

FEATURES

- High Efficiency up to 83%
- Fixed Switching Frequency
- Six-Sided Continuous Shield
- Standard 2 x 1 x 0.4 inch Package
- 2:1 and 4:1 Wide Input Voltage Range
- ISO9001 Certified Manufacturing Facilities
- Compliant to RoHS EU Directive 2002/95/EC
- Options: Positive Logic and Negative Logic Remote ON/OFF, Industrial Temperature

APPLICATIONS

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



SPECIFICATIONS: KR/KRW Series

All specifications apply @ 25°C ambient unless otherwise noted

INPUT SPECIFICATIONS

| | | |
|--|-------------------|-------------------------|
| Input Voltage Range | | |
| KR | 12V nominal input | 9-18VDC |
| | 24V nominal input | 18-36VDC |
| | 48V nominal input | 36-75VDC |
| KRW | 24V nominal input | 9-36VDC |
| | 48V nominal input | 18-75VDC |
| Input Filter | | Pi Type |
| Input Surge Voltage (100ms max) | 12V input | 36 VDC |
| | 24V input | 50 VDC |
| | 48V input | 100 VDC |
| Input Reflected Ripple Current (nom. Vin and FL) | | 20mA _{p-p} |
| Start Up Time (nom. Vin and constant resistive load) | | 450ms max. |
| Remote ON/OFF (Option) (See Note 6) | | |
| (Positive Logic) | DC-DC ON | Open or 3.5V < Vr < 12V |
| | DC-DC OFF | Short or 0V < Vr < 1.2V |
| (Negative Logic) | DC-DC ON | Short or 0V < Vr < 1.2V |
| | DC-DC OFF | Open or 3.5V < Vr < 12V |
| Input Current of Remote Control Pin (nominal Vin) | | -0.5mA ~ +1mA |
| Remote Off State Input Current (nominal Vin) | | 2.5mA |

OUTPUT SPECIFICATIONS

| | |
|---|---------------------|
| Output Voltage | see table |
| Voltage Accuracy (nominal Vin and full load) | ±1% |
| Output Current | see table |
| Output Power | 6 Watts max. |
| Line Regulation (LL to HL at FL) | ±0.2% |
| Load Regulation (no load to full load) | Single Output ±0.2% |
| | Dual Output ±1% |
| Cross Regulation (Dual) (Asymmetrical load 25% / 100% FL) | ±5% |
| Minimum Load | 0% |
| Ripple/Noise (20 MHz BW) | 50mV _{p-p} |
| Temperature Coefficient | ±0.02% / °C max. |
| Transient Response Recovery Time | |
| 25% load step change | (Single) 200us |
| FL to HL ±1% error band | (Dual) 200us |

PROTECTION SPECIFICATIONS

| | |
|---|--------------------------------|
| Over Load Protection (% of full load at nom. input) | 170% typ. |
| Short Circuit Protection | Continuous, automatic recovery |

GENERAL SPECIFICATIONS

| | |
|-------------------------------------|---------------------------|
| Efficiency | see table |
| Switching Frequency | |
| KR | 300KHz typ. |
| KRW | 200KHz typ. |
| Isolation Voltage (Input to Output) | 1600VDC min. |
| Isolation Resistance | 10 ⁹ ohms min. |
| Isolation Capacitance | 300pF max. |

ENVIRONMENTAL SPECIFICATIONS

| | |
|-----------------------------------|--|
| Operating Temperature | |
| Standard | -25°C ~ +85°C (with derating) |
| "l" suffix (See Note 7) | -40°C ~ +85°C (non-derating) |
| "i" suffix (KRW series) | -40°C ~ +85°C (with derating) |
| Storage Temperature | -55°C ~ +105°C |
| Maximum Case Temperature | 100°C |
| Relative Humidity | 5% to 95% RH |
| Thermal Impedance (See Note 8) | |
| Natural Convection | 12°C / Watt |
| Natural Convection with Heat-Sink | 10°C / Watt |
| Thermal Shock | MIL-STD-810F |
| Vibration | 10~55Hz, 10G, 30 minutes along X, Y, and Z |
| MTBF (See Note 1) | 3.145 x 10 ⁶ hours |

