XWR SERIES

DATEL
INNOVATION and EXCELLENCE

Dual Output
BWR Models
High-Density, 2" x 1" 7-10 Watt, DC/DC Converters

Features

- Compact size:
  2" x 1" x 0.375"
  51mm x 25mm x 9.5mm
- Modern SMT-on-ceramic construction
- Power densities to 13.3W/in³
- ±5, ±12 or ±15 Volt outputs
- Choice of 3 wide range inputs:
  4.7-7 Volts
  9-18 Volts
  18-72 Volts
- Industry-standard pinouts
- Guaranteed efficiencies to 82%
- Internal input/output filtering
- Superb ripple/noise, as low as 50mV
- Fully isolated (750Vdc min.) and protected
- –25 to +100°C operation, shielded cases
- UL 1950, CSA 22.2 No. 234 and IEC 950
- Modifications and customs for OEM's

Assembled with thick-film ceramic substrates, automatically placed SMT components, metal cases, and thermally conductive potting compounds, BWR Model 2" x 1" DC/DC converters are the result of DATEL's integrated approach to thermal management. The devices' high-frequency (165kHz) current-mode topologies and exploitation of the newest LDO (low drop out) components yields efficient, compact, highly reliable power converters with prolonged MTBF's, power densities as high as 13.3W/in³, and output power as high as 10 Watts.

Offering true "plug-and-play" convenience, these converters contain internal input (pi type) and output filters. They require no external components and offer outstanding ripple/noise performance (as low as 50mV maximum). Units are completely isolated (750Vdc minimum), tightly regulated (±0.3% max. line, ±1% max. load), and I/O protected. All devices incorporate input reverse-polarity protection and output current limiting

Output voltages are either ±5, ±12 or ±15 Volts. Input voltage ranges are either 4.7-7V ("D5" models), 9-18V ("D12" models) or an ultra-wide 18-72V ("D48" models). Cases are 5-side metal shielded with non-conductive baseplates. Transient response time is a quick 200µsec.

These extremely rugged modules are moisture and vibration resistant and operate over the –25 to +100°C temperature range. For telecommunication, computer and other EMI-sensitive applications, each device offers full EMI/EMC characterization data.

The industry-standard pinouts of DATEL's BWR Model 7-10W DC/DC's makes them ideal replacements for other more costly, less reliable power converters. They are similarly excellent choices for original design-ins in systems demanding small size, low cost and high reliability.

