

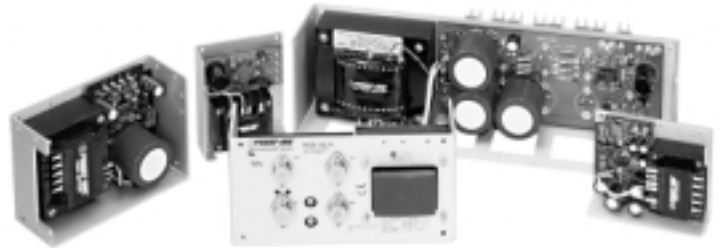
INTERNATIONAL SERIES LINEARS

Power-One produces the industry's broadest selection of linear power supplies with output voltages from 5 volts through 250 volts. Rugged technology and proven design merge to create quiet, highly regulated, dependable DC power.

The International Linear series is approved to domestic and international regulatory standards, and is CE Marked to the Low Voltage Directive (LVD).

FEATURES

- Worldwide AC Input Capabilities: 100/120/220/230/240 VAC
- ±0.05% Output Regulation
- Low Output Ripple
- UL, CSA, and TÜV Approvals
- Mean Time Before Failure (MTBF) in Excess of 300,000 Hours
- CE marked to Low Voltage Directive
- 100% Burn-In
- 2 Year Warranty
- Overvoltage Protection (OVP) Standard on 5V Single Outputs, Optional for other outputs under 48V



SINGLE OUTPUT MODELS

| VOLTAGE | MODEL | VOLTAGE/ CURRENT | CASE SIZE |
|---------|----------------------|---------------------------|--------------|
| 5V | HA5-1.5/OVP-A | 5V @ 1.5A (Note 1) | B |
| | HB5-3/OVP-A | 5V @ 3A (Note 1,5) | B |
| | HC5-6/OVP-A | 5V @ 6A (Note 1,5) | C |
| | HN5-9/OVP-A | 5V @ 9A (Note 1,5) | N |
| | HD5-12/OVP-A | 5V @ 12A (Note 1,5) | D |
| | HE5-18/OVP-A | 5V @ 18A (Note 1,5) | E |
| | F5-25/OVP-A | 5V @ 25A (Note 1,5,6,10) | F |
| | G5-35/OVP-A | 5V @ 35A (Note 1,5,6,10) | F |
| | CP197-A | 5V @ 50A (Note 1,5,6) | F |
| 12V | HA15-0.9-A | 12V @ 0.9A (Note 2) | B |
| | HB12-1.7-A | 12V @ 1.7A (Note 5) | B |
| | HC12-3.4-A | 12V @ 3.4A (Note 5) | C |
| | HN12-5.1-A | 12V @ 5.1A (Note 5) | N |
| | HD12-6.8-A | 12V @ 6.8A (Note 5) | D |
| | HE12-10.2-A | 12V @ 10.2A (Note 5) | E |
| | F15-15-A | 12V @ 16A (Note 2,5,6,10) | F |
| 15V | HA15-0.9-A | 15V @ 0.9A (Note 2) | B |
| | HB15-1.5-A | 15V @ 1.5A (Note 5) | B |
| | HC15-3-A | 15V @ 3A (Note 5) | C |
| | HN15-4.5-A | 15V @ 4.5A (Note 5) | N |
| | HD15-6-A | 15V @ 6A (Note 5) | D |
| | HE15-9-A | 15V @ 9A (Note 5) | E |
| | F15-15-A | 15V @ 15A (Note 2,5,6,10) | F |

| VOLTAGE | MODEL | VOLTAGE/ CURRENT | CASE SIZE |
|----------|---------------------|---------------------------|--------------|
| 24V | HA24-0.5-A | 24V @ 0.5A (Note 2) | B |
| | HB24-1.2-A | 24V @ 1.2A (Note 5) | B |
| | HC24-2.4-A | 24V @ 2.4A (Note 5) | C |
| | HN24-3.6-A | 24V @ 3.6A (Note 5) | N |
| | HD24-4.8-A | 24V @ 4.8A (Note 5) | D |
| | HE24-7.2-A | 24V @ 7.2A (Note 5) | E |
| | F24-12-A | 24V @ 12A (Note 2,5,6,10) | F |
| 28V | HA24-0.5-A | 28V @ 0.5A (Note 2) | B |
| | HB28-1-A | 28V @ 1A (Note 5) | B |
| | HC28-2-A | 28V @ 2A (Note 5) | C |
| | HN28-3-A | 28V @ 3A (Note 5) | N |
| | HD28-4-A | 28V @ 4A (Note 5) | D |
| | HE28-6-A | 28V @ 6A (Note 5) | E |
| | F24-12-A | 28V @ 10A (Note 2,5,6,10) | F |
| 48V | HB48-0.5-A | 48V @ 0.5A | B |
| | HC48-1-A | 48V @ 1A | C |
| | HD48-3-A | 48V @ 3A (Note 5) | D |
| | HE48-4-A | 48V @ 4A (Note 5) | E |
| 120V | HB120-0.2-A | 120V @ 0.2A | B |
| 175-210V | HB200-0.12-A | 175-210V @ 0.12A | B |
| 250V | HB250-0.1-A | 250V @ 0.1A | B |

