



# DC-DC Converters

Mini Encapsulated - with screw terminals  
**REGULATED**  
 single & dual tracking outputs

- Shipped Within 3 Days
- One Year Warranty

RoHS  
 COMPLIANT



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- Fast Shipping? Acopian invented it! For over half a century, Acopian has built and shipped thousands of power supplies within 3-DAYS after receipt of order. And we still do today! View our 3-DAY Shipping Promise: [www.acopian.com/3dayship.html](http://www.acopian.com/3dayship.html)
- You ALWAYS talk to a real person when you call Acopian.
- Acopian power supplies last a *very long time!*
- You can email [3day@acopian.com](mailto:3day@acopian.com) anytime for 24/7 product support.
- The *Online System Builder* ([www.acopian.com/SystemBuilder](http://www.acopian.com/SystemBuilder)) is a convenient way to get your own custom power supply or power system (and they ship within 9 Days).
- You can order Acopian power supplies factory direct.
- ALL Acopian products are made in the USA.



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 Made in USA



## DC-DC Converters

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*single & dual tracking outputs*



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**These DC-DC Converters** have the versatility to be used in a broad range of applications. Threaded mounting holes permit them to be mounted to a chassis, cabinet wall or bracket, or they may be used on a test bench or tabletop. Screw terminals provide easy connection without sockets or soldering.

Input/output isolation prevents ground loops, and permits the use of inputs of either polarity; outputs of single output models may be used in either polarity and floated up to 500 volts above the input. Short circuit and thermal protection, and rugged encapsulated construction, assure years of reliable service.

### SPECIFICATIONS

**Input Voltage:** Nominal voltage  $\pm 10\%$ .

**Input Reflected Ripple:** 1%  $E_{in}$  (max.)

**Output Ripple** (@25 MHz bandwidth):  
 1 mV rms, 50 mV p-p (5-15V outputs).  
 1.5 mV rms, 75 mV p-p (18-28V outputs).

**Output Voltage Setting:** Outputs are factory preset to within  $\pm 1\%$  of the nominal output voltage.

**T/C terminal:** For single output models, the T/C terminal can be used to trim the output more precisely to the nominal voltage rating by connecting an external resistor from the T/C terminal to either the + or - terminal. For dual output models, the T/C terminal is the output common.

**Polarity:** The output of single output models may be connected in either polarity. Dual output models have a positive/common/negative output terminal configuration.

**Transient Response (NL-FL):** 50 microseconds.

**Overload/Short Circuit Protection:** Electronic current limiting with automatic recovery. All models have thermal protection with automatic reset.

**Input/Output Isolation:**

- Voltage: 500 Vdc
- Resistance: 100 megohms
- Capacitance: 100 pF

**Switching Frequency:** 20 kHz minimum.

**Temperature Coefficient:** 0.02%/°C (Typical).

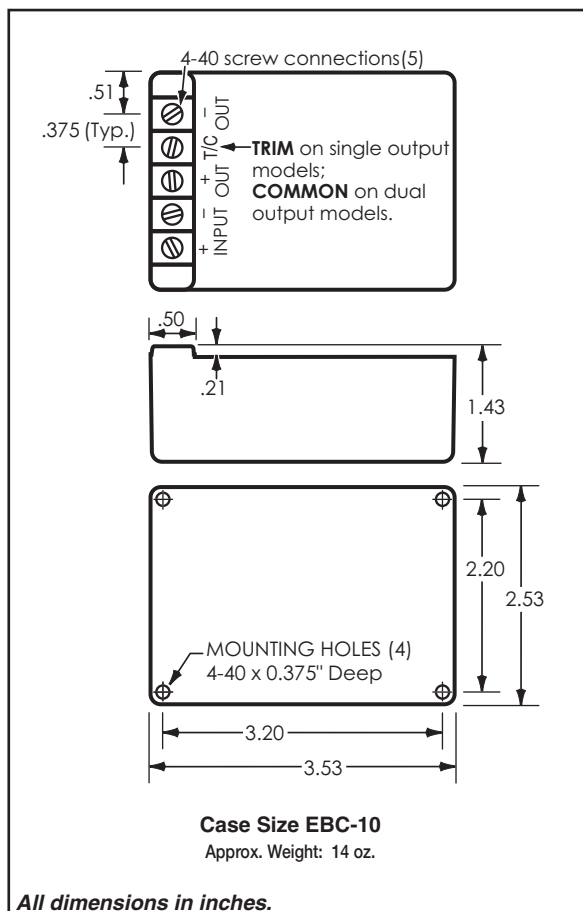
**Ambient Operating Temperature:** -20 to +71°C.

