FEATURES

- High Efficiency up to 91%
- Fixed Switching Frequency
- 2:1 Wide Input Voltage Range
- Six-Sided Continuous Shielding
- Standard 2.0 x 1.0 x 0.40 Inches
- Negative Logic Remote ON/OFF Option
- ISO9001 Certified Manufacturing Facilities
- Compliant to RoHS EU Directive 2002/95/EC
- Design Meets UL60950-1, EN60950-1, and IEC60950-1
- CE Mark Meets 2006/95/EC, 93/68/EEC, and 89/336 EEC

APPLICATIONS

- Measurement
- Telecom/Datacom
- Wireless Networks
- Industry Control Systems
- Semiconductor Equipment

SPECIFICATIONS: *CB Series*

All specifications apply are typical nominal input, full load, and @ 25°C ambient unless otherwise noted

INPUT SPECIFICATIONS

Input Voltage Range	12V nominal input	9 - 18 VDC
	24V nominal input	18 - 36 VDC
	48V nominal input	36 - 75 VDC
Input Filter		Pi type
Input Surge Voltage (100ms max)	12V input	25 VDC
	24V input	50 VDC
	48V input	100 VDC
Input Reflected Ripple Current (nominal Vin and full load)		20mAp-p
Start Up Time (nominal Vin and constant resistive load)		
Power Up		30ms typ.
Remote ON/OFF		30ms typ.
Start Up Voltage	12V input	9 VDC
	24V input	18 VDC
	48V input	36 VDC
Shutdown Voltage	12V input	8 VDC
	24V input	16 VDC
	48V input	32 VDC
Remote ON/OFF (Note 6)		
Positive Logic (standard)	DC-DC ON	Open or 3V < Vr < 12V
	DC-DC OFF	Short or 0V < Vr < 1.2V
Negative Logic (optional)	DC-DC ON	Short or 0V < Vr < 1.2V
	DC-DC OFF	Open or 3V < Vr < 12V
Input Current of Remote Control Pin (nominal Vin)		-0.5mA ~ +0.5mA
Remote Off Input Current (nominal Vin)		3mA

OUTPUT SPECIFICATIONS

Output Voltage	see table
Voltage Accuracy (nominal Vin and full load)	±1%
Voltage Adjustability (single outputs)	±10%
Output Current	see table
Output Power	30 watts max.
Line Regulation (LL to HL at FL)	±0.2%
Load Regulation (min load to full load)	
Single Output Models	±0.5%
Dual Output Models	±1%
Cross Regulation (Dual) (Asymmetrical load 25% / 100% FL)	±5%
Minimum Load	0%
Ripple/Noise (20 MHz BW) (measured with a 0.1µF/50V MLCC)	see table
Transient Response Recovery Time (25% load step)	250µs

PHYSICAL SPECIFICATIONS

Potting Material	Epoxy (UL94-V0)
Case Material	Nickel-coated copper
Base Material	FR4 PCB
Shielding	six-sided
Weight	30.5g (1.07 oz)
Dimensions (L x W x H)	2.0 x 1.0 x 0.40 inches 50.8 x 25.4 x 10.2 mm

PROTECTION SPECIFICATIONS

Over Voltage Protection (zener diode clamp)	1.5V output	2.0V
	2.5V output	3.3V
	3.3V output	3.9V
	5V, 5.1V, ±5V outputs	6.2V
	12V & ±12V outputs	15V
	15V & ±15V outputs	18V
Over Load Protection (% of full load at nominal input)		150% typ.
Short Circuit Protection		Hiccup, automatic recovery
Over Temperature Protection		+115°C typ.

GENERAL SPECIFICATIONS

Efficiency	see table
Switching Frequency	430KHz typ.
Isolation Voltage	
Input to Output	1600VDC min.
Input to case	1600VDC min.
Output to Case	1600VDC min.
Isolation Resistance	10^9 ohms min.
Isolation Capacitance	1500pF max.
Case Grounding	Connect case to-Vin with decoupling Y cap.