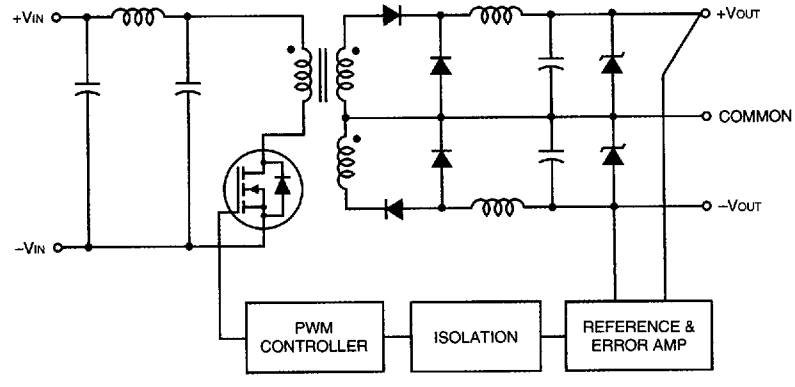


Figure 1. Simplified Schematic

Performance Specifications and Ordering Guide ①

Model	Output					Input			Efficiency (Min.)	Package (Case, Pinout)
	V_{OUT} (Volts)	I_{OUT} (mA, Max.)	Ripple/Noise ② (mVp-p, Max.)	Regulation (Max.) Line	Regulation (Max.) Load ③	V_{IN} Nom. (Volts)	Range (Volts)	I_{IN} ④ (mA, Max.)		
BWR-5/700-D5	±5	±700	75	±0.3%	±1.0%	5	4.7-7	50/1895	75%	C2, P12
BWR-5/800-D12	±5	±800	75	±0.3%	±1.0%	12	9-18	40/885	77%	C2, P12
BWR-5/700-D48	±5	±700	100	±0.3%	±1.0%	48	18-72	35/189	78%	C2, P12
BWR-12/335-D5	±12	±335	50	±0.3%	±1.0%	5	4.7-7	75/2225	73%	C2, P12
BWR-12/415-D12	±12	±415	50	±0.3%	±1.0%	12	9-18	45/1035	81%	C2, P12
BWR-12/415-D48	±12	±415	75	±0.3%	±1.0%	48	18-72	25/264	80%	C2, P12
BWR-15/275-D5	±15	±275	50	±0.3%	±1.0%	5	4.7-7	75/2250	74%	C2, P12
BWR-15/330-D12	±15	±330	50	±0.3%	±1.0%	12	9-18	45/1025	82%	C2, P12
BWR-15/330-D48	±15	±330	75	±0 3%	±1.0%	48	18-72	25/256	82%	C2, P12

① Typical at T_A = +25°C under nominal line voltage and full load conditions unless otherwise noted
② 20MHz bandwidth.
③ Balanced loads, 20% to 100% load
④ Nominal line voltage, no load/full load conditions.

Part Number Structure

BWR-15/330-D12

Output Configuration:
B = Bipolar

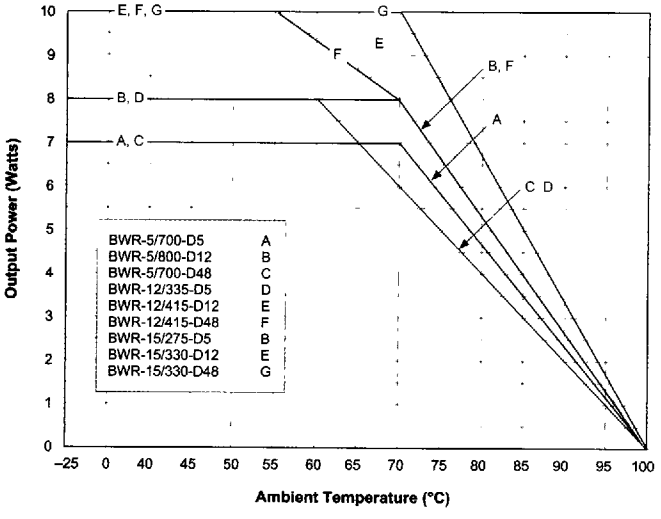
Wide Range Input

Nominal Output Voltages:
±5, ±12 or ±15 Volts

Maximum Output Current
in mA from each output

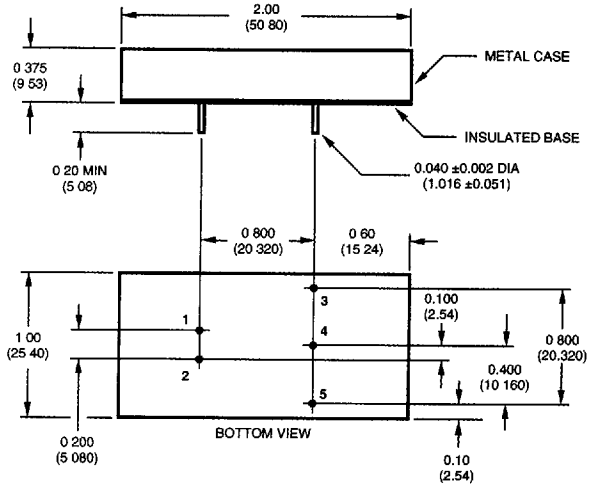
Input Voltage Range:
D5 = 4.7-7 Volts (5V nominal)
D12 = 9-18 Volts (12V nominal)
D48 = 18-72 Volts (48V nominal)

Temperature Derating



Mechanical Specifications

Case C2



I/O Connections	
Pin	Function P4
1	+Input
2	–Input
3	+Output
4	Common
5	–Output

Notes:

For "D5" and "D12"models, the case is connected to pin 2 ($-V_{IN}$).

For "D48" models, the case is connected to pin 1 ($+V_{IN}$).