**Storage Temperature:** -40 to +85°C.

**Humidity:** 20% to 80% R.H. (non-condensing).

**Case Size:** EBC-10.

**Mounting:** Threaded mounting holes permit mounting to a chassis, cabinet wall or bracket, or they may be used on a test bench or tabletop. When wall-mounting or DIN rail mounting is desired, use accessory Mounting Kits on page H4.



## DC-DC Converters

Mini Encapsulated - with screw terminals

DC-DC CONVERTERS

### SINGLE OUTPUT, WITH SCREW TERMINALS

Nominal Input Voltage	Nominal Output Voltage	Output Current Amps. at			Regulation		(\$) Price	Model
		40°C	55°C	71°C	Load ±%	Line ±%		
5	5	2.50	2.25	2.00	.15	.02	155	5EB5E250
5	6	2.00	1.80	1.60	.15	.02	155	5EB6E200
5	8	1.50	1.35	1.20	.10	.02	155	5EB8E150
5	9	1.40	1.25	1.10	.10	.02	155	5EB9E140
5	10	1.30	1.15	1.00	.10	.02	155	5EB10E130
5	12	1.20	1.10	1.00	.05	.02	155	5EB12E120
5	13	1.10	1.00	.90	.05	.02	155	5EB13E110
5	15	1.00	.90	.80	.05	.02	155	5EB15E100
5	18	.80	.70	.60	.05	.02	155	5EB18E80
5	20	.70	.60	.50	.05	.02	155	5EB20E70
5	24	.60	.55	.50	.05	.02	155	5EB24E60
5	28	.50	.45	.40	.05	.02	155	5EB28E50
12	5	2.50	2.25	2.00	.15	.02	155	12EB5E250
12	6	2.00	1.80	1.60	.15	.02	155	12EB6E200
12	8	1.50	1.35	1.20	.10	.02	155	12EB8E150
12	9	1.40	1.25	1.10	.10	.02	155	12EB9E140
12	10	1.30	1.15	1.00	.10	.02	155	12EB10E130
12	12	1.20	1.10	1.00	.05	.02	155	12EB12E120
12	13	1.10	1.00	.90	.05	.02	155	12EB13E110
12	15	1.00	.90	.80	.05	.02	155	12EB15E100
12	18	.80	.70	.60	.05	.02	155	12EB18E80
12	20	.70	.60	.50	.05	.02	155	12EB20E70
12	24	.60	.55	.50	.05	.02	155	12EB24E60
12	28	.50	.45	.40	.05	.02	155	12EB28E50
15	5	2.50	2.25	2.00	.15	.02	155	15EB5E250
15	6	2.00	1.80	1.60	.15	.02	155	15EB6E200
15	8	1.50	1.35	1.20	.10	.02	155	15EB8E150
15	9	1.40	1.25	1.10	.10	.02	155	15EB9E140
15	10	1.30	1.15	1.00	.10	.02	155	15EB10E130
15	12	1.20	1.10	1.00	.05	.02	155	15EB12E120