PHYSICAL SPECIFICATIONS

| | |
|------------------|---|
| Weight | 27g (0.95oz) |
| Dimensions | 2.0 x 1.0 x 0.40 inches (50.8 x 25.4 x 10.2 mm) |
| Case Material | Nickel-coated copper |
| Base Material | Non-conductive black plastic |
| Potting material | Epoxy (UL94-V0) |
| Shielding | six-sided |

SAFETY & EMC

| | |
|-------------------------|--|
| Approvals and Standards | IEC60950-1, UL60950-1, EN60950-1 |
| EMI | EN55022 Class A |
| ESD | EN61000-4-2 Air ± 8KV Perf. Criteria B |
| | Contact ± 6KV |
| Radiated Immunity | EN61000-4-3 10V/m Perf. Criteria A |
| Fast Transient | EN61000-4-4 ±2KV Perf. Criteria B |
| Surge (See Note 9) | EN61000-4-5 ±1KV Perf. Criteria B |
| Conducted Immunity | EN61000-4-6 10 Vrms Perf. Criteria A |

Due to advances in technology, specifications subject to change without notice

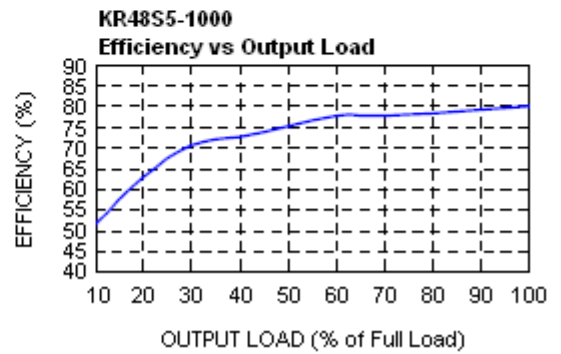
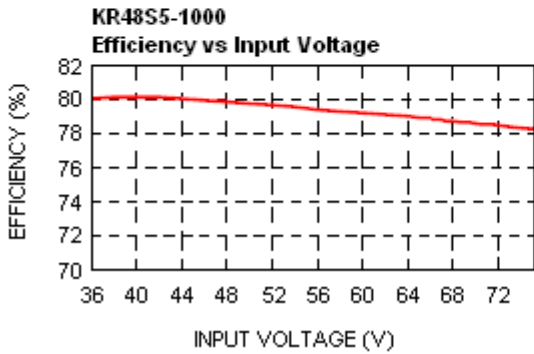
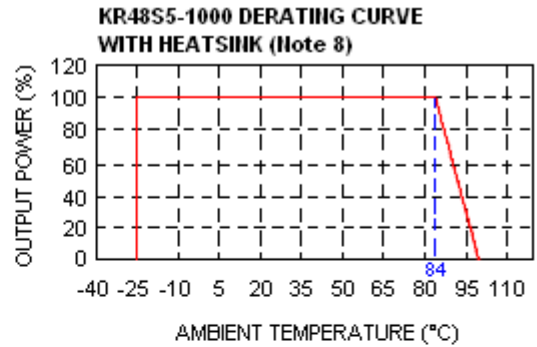
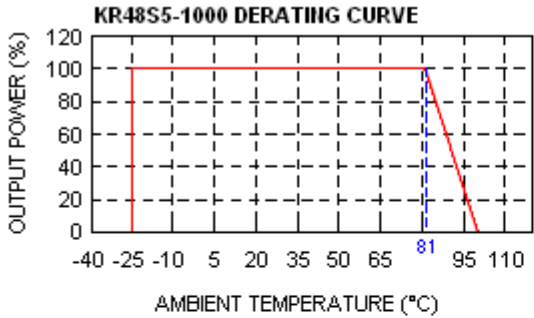
MODEL SELECTION GUIDE