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-40°C ~ +50°C (w/o derating) +50°C ~ +85°C (w/ derating)
Maximum Case Temperature	+105°C
Storage Temperature	-55°C ~ +125°C
Relative Humidity	5% to 95% RH
Thermal Impedance (Note 7)	
Natural Convection	12°C / Watt
Natural Convection with Heatsink	10°C / Watt
Temperature Coefficient	±0.02% / °C max
Thermal Shock	MIL-STD-810F
Vibration	MIL-STD-810F
MTBF for Single & Dual Output Models (Note 1)	
BELLCORE-TR-NWT-000332	3.173 X 10^6 hrs
MIL-HDBK-217F	5.548 x 10^5 hrs

SAFETY & EMC

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

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

OUTPUT VOLTAGE / CURRENT RATING CHARTS

SINGLE OUTPUT MODELS

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]		
CB12S1.5-8500	12 VDC (9-18 VDC)	1.5 VDC	0mA	8500mA	100mVp-p	70mA	1416mA	79%	20000µF
CB12S2.5-8000		2.5 VDC	0mA	8000mA	100mVp-p	100mA	2083mA	84%	20000µF
CB12S3.3-8000		3.3 VDC	0mA	8000mA	100mVp-p	90mA	2716mA	85%	20000µF
CB12S5-6000		5 VDC	0mA	6000mA	100mVp-p	130mA	3012mA	87%	14400µF
CB12S5.1-6000		5.1 VDC	0mA	6000mA	100mVp-p	130mA	3072mA	87%	14400µF
CB12S12-2500		12 VDC	0mA	2500mA	150mVp-p	90mA	2941mA	89%	3000µF
CB12S15-2000		15 VDC	0mA	2000mA	150mVp-p	80mA	2941mA	89%	2000µF
CB24S1.5-8500	24 VDC (18-36 VDC)	1.5 VDC	0mA	8500mA	100mVp-p	50mA	700mA	80%	20000µF
CB24S2.5-8000		2.5 VDC	0mA	8000mA	100mVp-p	50mA	1028mA	85%	20000µF
CB24S3.3-8000		3.3 VDC	0mA	8000mA	100mVp-p	50mA	1325mA	87%	20000µF
CB24S5-6000		5 VDC	0mA	6000mA	100mVp-p	75mA	1453mA	90%	14400µF
CB24S5.1-6000		5.1 VDC	0mA	6000mA	100mVp-p	75mA	1482mA	90%	14400µF
CB24S12-2500		12 VDC	0mA	2500mA	150mVp-p	40mA	1437mA	91%	3000µF
CB24S15-2000		15 VDC	0mA	2000mA	150mVp-p	30mA	1437mA	91%	2000µF
CB48S1.5-8500	48VDC (36-75VDC)	1.5 VDC	0mA	8500mA	100mVp-p	45mA	350mA	80%	20000µF
CB48S2.5-8000		2.5 VDC	0mA	8000mA	100mVp-p	45mA	514mA	84%	20000µF
CB48S3.3-8000		3.3 VDC	0mA	8000mA	100mVp-p	30mA	663mA	86%	20000µF
CB48S5-6000		5 VDC	0mA	6000mA	100mVp-p	45mA	727mA	88%	14400µF
CB48S5.1-6000		5.1 VDC	0mA	6000mA	100mVp-p	45mA	750mA	88%	14400µF
CB48S12-2500		12 VDC	0mA	2500mA	150mVp-p	40mA	718mA	90%	3000µF
CB48S15-2000		15 VDC	0mA	2000mA	150mVp-p	40mA	718mA	91%	2000µF