Nominal Input Voltage	Nominal Output Voltage	Output Current Amps. at			Regulation		(\$) Price	Model
		40°C	55°C	71°C	Load ±%	Line ±%		
15	13	1.10	1.00	.90	.05	.02	155	15EB13E110
15	15	1.00	.90	.80	.05	.02	155	15EB15E100
15	18	.80	.70	.60	.05	.02	155	15EB18E80
15	20	.70	.60	.50	.05	.02	155	15EB20E70
15	24	.60	.55	.50	.05	.02	155	15EB24E60
15	28	.50	.45	.40	.05	.02	155	15EB28E50
24	5	2.50	2.25	2.00	.15	.02	155	24EB5E250
24	6	2.00	1.80	1.60	.15	.02	155	24EB6E200
24	8	1.50	1.35	1.20	.10	.02	155	24EB8E150
24	9	1.40	1.25	1.10	.10	.02	155	24EB9E140
24	10	1.30	1.15	1.00	.10	.02	155	24EB10E130
24	12	1.20	1.10	1.00	.05	.02	155	24EB12E120
24	13	1.10	1.00	.90	.05	.02	155	24EB13E110
24	15	1.00	.90	.80	.05	.02	155	24EB15E100
24	18	.80	.70	.60	.05	.02	155	24EB18E80
24	20	.70	.60	.50	.05	.02	155	24EB20E70
24	24	.60	.55	.50	.05	.02	155	24EB24E60
24	28	.50	.45	.40	.05	.02	155	24EB28E50
28	5	2.50	2.25	2.00	.15	.02	155	28EB5E250
28	6	2.00	1.80	1.60	.15	.02	155	28EB6E200
28	8	1.50	1.35	1.20	.10	.02	155	28EB8E150
28	9	1.40	1.25	1.10	.10	.02	155	28EB9E140
28	10	1.30	1.15	1.00	.10	.02	155	28EB10E130
28	12	1.20	1.10	1.00	.05	.02	155	28EB12E120
28	13	1.10	1.00	.90	.05	.02	155	28EB13E110
28	15	1.00	.90	.80	.05	.02	155	28EB15E100
28	18	.80	.70	.60	.05	.02	155	28EB18E80
28	20	.70	.60	.50	.05	.02	155	28EB20E70
28	24	.60	.55	.50	.05	.02	155	28EB24E60
28	28	.50	.45	.40	.05	.02	155	28EB28E50

120 to 180

See pages 38-39.

### DUAL TRACKING OUTPUTS

Nominal Input Voltage	Nominal Output Voltages	Amps. per Output at			Regulation		(\$) Price	Model
		40°C	55°C	71°C	Load ±%	Line ±%		
5	±10	.60	.55	.50	.05	.02	160	5EB10D60
5	±12	.60	.55	.50	.05	.02	160	5EB12D60
5	±15	.50	.45	.40	.05	.02	160	5EB15D50
5	±18	.40	.35	.30	.05	.02	160	5EB18D40
12	±10	.60	.55	.50	.05	.02	160	12EB10D60
12	±12	.60	.55	.50	.05	.02	160	12EB12D60
12	±15	.50	.45	.40	.05	.02	160	12EB15D50
12	±18	.40	.35	.30	.05	.02	160	12EB18D40
15	±10	.60	.55	.50	.05	.02	160	15EB10D60
15	±12	.60	.55	.50	.05	.02	160	15EB12D60

