ASTRODYNE

Isolated and Regulated 40 WATT Modular DC/DC Converters

# FEC40 series


Unit measures 2.0"W x 2.0"L x 0.4"H

- Wide 2 : 1 Input Range
- High Efficiency
- Regulated Outputs
- 1600V Isolation
- Full EMI Shielding
- L-C Type Input Filter

| Model Number | Output Voltage | Output Amps | Input Range | Efficiency | Ripple & Noise |
|---|---|---|---|---|---|
| **SINGLE OUTPUT** | | | | | |
| FEC40-24S3P3 | 3.3 VDC | 8 | 18-36 VDC | 50mV Pk-Pk | 87% |
| FEC40-48S3P3 | | 8 | 36-75 VDC | 50mV Pk-Pk | 88% |
| FEC40-24S05 | 5 VDC | 8 | 18-36 VDC | 50mV Pk-Pk | 89% |
| FEC40-48S05 | | 8 | 36-75 VDC | 50mV Pk-Pk | 90% |
| FEC40-24S12 | 12 VDC | 3.33 | 18-36 VDC | 75mV Pk-Pk | 88% |
| FEC40-48S12 | | 3.33 | 36-75 VDC | 75mV Pk-Pk | 89% |
| FEC40-24S15 | 15 VDC | 2.66 | 18-36 VDC | 75mV Pk-Pk | 89% |
| FEC40-48S15 | | 2.66 | 36-75 VDC | 75mV Pk-Pk | 89% |
| **DUAL OUTPUT** | | | | | |
| FEC40-24D3305 | 3.3 / 5 VDC | 4 / 4 | 18-36 VDC | 100mV Pk-Pk | 84% |
| FEC40-48D3305 | | 4 / 4 | 36-75 VDC | 100mV Pk-Pk | 85% |
| **TRIPLE OUTPUT** | | | | | |
| FEC40-24T3312 | 3.3, +/-12 VDC | 6, +/-0.40 | 18-36 VDC | 50 / 75mV Pk-Pk | 85% |
| FEC40-48T3312 | | 6, +/-0.40 | 36-75 VDC | 50 / 75mV Pk-Pk | 86% |
| FEC40-24T3315 | 3.3, +/-15 VDC | 6, +/-0.30 | 18-36 VDC | 50 / 75mV Pk-Pk | 85% |
| FEC40-48T3315 | | 6, +/-0.30 | 36-75 VDC | 50 / 75mV Pk-Pk | 86% |
| FEC40-24T0512 | 5, +/-12 VDC | 6, +/-0.40 | 18-36 VDC | 50 / 75mV Pk-Pk | 87% |
| FEC40-48T0512 | | 6, +/-0.40 | 36-75 VDC | 50 / 75mV Pk-Pk | 88% |
| FEC40-24T0515 | 5, +/-15 VDC | 6, +/-0.30 | 18-36 VDC | 50 / 75mV Pk-Pk | 87% |
| FEC40-48T0515 | | 6, +/-0.30 | 36-75 VDC | 50 / 75mV Pk-Pk | 88% |

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## INPUT SPECIFICATIONS

| | | |
|---|---|---|
| Input Voltage Ranges: | 24 VDC Nominal | 18-36 VDC |
| | 48 VDC Nominal | 36-75 VDC |
| Input Filter (Note 6) | L-C Type | |
| Under Voltage Lockout | 24V Input | DC-DC On: 17.8V |
| | | DC-DC Off: 16V |
| | 48V Input | DC-DC On: 36V |
| | | DC-DC Off: 34V |
| Input Voltage Variation dv/dt | 5V / mS, max. | |
| | (Complies with ETS300 132 part 4.4) | |
| Input Surge Voltage 100mS max. | 24V Input | 50VDC |
| | 48V Input | 100VDC |
| Input Reflected Ripple (Note 7) | Nom I/P and FL | 40mA Pk-Pk |
| Start Up Time | Nom. I/P and Static Resistive Load | |
| | 25mS, typ. | |
| Remote ON/OFF (Note 8) | DC-DC On: Open or 3.5V < Vr < 12V | |
| | DC-DC Off: Short or 0V < Vr < 1.2V | |
| Remote Off Input Current | Nom. Input: | 2.5mA |