- NOTES:** 1) Overvoltage protection provided. Set at 6.2V ±0.4V.
 2) Adjustable outputs: F15-15-A: 12-15V, F24-12-A: 24-28V, HA15-0.9-A: 12-15V, HA24-0.5-A: 24-28V.
 3) Nonadjustable 3 terminal regulator.
 4) Isolated outputs, can be referenced as positive (+) or negative (-).
 5) Remote sense provided.

- 6) With output inhibit and parallel operation master/slave capability.
 7) With output inhibit.
 8) Adjustable 3 terminal regulator.
 9) Can be made into an isolated output by removing jumper W1.
 10) Model requires 100 LFM forced air cooling above 75% of rated output power.

INTERNATIONAL SERIES LINEARS

DUAL OUTPUT MODELS

| VOLTAGE | MODEL | OUTPUT # 1 | OUTPUT # 2 | CASE SIZE |
|----------------------|-----------------------|--|---|-----------|
| ±5V | HAA5-1.5/OVP-A | +5V @ 1.5A (Note 1) | -5V @ 1.5A (Note 1) | AA |
| | HBB5-3/OVP-A | +5V @ 3A (Note 1) | -5V @ 3A (Note 1) | BB |
| | HCC5-6/OVP-A | 5V @ 6A (Note 1,4,5) | 5V @ 6A (Note 1,4,5) | CC |
| ± 12V | HAD12-0.4-A | +12V @ 0.4A (Note 3) | -12V @ 0.4A (Note 3) | B |
| ± 15V | HAD15-0.4-A | +15V @ 0.4A (Note 3) | -15V @ 0.4A (Note 3) | B |
| ±12V to ±15V | HAA15-0.8-A | +12V @ 1A or +15V @ 0.8A (Note 5) | -12V @ 1A or -15V @ 0.8 or -5V @ 0.4A (Note 5) | AA |
| | HBB15-1.5-A | +12V @ 1.7A or +15V @ 1.5A (Note 5) | -12V @ 1.7A or -15V @ 1.5A or -5V @ 0.7A (Note 5) | BB |
| | HCC15-3-A | +12V @ 3.4A or +15V @ 3A (Note 5) | -12V @ 3.4A or -15V @ 3A (Note 5) | CC |
| | HDD15-5-A | +12V or 15V @ 5A (Note 5) | (-)12V or 15V @ 5A | E |
| ±18V ±24V | HAA24-0.6-A | +18-20V @ 0.4A or +24V @ 0.6A | (-)18-20V @ 0.4A or -24V @ 0.6A | AA |
| | HBB24-1.2-A | +18-20V @ 0.9A or +24V @ 1.2A | (-)18-20V @ 0.9A or -24V @ 1.2A | BB |
| | HCC24-2.4-A | +18-20V @ 1.8A +24V @ 2.4A (Note 5) | (-)18-20V @ 1.8A -24V @ 2.4A (Note 5) | CC |
| 5V and 12V-15V | HAA512-A | 5V @ 2A (Note 1,4,5) | 12-15V @ 0.5A (Note 4) | AA |
| | HBB512-A | 5V @ 3A (Note 1,4,5) | 12-15V @ 1.25A (Note 4,5) | BB |
| | HCC512-A | 5V @ 6A (Note 1,4,5) | 12-15V @ 2.5A (Note 4,5) | CC |