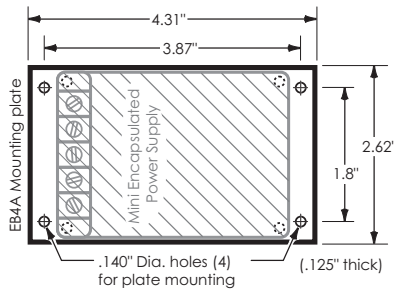
Nominal Input Voltage	Nominal Output Voltages	Amps. per Output at			Regulation		(\$) Price	Model
		40°C	55°C	71°C	Load ±%	Line ±%		
15	±15	.50	.45	.40	.05	.02	160	15EB15D50
15	±18	.40	.35	.30	.05	.02	160	15EB18D40
24	±10	.60	.55	.50	.05	.02	160	24EB10D60
24	±12	.60	.55	.50	.05	.02	160	24EB12D60
24	±15	.50	.45	.40	.05	.02	160	24EB15D50
24	±18	.40	.35	.30	.05	.02	160	24EB18D40
28	±10	.60	.55	.50	.05	.02	160	28EB10D60
28	±12	.60	.55	.50	.05	.02	160	28EB12D60
28	±15	.50	.45	.40	.05	.02	160	28EB15D50
28	±18	.40	.35	.30	.05	.02	160	28EB18D40

## Mounting Kits for 'Mini Encapsulated - with screw terminals' power supplies:

### WALL MOUNTING

**Model EB4A** . . . . . \$10

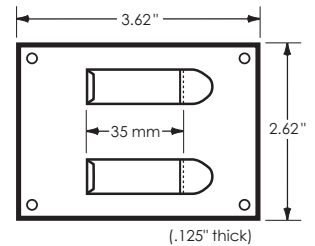
Use Mounting Kit EB4A to mount from the power supply side of the mounting surface, necessary when the other side of the mounting surface is inaccessible. This kit consists of an aluminum plate and four screws for attaching it to the power supply, effectively adding mounting flanges to any Mini Encapsulated power supply with screw terminals or any Mini DC-DC Converter with screw terminals.



### DIN RAIL MOUNTING

**Model EB35DIN** . . . . . \$15

Mounting Kit EB35DIN consists of an aluminum plate, with two DIN clips attached to it, and four screws for attaching the plate to the bottom of any Mini Encapsulated power supply with screw terminals or any Mini DC-DC Converter with screw terminals. The power supply can then be snapped onto a 35mm 'top hat' type of DIN rail.

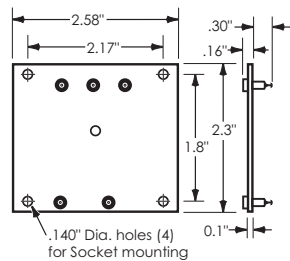


## Sockets for 'Mini Encapsulated - PC Board mounting' power supplies:

For use with PC board mounting Mini Linears and PC board mounting DC-DC Converters. Each of these sockets has a sturdy phenolic base with gold plated teflon-insulated contacts.

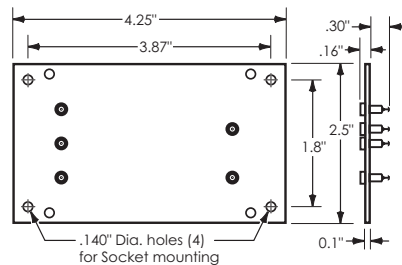
**Model ES-1** . . . . . \$40

For case sizes ES-10 and ESC-10



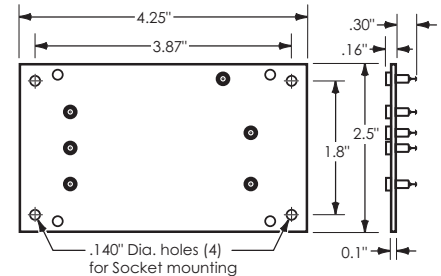
**Model EL-1** . . . . . \$40

For case sizes EL-10, EL-13, EL-20 and ELC-10



**Model ELW-1** . . . . . \$40

For case sizes ELW-13 and ELW-20

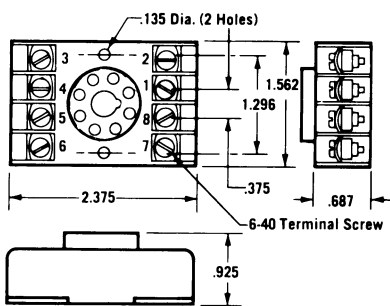


## Sockets for 'Plug-In' power supplies:

RETMA-numbered screw-type terminals simplify wiring and permit the use of wire terminals or bare wire, 12 to 20 guage. Rated at 300 volts RMS, 10 amp.

