

**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 <sub>p-p</sub>
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 <sub>p-p</sub>
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 <sup>9</sup> 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 <sup>6</sup> 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*

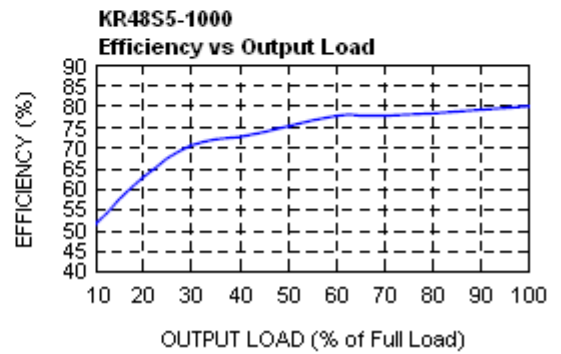
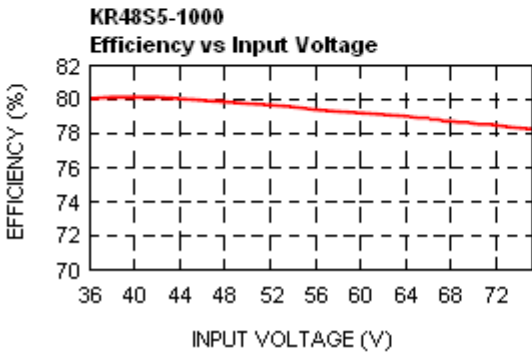
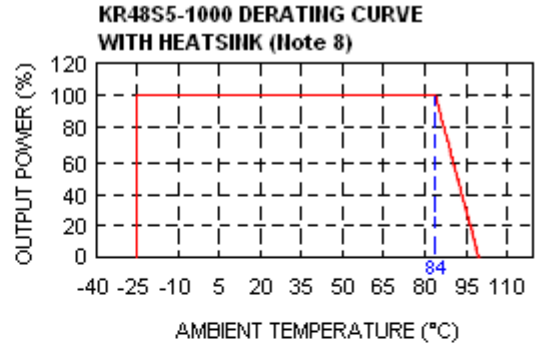
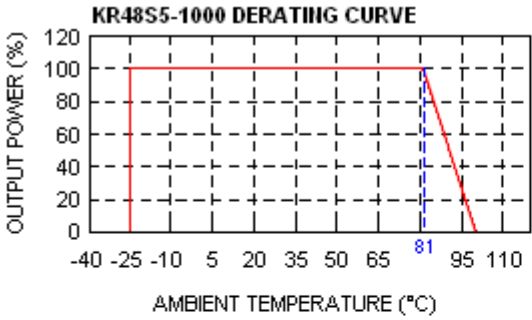
**MODEL SELECTION GUIDE**

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**

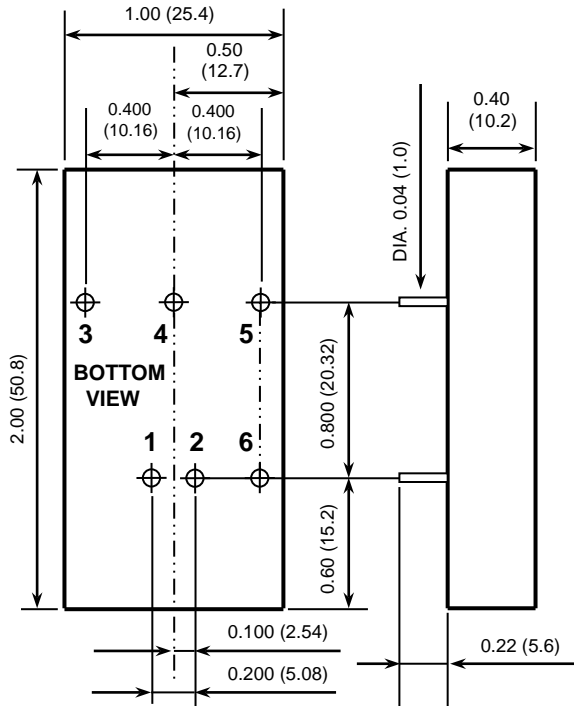
- BELLCORE TR-NWT-000332. Case 1: 50% Stress, Temperature at 40°C. (Ground fixed and controlled environment)
- Maximum value at nominal input voltage and full load of standard type.
- Typical value at nominal input voltage and no load.
- Typical value at nominal input voltage and full load.
- Test by 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)