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Performance/Functional Specifications

Typical @ T_A = +25°C under nominal line voltage and full load conditions unless noted ①

Input	
Input Voltage Range:	
"D5" Models	4.7-7 Volts (5V nominal)
"D12" Models	9-18 Volts (12V nominal)
"D48" Models	18-72 Volts (48V nominal)
Input Current	See Ordering Guide
Input Filter Type ②	Pi
Reverse-Polarity Protection	Yes (Instantaneous, 6A maximum)
Output	
V_{OUT} **Accuracy** (50% load):	
±5V Outputs	±1.5%, maximum
±12/15V Outputs	±1%, maximum
Temperature Coefficient	±0.02% per °C
Ripple/Noise (20MHz BW) ②	See Ordering Guide
Line/Load Regulation	See Ordering Guide
Efficiency	See Ordering Guide
Isolation Voltage ③	750Vdc, minimum
Isolation Capacitance	200pF
Current Limiting	Auto-recovery
Overvoltage Protection	Clamp, 2W transorb
Dynamic Characteristics	
Transient Response (50% load step)	200µsec max to ±1.5% of final value
Switching Frequency	165kHz (±15kHz)
Environmental	
Operating Temperature (ambient): ④	
Without Derating	–25 to +55/60/65/70°C (model dependent)
With Derating	to +100°C (See Derating Curves)
Storage Temperature	–55 to +125°C
Physical	
Dimensions	2" x 1" x 0.375" (51 x 25 x 9.5mm)
Shielding	5-sided ⑤
Case Connection:	
"D5" and "D12" Models	Pin 2 ($-V_{IN}$)
"D48" Models	Pin 1 ($+V_{IN}$)
Case Material	Corrosion resistant steel with epoxy-based enamel finish
Pin Material	Brass, solder coated
Weight	1.3 ounces (37 grams)

① These power converters require a minimum 20% loading on each output to maintain specified regulation. Operation under no-load conditions will not damage these devices, however, they may not meet all listed specifications.
② Application-specific internal input/output filtering can be added upon request. Contact DATEL for details.
③ Devices can be screened for higher guaranteed isolation voltages. Contact DATEL for details.
④ Devices can be screened for –40°C operation. Contact DATEL for details.
⑤ Cases can be provided with 6-sided shielding. Contact DATEL for details.

Absolute Maximum Ratings

These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied. Storage temperatures have been verified for 168 hours.

Input Voltage:	
"D5" Models	10 Volts
"D12" Models	20 Volts
"D48" Models	80 Volts
Input Reverse-Polarity Protection	Current must be <6A. Brief duration only. Fusing recommended.
Output Overvoltage Protection:	
±5V Output	±6.8 Volts, limited duration
±12V Outputs	±15 Volts, limited duration
±15V Outputs	±18 Volts, limited duration
Output Current	Current limited. Max. current and short-circuit duration model dependent.
Storage Temperature	–55 to +125°C
Lead Temperature (soldering, 10sec.)	+300°C

Technical Notes

Floating Outputs

All outputs are floating. Any BWR model may be configured to produce an output of 10V, 24V or 30V (for ±5V, ±12V or ±15V models, respectively) by applying the load across the +Output and –Output pins (pins 3 and 5), with either output grounded. The Common pin (pin 4) should be left open. Minimum 20% loading is recommended under these conditions.

Filtering and Noise Reduction

All BWR 7-10 Watt DC/DC Converters achieve their rated ripple and noise specifications without the use of external input/output capacitors. In critical applications, input/output ripple and noise may be further reduced by installing electrolytic capacitors across the input terminals and/or low-ESR tantalum or electrolytic capacitors across the output terminals. Output capacitors should be connected between their respective output pin (pin 3 or 5) and Common (pin 4) as shown in Figure 2. The caps should be located as close to the power converters as possible. Typical values are listed in the tables below. In most applications, using values greater than those listed will yield better results.

To Reduce Input Ripple

"D5" Models	47µF, 10V
"D12" Models	20µF, 35V
"D48" Models	10µF, 100V

To Reduce Output Ripple

±5V Output	47µF, 10V, Low ESR
±12/15V Outputs	22µF, 20V, Low ESR

In critical, space-sensitive applications, DATEL can easily tailor the internal input/output filtering of these devices to meet your specific requirements. Contact DATEL for additional details.

