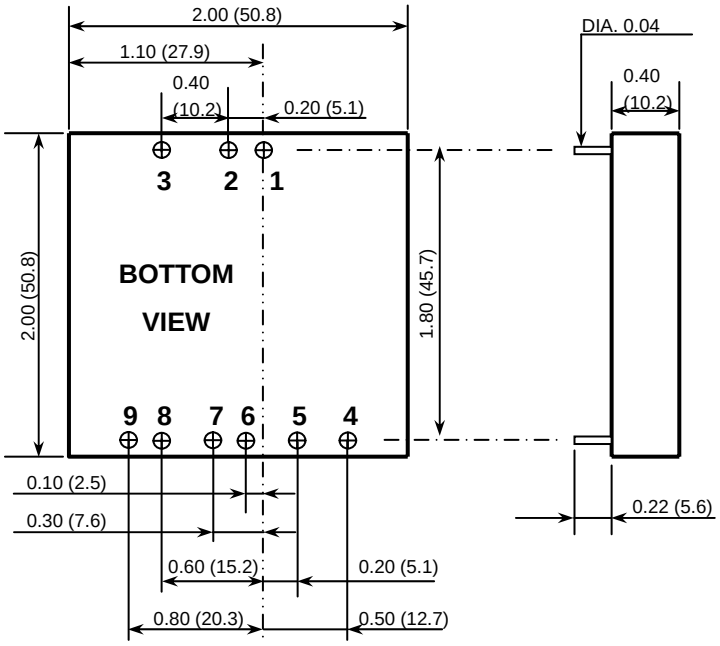


FEC40-48S05
Efficiency VS Input voltage



FEC40-48S05
Efficiency VS Output load





1. All dimensions in Inches (mm)
   Tolerance: X.XX±0.02 (X.X±0.5)
   X.XXX±0.01 (X.XX±0.25)
2. Pin pitch tolerance ±0.014(0.35)

PIN CONNECTION

PIN	SINGLE	DUAL	DUAL POSITIVE	TRIPLE
1	+ INPUT	+ INPUT	+ INPUT	+ INPUT
2	- INPUT	- INPUT	- INPUT	- INPUT
3	CTRL	CTRL	CTRL	CTRL
4	NC	NO PIN	3.3V	+ AUX
5	- SENSE (Note1)	+ VO	3.3V RTN (COM)	COMMON
6	+ SENSE (Note1)	COM	NC	- AUX
7	+ OUTPUT	COM	NC	+ OUTPUT
8	- OUTPUT	- VO	5V	- OUTPUT (COM)
9	TRIM	TRIM	5V RTN (COM)	NC

EXTERNAL OUTPUT TRIMMING

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