## OUTPUT SPECIFICATIONS

| | | |
|---|---|---|
| Output Power | 40 Watts Max. | |
| Voltage and Current | See Selection Chart | |
| O/P Accuracy (FL & Nom I/P) | single/dual; +/- 1% | |
| | Triple Main: +/-1% | |
| | Triple Aux.: +/-3% | |
| Voltage Adjust (Note 1) | +/-10% | |
| Min. Load-Triple Only (Note 2) | 10% | |
| Load Regulation-10%-FL | singles: +/-0.5% | |
| (Note 3) | duals: +/-1% | |
| | Triple Main: +/-2% | |
| | Triple Aux.: +/-5% | |
| Line Regulation | single/dual; +/- 0.5% | |
| | Triple Main: +/-1% | |
| | Triple Aux.: +/-5% | |
| Cross Regulation (Note 4) | single/dual/triple main +/-1% | |
| | triple aux. +/-5% | |
| Temperature Coefficient | +/-0.02%/DegC, Max. | |
| Ripple/Noise (Note 5) | See Selection Chart | |
| Transient Response | (25% Load Step) | 400uS |
| Voltage Stability | (singles/duals) | +/- 2% |
| | (triples) | 5 V:+/-2%, Aux: +/-5% |
| Over Load Protection | FL, Nom. I/P: 150% Max. | |
| Short Circuit Protection | Hiccup, Auto Recovery | |

OVP Threshold, Zener Diode Clamp:

| | | |
|---|---|---|
| | 3.3V Output | 3.9Volts |
| | 5V Output | 6.2Volts |
| | 12V Output | 15Volts |
| | 15V Output | 18Volts |

## GENERAL SPECIFICATIONS

| | |
|---|---|
| Input-Out Isolation | 1600VDC |
| Isolation Resistance | 10-9nth Ohms |
| Isolation Capacitance | 1000pF, Max. |
| Efficiency | See Selection Chart |
| Switching Frequency (Note 9) | 300Khz, typ |

## ENVIRONMENTAL SPECIFICATIONS

| | | |
|---|---|---|
| Oper. Temperature | -40 to +85°C with derate | |
| Storage Temperature | -55 to +105°C * | |
| Relative Humidity | 5 to 95% RH * | |
| Maximum Case Temp | 100°C * | |
| Over Temp. Protection | 115°C, typ. | |
| Thermal Impedance (Note 11) | Convection: | 9.2°C/Watt |
| | Heat Sink w. 20LFM | 8.5°C/Watt |
| | Heat Sink w. 500LFM | 2.8°C/Watt |
| Thermal Shock | MIL-STD-810D | |
| Vibration | 10-55Hz, 2G, 30 Minutes | |
| | along X, Y and Z Axes | |
| MTBF (Note 10) | 1.398 MHrs | |

## PHYSICAL SPECIFICATIONS

| | |
|---|---|
| Case Material | Nickel-Coated Copper |
| | Non-Conductive Base |
| Construction | Fully Encapsulated with |
| | UL94-VO Epoxy |
| Dimensions | 2.0" x 2.0" x 0.40" |
| Weight | 2.11 oz, (60g) |

* These are stress ratings. Exposure of the devices to any of these conditions may adversely affect long term reliability. Proper operation under conditions other than the standard operating conditions is neither warranteed nor implied.

*All specifications are typical at nominal input, full load, and 25DegC unless otherwise noted*

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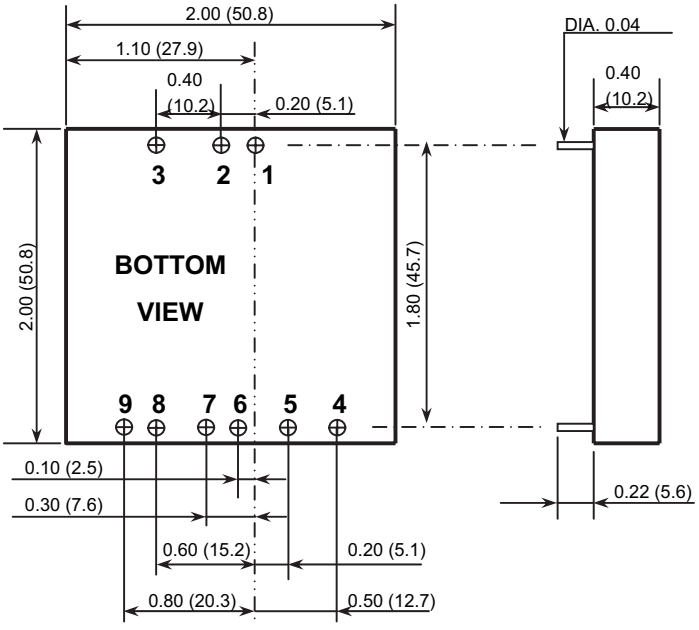
Notes:

1. Maximum output deviation is 10% inclusive of remote sense and him. 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. Triple outputs requires 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 specifications
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 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%.
5. The models of FEC40-XXD3305 are specified with a 1uF ceramic output capacitors.
6. An external filter capacitor is required for normal operation. The capacitor should be capable of handing 1A ripple current for 48V/24V models. Astrodyne suggests: Nippon chemi-con KMF series, 220µF/100V, ESR 9OmÙ.
7. Simulated source impedance of 12uH. 12uH inductor in series with +Vin.
8. The ON/OFF control pin voltage is referenced to negative Input.
9. Switching frequency for dual output: Master (5Vo) 300KHz; Slave (3.3Vo) 500KHz
10. BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 4OºC. (Ground fixed and controlled environment).
11. Heat sink is optional and P/N: 7G-OO26A.
12. Any condition of dual output (3.3V/5V) rated lout current, not to exceed 8A of total output currents.
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 resistor load.

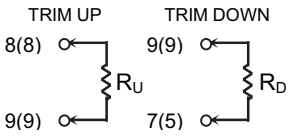
## MECHANICAL DIMENSIONS




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# | Single | Dual | Triple |
|---|---|---|---|
| 1 | +INPUT | +INPUT | +INPUT |
| 2 | -INPUT | -INPUT | -INPUT |
| 3 | CTRL | CTRL | CTRL |
| 4 | NC | 3.3V | +AUX |
| 5 | -SENSE (note 1) | 3.3V RTN (COM) | COMMON |
| 6 | +SENSE (note 1) | NC | -AUX |
| 7 | +OUTPUT | NC | +OUTPUT |
| 8 | -OUTPUT | 5V | -OUTPUT (COM) |
| 9 | TRIM | 5V RTN (COM) | NC |

## EXTERNAL OUTPUT TRIMMING




***Astrodyne products are not authorized or warranteed for use as critical components in life support systems, equipment used in hazardous environments, nuclear controls systems, or other mission-critical applications.***

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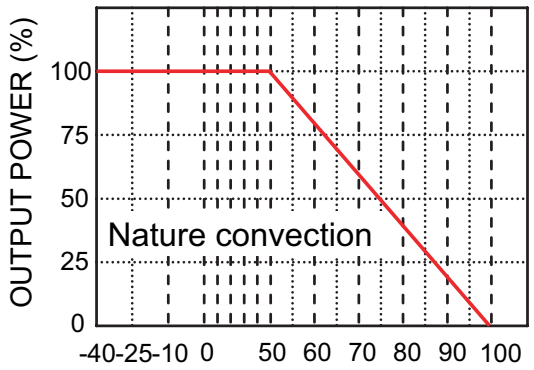
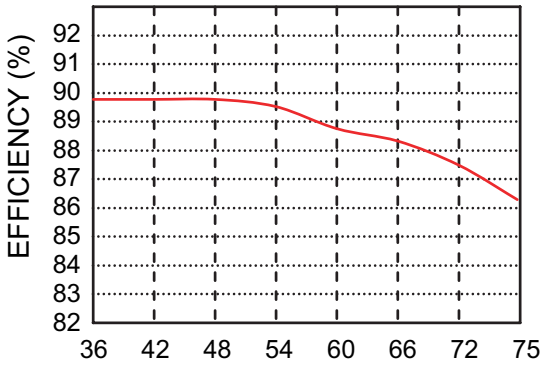
## OUTPUT DERATING CURVE

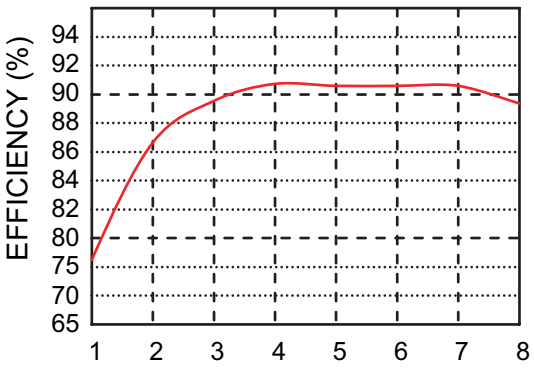
FEC40-48S05
Derating Curve




FEC40-48S05
Efficiency VS Input voltage




FEC40-48S05
Efficiency VS Output load



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