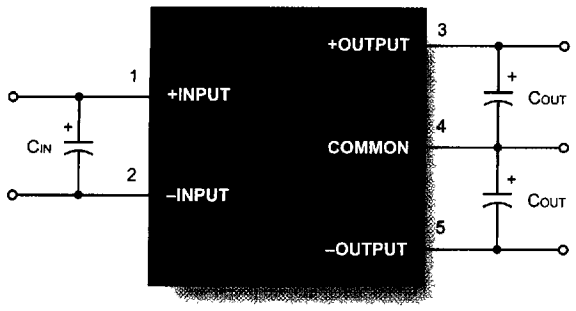


Figure 2. Using External Capacitors to Reduce Input/Output Noise/Ripple

Input Fusing

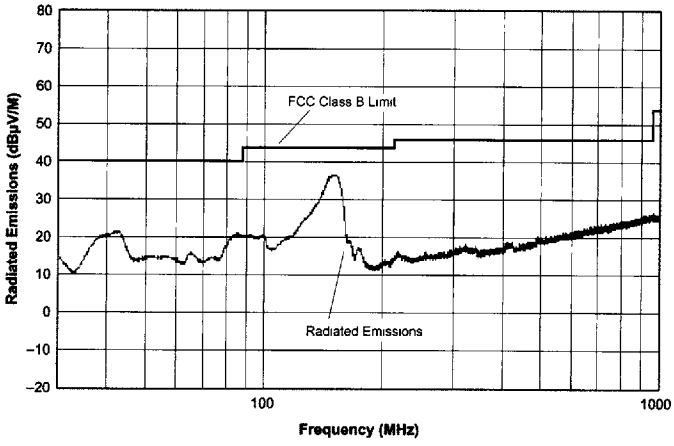
Certain applications and/or safety agencies may require the installation of fuses at the inputs of power conversion components. For DATEL BWR 7-10 Watt DC/DC Converters, you should use slow-blow type fuses with values no greater than the following:

V_{IN} Range	Fuse Value
"D5"	3A
"D12"	2A
"D48"	1A

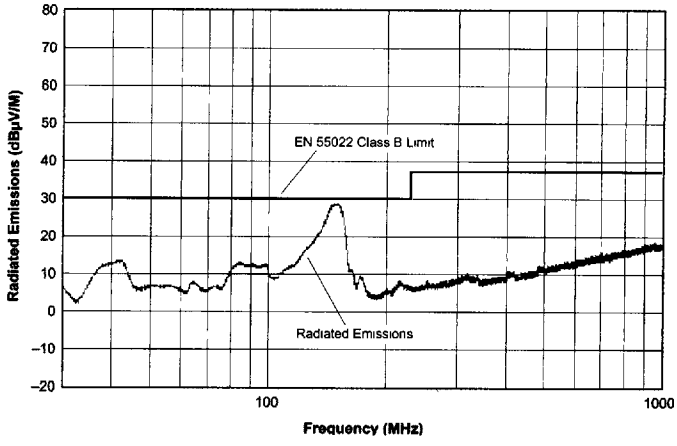
EMI Radiated Emissions

If you're designing with EMC in mind, please note that all of DATEL's BWR 7-10 Watt DC/DC Converters have been characterized for radiated and conducted emissions in our new EMI/EMC laboratory. Testing is conducted in an EMCO 5305 GTEM test cell utilizing EMCO automated EMC test software. Radiated emissions are tested to the limits of FCC Part 15, Class B and CISPR 22 (EN 55022), Class B. Correlation to other specifications can be supplied upon request. Radiated emissions plots to FCC and CISPR 22 for model BWR-12/335-D5 appear below. Published EMC test reports are available for each model number. Contact DATEL's Applications Engineering Department for more details.

BWR-12/335-D5 Radiated Emissions
FCC Part 15 Class B, 3 Meters
Converter Output = ±12Vdc @ ±269mA



BWR-12/335-D5 Radiated Emissions
EN 55022 Class B, 10 Meters
Converter Output = ±12Vdc @ ±269mA



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