DUAL OUTPUT MODELS

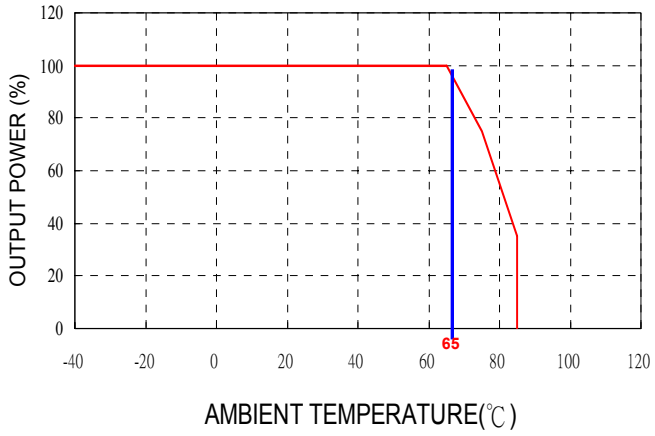
Model Number	Input Range	Output Voltage	Output Current		Output[4] Ripple & Noise	Input Current		Efficiency[4]	Capacitor[5] Load max
			Min. load	Full load		No load[3]	Full load[2]		
CB12D5-3000	12 VDC (9-18 VDC)	±5 VDC	0mA	±3000mA	100mVp-p	90mA	3012mA	87%	±3000µF
CB12D12-1250		±12 VDC	0mA	±1250mA	150mVp-p	50mA	3012mA	87%	±2000µF
CB12D15-1000		±15 VDC	0mA	±1000mA	150mVp-p	40mA	3012mA	87%	±1300µF
CB24D5-3000	24 VDC (18-36 VDC)	±5 VDC	0mA	±3000mA	100mVp-p	70mA	1453mA	90%	±3000µF
CB24D12-1250		±12 VDC	0mA	±1250mA	150mVp-p	30mA	1471mA	89%	±2000µF
CB24D15-1000		±15 VDC	0mA	±1000mA	150mVp-p	30mA	1453mA	90%	±1300µF
CB48D5-3000	48VDC (36-75VDC)	±5 VDC	0mA	±3000mA	100mVp-p	35mA	727mA	90%	±3000µF
CB48D12-1250		±12 VDC	0mA	±1250mA	150mVp-p	30mA	744mA	88%	±2000µF
CB48D15-1000		±15 VDC	0mA	±1000mA	150mVp-p	20mA	735mA	89%	±1300µF

NOTES

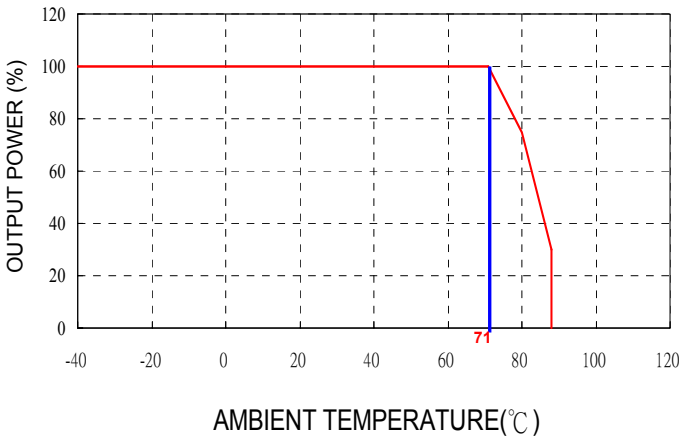
1. BELLCORE TR-NWT-000332. Case 1: 50% Stress, Temperature at 40ºC (Ground fixed and controlled environment). MIL-STD-217F Notice2 @Ta=25ºC, Full load (Ground, Benign, controlled environment)
2. Maximum value at nominal input voltage.
3. Typical value at nominal input voltage and no load.
4. Typical value at nominal input voltage and full load.
5. Test by minimum Vin and constant resistive load.
6. The ON/OFF control pin voltage is referenced to -Vin.
   To order negative logic ON/OFF control add the suffix ”R” (Ex: CB48S5-6000R)
7. Heat sink is optional, consult factory for ordering details.
8. The CB series can meet EN55022 Class A with an external capacitor in parallel with the input pins.
   Recommended: 12Vin: 10µF/25V X7R 1812 MLCC
   24Vin: 4.7µF/50V X7R 1812 MLCC
   48Vin: 2.2µF/100V X7R 1812 MLCC
9. An external filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.
   The filter capacitor suggested: 12Vin & 24Vin Nippon chemi-con KY series, 330µF/50V, ESR 55mΩ.
   48Vin Nippon chemi-con KY series, 220µF/100V, ESR 48mΩ.

