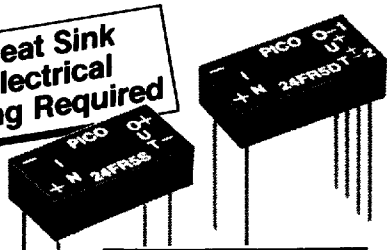
T-57-11

# SERIES FR Hi Reliability Isolated Regulated DC-DC Converters

**No Heat Sink or Electrical Derating Required**




**Low Profile .5"×1"×.3" ht. up to 1 Watt**

**FEATURES:**
- Excellent voltage regulations ±0.1% single/±0.2% dual
- Encapsulated semiconductors, conservatively rated for maximum reliability.
- Excellent load regulations 0.2% single/0.4% dual
- Up to 1.0 watts output power at 70°C ambient
- Low output ripple
- 100 megohm 500V DC isolation
- Single and dual isolated outputs
- Low profile, ultra-miniature size
- No output capacitor required • No heat sink required

This series of encapsulated converters come in 24 different models. The highly regulated output is isolated from the input. The units will operate over the temperature range of −25°C to +70°C. No heat sink is required. These units are excellent for applications where the input voltage varies ±10% and the output must be held to ±0.1% single/and ±0.2% dual. The output voltage is maintained to within 0.2% from no load to full load for single and 0.4% for dual.

**OPTIONS AVAILABLE**
- *Expanded operating temp. (−55°C to +85°C)*
- *Stabilization Bake (125°C ambient)*
- *Temperature Cycle (−55°C to +125°C)*
- *Hi Temp, full power burn in (100% power, 125°C case temp)*

**TYPICAL CHARACTERISTICS FOR ALL MODELS:**

**Test conditions:** 25°C ambient
**Output voltage tolerance:** ±1% on all single/±2% dual
**Line regulations:** ±0.1% single/±0.2% dual (for the input voltage range of ±10%)
**Load regulation:** 0.2% single/0.4% dual
**Converter frequency:** 20-40K Hz.
**Operating temperature:** −25°C to +70°C ambient
**Output voltage temperature coefficient:** 0.01%/°C
**Storage temperature:** −55°C to +125°C
**Isolation:** 100 megohms minimum at 500 volts DC
**Short circuit protection:** Temporary

## SERIES FR - SINGLE OUTPUT

| PICO PART NUMBER | *INPUT VOLTAGE (V dc) | OUTPUT VOLTAGE (V dc) | MAX. LOAD CURRENT (mA) | MAX. OUTPUT POWER (watts) | EFF. @ FULL LOAD AT NOMINAL INPUT VOLTAGE TYPICAL (%) | INPUT CURRENT @ FULL LOAD TYPICAL (mA) AT NOMINAL INPUT VOLTAGE | OUTPUT VOLTAGE RIPPLE @ FULL LOAD (mVp-p) max. | INPUT CURRENT @ NO LOAD TYPICAL AT NOMINAL INPUT VOLTAGE (mA) | EFF. @ FULL LOAD TYPICAL (%) HIGH LINE | EFF. @ FULL LOAD TYPICAL (%) LOW LINE | PRICE 1-24 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5FR5S | 5 | 5 | 150 | 0.75 | 37 | 405 | 75 | 88 | 34 | 42 | 72.09 |
| 5FR12S | 5 | 12 | 83 | 1.00 | 50 | 400 | 50 | 88 | 45 | 56 | 72.09 |
| 5FR15S | 5 | 15 | 67 | 1.00 | 51 | 392 | 50 | 86 | 45 | 57 | 72.09 |
| 12FR5S | 12 | 5 | 150 | 0.75 | 42 | 149 | 75 | 27 | 38 | 48 | 72.09 |
| 12FR12S | 12 | 12 | 83 | 1.00 | 53 | 157 | 50 | 32 | 47 | 60 | 72.09 |
| 12FR15S | 12 | 15 | 67 | 1.00 | 55 | 152 | 50 | 34 | 49 | 62 | 72.09 |
| 24FR5S | 24 | 5 | 150 | 0.75 | 41 | 76 | 75 | 16 | 37 | 47 | 72.09 |
| 24FR12S | 24 | 12 | 83 | 1.00 | 51 | 82 | 50 | 19 | 45 | 58 | 72.09 |
| 24FR15S | 24 | 15 | 67 | 1.00 | 54 | 77 | 50 | 19 | 47 | 61 | 72.09 |
| 28FR5S | 28 | 5 | 150 | 0.75 | 35 | 76 | 75 | 16 | 32 | 40 | 72.09 |
| 28FR12S | 28 | 12 | 83 | 1.00 | 44 | 82 | 50 | 19 | 40 | 50 | 72.09 |
| 28FR15S | 28 | 15 | 67 | 1.00 | 46 | 77 | 50 | 19 | 41 | 52 | 72.09 |