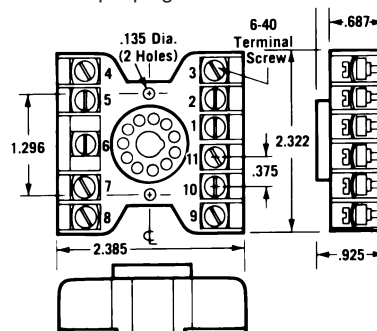
**Model SL608** . . . . . \$20

For 8-pin plugs.



**Model SL611** . . . . . \$20

For 11-pin plugs.



**ACOPIAN SELLS FACTORY DIRECT WORLDWIDE:** We do not use representatives or distributors. Contact Acopian for technical information or a quote.

**WARRANTY:** Acopian power supplies are warranted to be free from defects in material and workmanship for a period of five years (encapsulated devices, for one year) from date of original shipment. Acopian's obligation under this warranty is limited to repairing any power supply returned to the factory Service Department in Easton, PA or Melbourne, FL, and replacing any defective parts. Mini Encapsulated power supplies are not repairable. Authorization must be obtained from Acopian before a power supply may be returned for repair. Units must be well packed when shipping to Acopian; the repair of any damage incurred during shipment will be charged. Transportation charges are to be paid by the purchaser. A reinspection and handling charge will be applied to returned units found to have no defects. If a failure has been caused by misuse, operation in excess of specifications, or modification by the customer, repairs will be billed at cost; in such cases, a cost estimate will be submitted before work is started.

Acopian reserves the right to make changes or improvements in its products without incurring any obligation to install the same on products previously manufactured.

This warranty is in lieu of all other warranties, obligations, and liabilities, expressed or implied, and is the purchaser's exclusive remedy. Acopian makes no warranty, either express or implied, of merchantability, fitness for a particular purpose or otherwise. In no event shall Acopian be liable whether in contract, tort, or negligence, for special, indirect, incidental or consequential damages of any kind, including loss of business or profits, or any other losses incurred by the purchaser or any third party, the Customer's remedies being limited, at Acopian's option, to replacement, repair or credit at the price on the date of claim.

The validity, performance and construction of all terms and conditions and any sale made by Acopian shall be determined by the law of Pennsylvania, without regard to its conflict of law principles, and all parties to the transaction expressly consent to the jurisdiction of such courts and consent to the venue of the Court of Common Pleas for Northampton County, Pennsylvania.

**PRICES:** The prices shown are F.O.B. our factory; Easton, PA or Melbourne, FL. ('EXW Factory' if outside the 50 United States.) All prices and specifications are subject to change without notice.

**TERMS:** Net 30 days, subject to credit approval. Visa, MasterCard and American Express also accepted.

**SHIPPING:** Location permitting, small shipments are made by United Parcel Service, FedEx, DHL (international orders) or by Parcel Post; larger shipments, by insured motor freight collect. Shipments can be made by air upon request. Risk of loss shall be F.O.B. Our Factory, even in cases where freight may be prepaid or allowed to destination by Acopian. If equipment is received in damaged condition, it is the customer's responsibility to contact the carrier and file a claim for damages.

**TIME FOR DELIVERY:** The time for delivery quoted by Acopian is the time required to ship from our plants. We will not be liable for delays in delivery caused by any reason beyond our control, including but not limited to acts of God, casualty, civil disturbance, labor disputes, transportation or supply difficulties, or any interruption of our facilities, and the quoted time for delivery shall be extended during the continuance of such conditions and for a reasonable time thereafter. In no event will Acopian be liable for any premium transportation, reprourement, or similar costs incurred by the Customer as a result of conditions beyond Acopian's control resulting in Acopian's inability to deliver product in accordance with customer's requested delivery schedules.