DERATING CURVES & EFFICIENCY GRAPHS

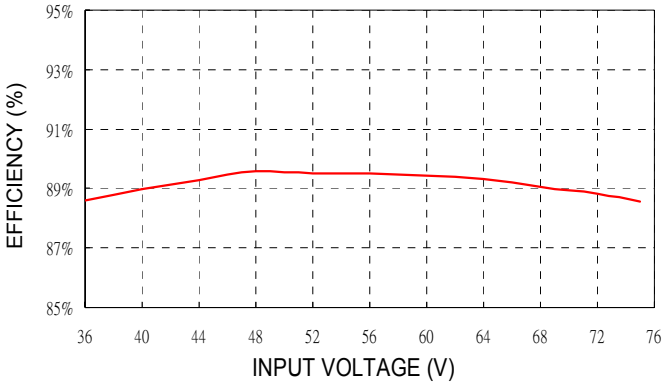
CB48S5-6000 DERATING CURVE



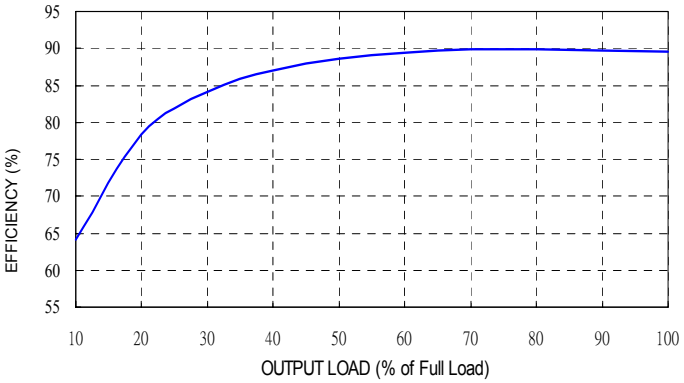
CB48S5-6000 DERATING CURVE WITH HEATSINK