TRIPLE OUTPUT MODELS

| MODEL | OUTPUT # 1 | OUTPUT # 2 | OUTPUT # 3 | CASE SIZE |
|--------------------|-----------------------|--|---|-----------|
| HTAA-16W-A | 5V @ 2A (Note 1,4) | +12 to 15V @ 0.4A | (-)12 to 15V @ 0.4A or -5V @ 0.4A | AA |
| HBAA-40W-A | 5V @ 3A (Note 1,4,5) | +12V @ 1A or +15V @ 0.8A (Note 5) | -12V @ 1A or -15V @ 0.8A or -5V @ 0.4A (Note 5) | BAA |
| HCAA-60W-A | +5V @ 6A (Note 1,5) | +12 to 15V @ 1A | (-)12 to 15V @ 1A or -5V @ 0.4A | D |
| HCBB-75W-A | 5V @ 6A (Note 1,4,5) | +12V @ 1.7A or +15V @ 1.5A (Note 5) | -12V @ 1.7A or -15V @ 1.5A or -5V @ 0.7A (Note 5) | CBB |
| CP131-A | 5V @ 8A (Note 1,4,5) | +12V @ 1.7A or +15V @ 1.5A (Note 5) | -12V @ 1.7A or -15V @ 1.5A or -5V @ 0.7A (Note 5) | 131 |
| HDBB-105W-A | 5V @ 12A (Note 1,4,5) | +12V @ 1.5A or +15V @ 1.5A (Note 5) | -12V @ 1.7A or -15V @ 1.5A or -5V @ 0.7A (Note 5) | DBB |
| HDCC-150W-A | 5V @ 12A (Note 1,4,5) | +12V @ 3.4A or +15V @ 3A (Note 5) | -12V @ 3.4A or -15V @ 3A | DCC |

- NOTES:**
- | | |
|---|--|
| 1) Overvoltage protection provided. Set at 6.2V ±0.4V. | 5) Remote sense provided. |
| 2) Adjustable outputs: F15-15-A: 12-15V, F24-12-A: 24-28V, HA15-0.9-A: 12-15V, HA24-0.5-A: 24-28V. | 6) With output inhibit and parallel operation master/slave capability. |
| 3) Nonadjustable 3 terminal regulator. | 7) With output inhibit. |
| 4) Isolated outputs, can be referenced as positive (+) or negative (-). | 8) Adjustable 3 terminal regulator |
| | 9) Can be made into an isolated output by removing jumper W1. |

INTERNATIONAL SERIES LINEARS HIGH PEAK MODELS

| MODEL | OUTPUT # 1 | OUTPUT # 2 | OUTPUT # 3 | OUTPUT #4 | CASE SIZE |
|-----------------|-----------------------|---------------------------------------|--|-------------------------------|-----------|
| CP323-A* | +5V @ 2A (Note 1) | +12 @ 4A (Note 7) | | | N |
| CP205-A* | +5V @ 1A (Note 1) | -5V @ 0.5A (Note 1) | 24V @ 1.5A/ or 1.7A @ PK (Note 4) | | BAA |
| CP162-A* | +5V @ 3A (Note 1,5) | -5V @ 0.6A (Note 1) | 24V @ 5A/ or 6APK (Note 4,5) | | CP131 |
| CP510-A* | +5V @ 6A (Note 1) | +12V @ 2.5A/ 7.5APK | | | CP510-A |
| CP379-A* | +5V @ 6A (Note 1,5,9) | -5V @ 1.2A or -12V @ 1.2A (Note 8) | 24V @ 3.5A/ 8APK (Note 4,5) | | CP131 |
| CP498-A* | +5V @ 6A (Note 1,5) | +12V @ 5A/10APK (Note 5) | 12V @ 0.5A or 5V @ 0.25A (Note 4,8) | | CP131 |
| CP503-A* | +5V @ 6A (Note 1) | +12V @ 1A | -12V @ 1A or -5V @ 0.5A | +24V @ 2.4A/ 4APK (Note 9) | CP131 |

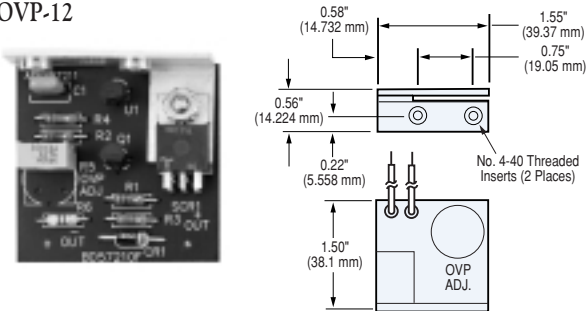
- NOTES:** 1) Overvoltage protection provided. Set at 6.2V ±0.4V.
 2) Adjustable outputs: F15-15-A: 12-15V, F24-12-A: 24-28V, HA15-0.9-A: 12-15V, HA24-0.5-A: 24-28V.
 3) Nonadjustable 3 terminal regulator.
 4) Isolated outputs, can be referenced as positive (+) or negative (-).
 5) Remote sense provided.
 6) With output inhibit and parallel operation master/slave capability.
 7) With output inhibit.
 8) Adjustable 3 terminal regulator
 9) Can be made into an isolated output by removing jumper W1.
 * Non-stocked standards

OVERVOLTAGE PROTECTION OPTIONS

OVERVOLTAGE PROTECTION OPTIONS

These optional overvoltage protection modules are offered for use with Power-One's International Series Linear power supplies. Each is user adjustable from 6.4V to 34V.