**QUANTITY DISCOUNTS:** Discounts are available to quantity buyers and are dependent upon the order quantity and the manufacturing scheduling anticipated by the order, and apply only to the quantity and delivery ordered. Partial shipments are considered as separate orders for discounting purposes.

**EXPORT ORDERS:** A minimum export documentation charge of \$60.00 applies. (A minimum charge of \$25.00 applies on orders to certain U.S. territories requiring customs forms.)

**MOISTURE/FUNGUS PROOFING:** Power supplies can be furnished with a moisture and fungus resistant varnish applied to interior surfaces. To order, add the suffix letter F to the model number. This option requires two additional days and is not available on High Voltage, Mini Encapsulated, Rack Mounting, and Gold Box Switching models.

**TAGGING:** Add \$10.00 to price.

**TEST DATA:** Cost, \$35.00 or 2% of order, whichever is greater.

**SPECIAL MODELS/MODIFICATIONS:** Cataloged models can be altered at the factory to meet special requirements. Contact the Applications Engineering Department to discuss your needs.

**PARTS:** The designs used in Acopian power supplies utilize standard components to the greatest practical extent. When replacements are required, the types originally used, or their equivalents, can usually be obtained most quickly from a local electronic components distributor.

Special components, such as transformers, are stocked at the factory warehouses. Contact the Applications Engineering Department for information on the parts required, referencing the model number of the power supply, the circuit designation of the component, and a description.

**PURCHASE ORDER ACCEPTANCE:** Orders are accepted subject to Acopian's Terms and Conditions. Any Terms and Conditions of any Purchaser's order, agreement, or understanding which are in addition to or inconsistent with Acopian's shall not be binding upon Acopian unless made in writing and accepted over the signature of an authorized officer of Acopian. Orders shall not be considered accepted until entered into production at our plant. Acopian reserves the right to refuse any order. All typographical and clerical errors are subject to correction by Acopian.

**RETURNED GOODS:** Acopian products are built on a per-order basis, and ordinarily no credit can be extended for their return. No goods will be accepted for return unless authorized in writing by Acopian.

**CHANGES:** The customer may, by a written notice, request changes within the general scope of the order, in the drawings, designs or specifications; method of shipment; and place of delivery. If any such change causes an increase or decrease in the cost, or the time required for the processing of any part of the order, an equitable adjustment shall be made in the price or delivery schedule, or both, and the order shall be modified in writing accordingly.

**CANCELLATION:** Suspension or cancellation of orders may be made only upon our written approval and on terms that will indemnify us against all loss.

**OVERTIME:** It is anticipated that any order will be processed during regular working hours on regular working days. If for any reason the Purchaser requests Acopian to process the order, or any portion of it, outside of such regular working hours, any overtime or other additional expense occasioned thereby shall be billed to and paid by the Purchaser as an extra cost. Acopian reserves the right to decline to process the order outside regular working hours.

**CUSTOMER DELAY OF WORK:** If the performance of all or any part of the work is delayed or interrupted by Customer's failure to act within the time specified (or within a reasonable time if no time is specified) and such act is not expressed or implied by the order, an adjustment shall be made in the cost of performance of the order caused by such delay or interruption and the order modified in writing accordingly. Adjustment will also be made in the delivery or performance dates and any other contractual provisions affected by such delay or interruption.

**GOVERNMENT SPECIFICATIONS:** Pricing is based upon industrial-grade construction, marking, packing, and packaging. Exception is taken to any MIL specifications, and to any requirements for the use of special forms, documentation other than quoted, and Government Source Inspection. Acopian must decline to quote on any other basis.

**APPLICATIONS ASSISTANCE:** *Questions regarding the specifications, features, and use of any Acopian product should be directed to the Applications Engineering Department. A staff of power supply specialists will be pleased to assist you.*

**ACOPIAN IS AN ISO 9001 CERTIFIED COMPANY**