CB48S5-6000 EFFICIENCY VS INPUT VOLTAGE

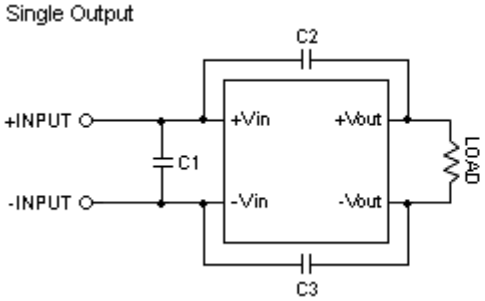


CB48S5-6000 EFFICIENCY VS OUTPUT LOAD

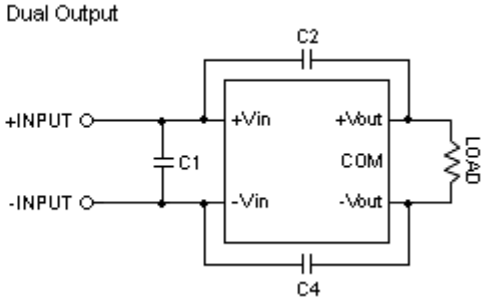


Recommended Filters for EN55022 Class A Compliance

Single Output



Dual Output

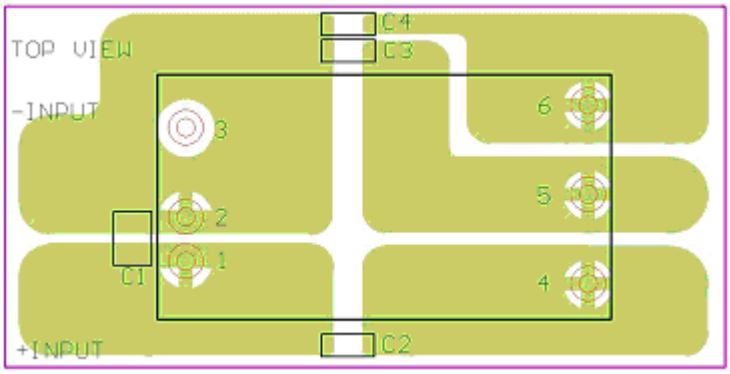


The components used in the figures above together with the manufacturers' part numbers for these components are as follows

Single Output	C1	C2 & C3
CB12Sxx-xxxx	10µF/25V 1812 MLCC	1000pF/2KV 1808 MLCC
CB24Sxx-xxxx	6.8µF/50V 1812 MLCC	1000pF/2KV 1808 MLCC
CB48Sxx-xxxx	2.2µF/100V 1812 MLCC	1000pF/2KV 1808 MLCC

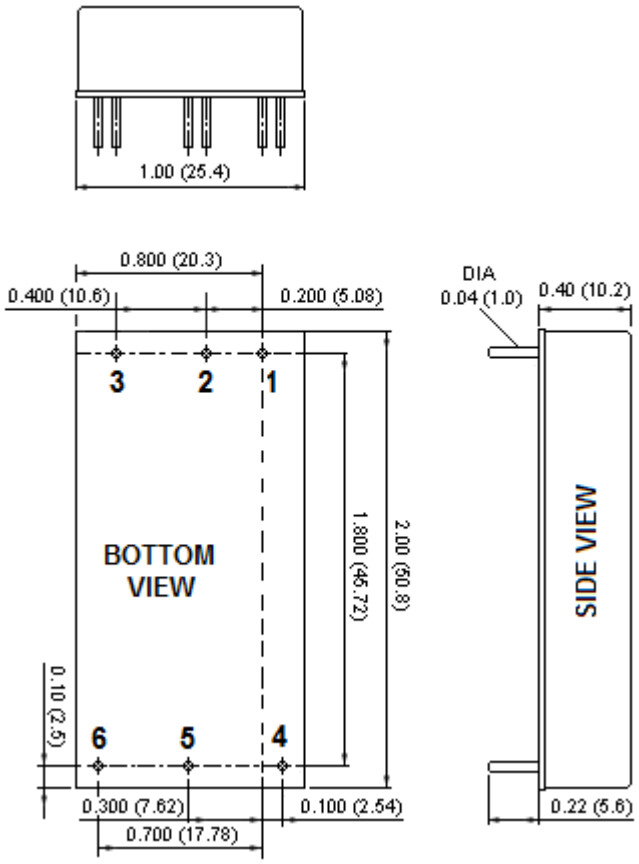
Dual Output	C1	C2 & C4
CB12Sxx-xxxx	10µF/25V 1812 MLCC	1000pF/2KV 1808 MLCC
CB24Dxx-xxxx	6.8µF/50V 1812 MLCC	1000pF/2KV 1808 MLCC
CB48Dxx-xxxx	2.2µF/100V 1812 MLCC	1000pF/2KV 1808 MLCC

Recommended EN55022 Class A Filter Circuit Layout



MECHANICAL DRAWING

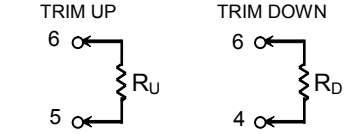
Unit: inches (mm)



PIN CONNECTIONS		
PIN	SINGLE OUTPUT	DUAL OUTPUT
1	+ INPUT	+ INPUT
2	-INPUT	-INPUT
3	CTRL	CTRL
4	+OUTPUT	+OUTPUT
5	-OUTPUT	COMMON
6	TRIM	-OUTPUT

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method shown below.



Single Output Models only

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)