| Model Number | Input Range | Output Voltage | Output Current | | Output ⁽⁴⁾ Ripple & Noise | Input Current | | Efficiency ⁽⁴⁾ | Capacitor ⁽⁵⁾ Load max |
|---------------|-------------------------|----------------|----------------|-----------|---|------------------------|--------------------------|---------------------------|--------------------------------------|
| | | | Min. load | Full load | | No load ⁽³⁾ | Full load ⁽²⁾ | | |
| KR12S33-1000 | 12 VDC (9 – 18 VDC) | 3.3 VDC | 0mA | 1000mA | 50mVp-p | 10mA | 382mA | 76 | 3700µF |
| KR12S5-1000 | | 5 VDC | 0mA | 1000mA | 50mVp-p | 10mA | 556mA | 79 | 1700µF |
| KR12S12-470 | | 12 VDC | 0mA | 470mA | 50mVp-p | 10mA | 610mA | 81 | 290µF |
| KR12S15-400 | | 15 VDC | 0mA | 400mA | 50mVp-p | 15mA | 658mA | 80 | 188µF |
| KR12D5-500 | | ±5 VDC | 0mA | ±500mA | 50mVp-p | 20mA | 556mA | 79 | ±850µF |
| KR12D12-230 | | ±12 VDC | 0mA | ±230mA | 50mVp-p | 15mA | 597mA | 81 | ±140µF |
| KR12D15-190 | | ±15 VDC | 0mA | ±190mA | 50mVp-p | 20mA | 609mA | 82 | ±47µF |
| KR24S33-1000 | 24 VDC (18 – 36 VDC) | 3.3 VDC | 0mA | 1000mA | 50mVp-p | 15mA | 199mA | 73 | 3700µF |
| KR24S5-1000 | | 5 VDC | 0mA | 1000mA | 50mVp-p | 15mA | 282mA | 78 | 1700µF |
| KR24S12-470 | | 12 VDC | 0mA | 470mA | 50mVp-p | 10mA | 305mA | 81 | 290µF |
| KR24S15-400 | | 15 VDC | 0mA | 400mA | 50mVp-p | 20mA | 325mA | 81 | 188µF |
| KR24D5-500 | | ±5 VDC | 0mA | ±500mA | 50mVp-p | 15mA | 278mA | 79 | ±850µF |
| KR24D12-230 | | ±12 VDC | 0mA | ±230mA | 50mVp-p | 20mA | 295mA | 82 | ±140µF |
| KR24D15-190 | | ±15 VDC | 0mA | ±190mA | 50mVp-p | 20mA | 308mA | 91 | ±47µF |
| KR48S33-1000 | 48 VDC (36 – 75 VDC) | 3.3 VDC | 0mA | 1000mA | 50mVp-p | 5mA | 100mA | 73 | 3700µF |
| KR48S5-1000 | | 5 VDC | 0mA | 1000mA | 50mVp-p | 10mA | 145mA | 76 | 1700µF |
| KR48S12-470 | | 12 VDC | 0mA | 470mA | 50mVp-p | 10mA | 151mA | 82 | 290µF |
| KR48S15-400 | | 15 VDC | 0mA | 400mA | 50mVp-p | 10mA | 160mA | 82 | 188µF |
| KR48D5-500 | | ±5 VDC | 0mA | ±500mA | 50mVp-p | 10mA | 141mA | 78 | ±850µF |
| KR48D12-230 | | ±12 VDC | 0mA | ±230mA | 50mVp-p | 10mA | 149mA | 81 | ±140µF |
| KR48D15-190 | | ±15 VDC | 0mA | ±190mA | 50mVp-p | 10mA | 154mA | 81 | ±47µF |
| KRW24S33-1000 | 24 VDC (9 – 36 VDC) | 3.3 VDC | 0mA | 1000mA | 50mVp-p | 5mA | 188mA | 77 | 3700µF |
| KRW24S5-1000 | | 5 VDC | 0mA | 1000mA | 50mVp-p | 5mA | 274mA | 80 | 1700µF |
| KRW24S12-470 | | 12 VDC | 0mA | 470mA | 50mVp-p | 5mA | 301mA | 82 | 290µF |
| KRW24S15-400 | | 15 VDC | 0mA | 400mA | 50mVp-p | 5mA | 325mA | 81 | 188µF |
| KRW24D5-500 | | ±5 VDC | 0mA | ±500mA | 50mVp-p | 5mA | 274mA | 80 | ±850µF |
| KRW24D12-230 | | ±12 VDC | 0mA | ±230mA | 50mVp-p | 5mA | 295mA | 82 | ±140µF |
| KRW24D15-190 | | ±15 VDC | 0mA | ±190mA | 50mVp-p | 10mA | 301mA | 83 | ±47µF |
| KRW48S33-1000 | 48 VDC (18 – 75 VDC) | 3.3 VDC | 0mA | 1000mA | 50mVp-p | 5mA | 100mA | 73 | 3700µF |
| KRW48S5-1000 | | 5 VDC | 0mA | 1000mA | 50mVp-p | 10mA | 145mA | 76 | 1700µF |
| KRW48S12-470 | | 12 VDC | 0mA | 470mA | 50mVp-p | 10mA | 151mA | 82 | 290µF |
| KRW48S15-400 | | 15 VDC | 0mA | 400mA | 50mVp-p | 10mA | 163mA | 81 | 188µF |
| KRW48D5-500 | | ±5 VDC | 0mA | ±500mA | 50mVp-p | 5mA | 141mA | 78 | ±850µF |
| KRW48D12-230 | | ±12 VDC | 0mA | ±230mA | 50mVp-p | 10mA | 149mA | 81 | ±140µF |
| KRW48D15-190 | | ±15 VDC | 0mA | ±190mA | 50mVp-p | 10mA | 154mA | 81 | ±47µF |