OVP-12

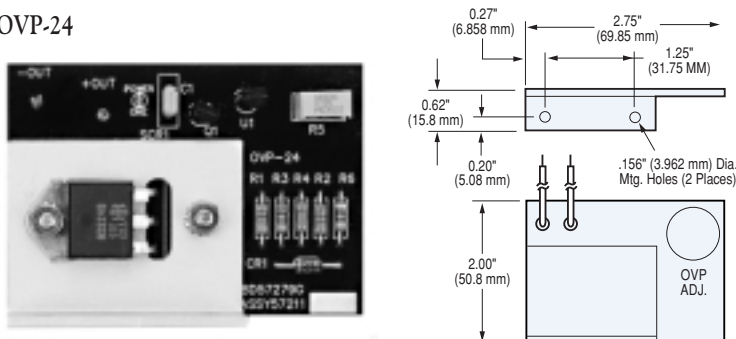


OVP SELECTION GUIDE

| MODEL | CASE SIZE | OVP MODULES REQUIRED |
|----------------------------|--------------|---|
| SINGLE OUTPUT | B,C,N,D | (1) OVP-12 |
| | E,F | (1) OVP-24 |
| DUAL OUTPUT | AA,B,BB,CC | (1) OVP-12 protects both outputs |
| | E | (1) OVP-24 protects both outputs |
| TRIPLE OUTPUT | AA,BAA,D | (1) OVP-12 protects both 12V through 15V outputs |
| | CBB, 131 | |
| | DBB,DCC | |
| PEAK CURRENT MODELS | N,BAA,CBB | (1) OVP-12 protects any output not provided with built-in OVP |
| | 131, CP340-A | |
| | CP510-A | |

NOTE: Outputs with factory built-in OVP are indicated in the Voltage/Current Rating Chart for each model. OVP is not available for 48V through 250V models.

OVP-24



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INTERNATIONAL SERIES LINEARS

INPUT SPECIFICATIONS

| PARAMETER | CONDITIONS/DESCRIPTION | MIN | NOM | MAX | UNITS | |
|-----------------------------------|--|-------------|-------|-----|-------|-----|
| Input Voltage - AC (Note 1, 2) | Jumper selectable, shipped factory configured for 120VAC operation. All models must be correctly fused for proper operation. | 100 VAC Tap | 87 | 100 | 110 | VAC |
| | | 120 VAC Tap | 104 | 120 | 132 | |
| | | 220 VAC Tap | 191 | 220 | 242 | |
| | | 240 VAC Tap | 209 | 240 | 264 | |
| Input Frequency | AC input. | 47 | | 63 | Hz | |
| Line Regulation | Output voltage change for a 10% line change: F case models. HAD12, HAD15. Outputs with adjustable three terminal regulators. All other models. | | -0.01 | | +0.01 | % |
| | | | -1.0 | | +1.0 | |
| | | | -0.5 | | +0.5 | |
| | | | -0.05 | | +0.05 | |

NOTES: 1) Derate output current 10% for 50Hz operation.
2) Input voltage tolerance for 230VAC operation is +15%, -10%.

OUTPUT SPECIFICATIONS

| PARAMETER | CONDITIONS/DESCRIPTION | MIN | NOM | MAX | UNITS | |
|------------------------------|--|--|-------|-----|---------------------|---|
| Output Adjustment | Minimum output adjustment range (Note 1). | -5 | | +5 | % | |
| Efficiency | 5 volt outputs. | | 45 | | % | |
| | 12 volt and 15 volt outputs. | | 55 | | | |
| | 24 volt and higher outputs. | | 60 | | | |
| Ripple and Noise (Note 2) | F case models. | | | 3.0 | mV _{PK-PK} | |
| | 5 volt, 12 volt, and 15 volt models. | | | 5.0 | mV _{PK-PK} | |
| | All three terminal regulator outputs. | | | 0.2 | % _{PK-PK} | |
| | 24 volt through 250 volt models. | 3.0mV _{PK-PK} plus 0.02% of output voltage, max | | | | |
| Load Regulation | Output change for a 50% load change: F case models. HAD12, HAD15. Outputs with adjustable three terminal regulators. All other models. | | -0.02 | | +0.02 | % |
| | | | -1 | | +1 | |
| | | | -0.5 | | +0.5 | |
| | | | -0.05 | | +0.05 | |
| Transient Response | Recovery time, to within 1% of initial set point due to a 50% load change. | | | 50 | μS | |

NOTES: 1) Voltages from 3 terminal regulator outputs are not adjustable on HAD12 and HAD15.
2) Full load, 20MHz bandwidth.