## SERIES FR - DUAL OUTPUT

| PICO PART NUMBER | *INPUT VOLTAGE (V dc) | DUAL OUTPUT VOLTAGE ISOLATED (V dc) | MAX. LOAD CURRENT PER OUTPUT (mA) | MAX. OUTPUT POWER PER OUTPUT (watts) | EFF. @ FULL LOAD AT NOMINAL INPUT VOLTAGE TYPICAL (%) | INPUT CURRENT FULL LOAD TYPICAL AT NOMINAL INPUT VOLTAGE (mA) | OUTPUT VOLTAGE RIPPLE @ FULL LOAD PER OUTPUT (mVp-p max.) | INPUT CURRENT @ NO LOAD TYPICAL AT NOMINAL INPUT VOLTAGE (mA) | EFF. @ FULL LOAD TYPICAL (%) HIGH LINE | EFF. @ FULL LOAD TYPICAL (%) LOW LINE | PRICE 1-24 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5FR5D | 5 | 5 | 50 | 0.25 | 37 | 270 | 50 | 100 | 34 | 42 | 96.30 |
| 5FR12D | 5 | 12 | 29 | 0.35 | 42 | 333 | 50 | 100 | 38 | 48 | 96.30 |
| 5FR15D | 5 | 15 | 23 | 0.35 | 45 | 311 | 50 | 120 | 41 | 52 | 96.30 |
| 12FR5D | 12 | 5 | 50 | 0.25 | 40 | 104 | 50 | 32 | 36 | 45 | 96.30 |
| 12FR12D | 12 | 12 | 29 | 0.35 | 49 | 119 | 50 | 39 | 44 | 55 | 96.30 |
| 12FR15D | 12 | 15 | 23 | 0.35 | 49 | 119 | 50 | 35 | 44 | 55 | 96.30 |
| 24FR5D | 24 | 5 | 50 | 0.25 | 39 | 53 | 50 | 18 | 35 | 44 | 96.30 |
| 24FR12D | 24 | 12 | 29 | 0.35 | 46 | 63 | 50 | 22 | 41 | 52 | 96.30 |
| 24FR15D | 24 | 15 | 23 | 0.35 | 47 | 62 | 50 | 22 | 42 | 53 | 96.30 |
| 28FR5D | 28 | 5 | 50 | 0.25 | 34 | 53 | 50 | 18 | 31 | 39 | 96.30 |
| 28FR12D | 28 | 12 | 29 | 0.35 | 40 | 63 | 50 | 22 | 36 | 45 | 96.30 |
| 28FR15D | 28 | 15 | 23 | 0.35 | 40 | 62 | 50 | 22 | 36 | 45 | 96.30 |

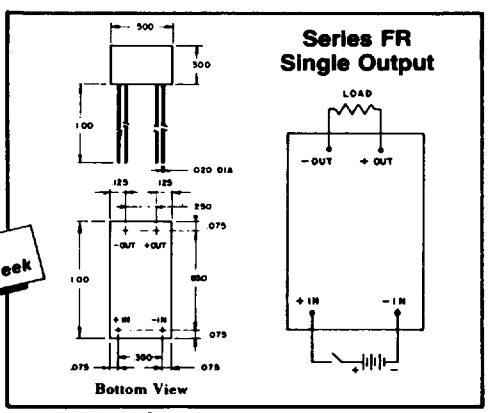
*Input voltage +/−10%

Ordering Instructions: No minimum. Net 30 days F.O.B. Mt. Vernon, New York.

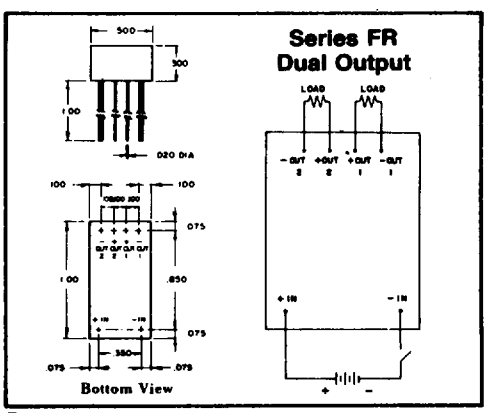
**PICO Electronics, Inc.**
453 N. MacQuesten Pkwy.,
Mt. Vernon, N.Y. 10552
914-699-5514 • FAX 914-699-5565

For immediate engineering assistance or to place an order—
Call Toll Free 800-431-1064

Delivery—stock to one week




Typical Weight: 6.0 Grams




Typical Weight: 5.5 Grams