NOTES

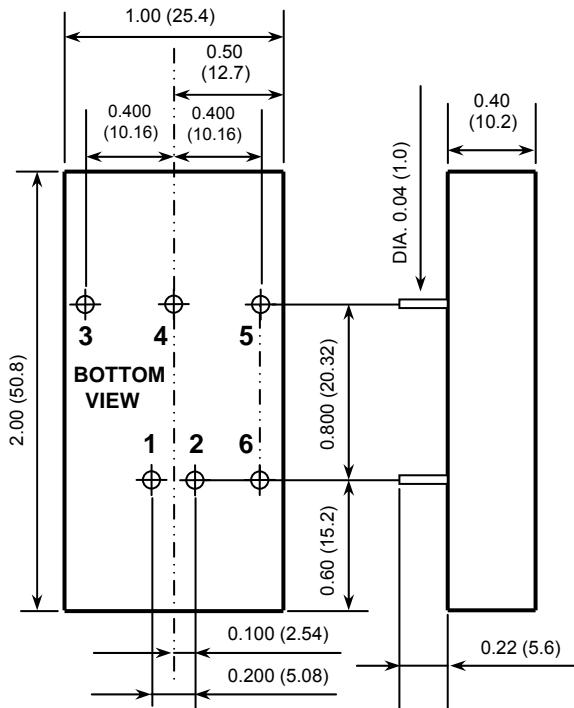
- BELLCORE TR-NWT-000332. Case 1: 50% Stress, Temperature at 40°C. (Ground fixed and controlled environment)
- Maximum value at nominal input voltage and full load of standard type.
- Typical value at nominal input voltage and no load.
- Typical value at nominal input voltage and full load.
- Test by minimum Vin and constant resistive load.
- The ON/OFF control pin voltage is referenced to -Vin.
 To order positive logic ON-OFF control add the suffix "P" (Ex: KR48S5-1000P)
 To order negative logic ON-OFF control add the suffix "R" (Ex: KR48S5-1000R)
- The industrial "I" suffix for the 2:1 input version is more efficient; therefore, it can be operated in a more extensive temperature range than "standard" and "I" suffix 4:1 input versions.
 To order industrial temperature range (-40°C ~ +85°C) add the suffix "I" to the part number (Ex: KR48S5-1000I)
- Heat sink is optional, consult factory.
- An external filter capacitor is required if the module has to meet EN61000-4-5. The filter capacitor Wall Industries suggests:
 Nippon chemi-con KY Series 220µF/100V ESR 48mΩ.

DERATING CURVE & EFFICIENCY GRAPHS



MECHANICAL DRAWING

Unit: inches (mm)



| PIN CONNECTION | | |
|----------------|------------------|------------------|
| PIN | SINGLE | DUAL |
| 1 | +Vin | +Vin |
| 2 | -Vin | -Vin |
| 3 | +Vout | +Vout |
| 4 | No Pin | Common |
| 5 | -Vout | -Vout |
| 6 | Control (option) | Control (option) |

1. 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)