SAFETY, REGULATORY, AND EMI SPECIFICATIONS

| PARAMETER | CONDITIONS/DESCRIPTION | MIN | NOM | MAX | UNITS |
|------------------------------|---|------|-----|-----|---|
| Agency Approvals | UL1950. | | | | Approved |
| | CSA 1402 or CSA 22.2 No. 234/950. | | | | |
| | EN60950 (TÜV). | | | | |
| Dielectric Withstand Voltage | Input to output. | 3750 | | | V _{RMS} |
| | Input to ground. | 3750 | | | |
| Electromagnetic Interference | FCC CFR title 47 Part 15 Sub-Part B - conducted. EN55022 / CISPR 22 conducted. EN55022 / CISPR 22 radiated. | | | | Compatible with system compliance to Level B. |
| Leakage Current | Per EN60950 (264VAC) | | 23 | 50 | μA |

INTERFACE SIGNALS AND INTERNAL PROTECTION

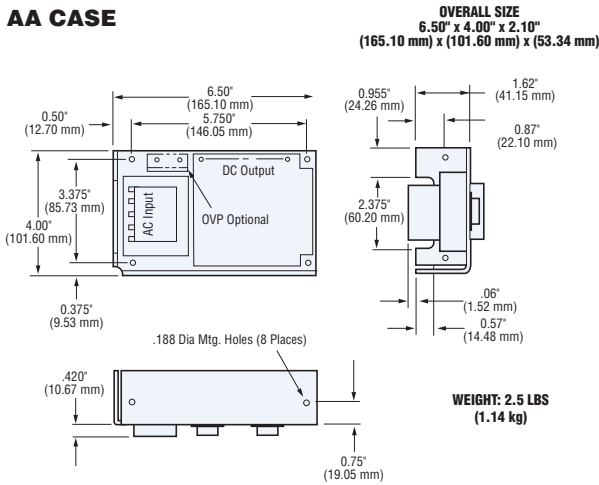
| PARAMETER | CONDITIONS/DESCRIPTION | MIN | NOM | MAX | UNITS |
|--------------------------------------|--|-----|-----|-----|-------|
| Overvoltage Protection | Provided on 5 volt output units where indicated. Other outputs may use optional overvoltage protectors OVP-12 and OVP-24. | 5.8 | | 6.6 | V |
| Remote Sense | Total voltage compensation for cable losses with respect to the main output. Provided on models where indicated. | | | 250 | mV |
| Overcurrent/Short Circuit Protection | Automatic current limit/foldback. Rated as a percentage of output power. | 115 | 120 | 140 | % |
| Master/Slave Operation | For parallel operation of up to 6 units. Master/slave pin provided on F case models only. Contact factory for application notes. | | | | |

ENVIRONMENTAL SPECIFICATIONS

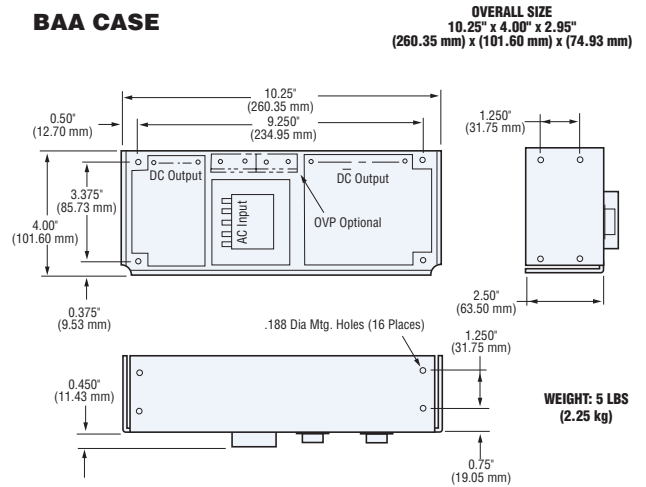
| PARAMETER | CONDITIONS/DESCRIPTION | MIN | NOM | MAX | UNITS |
|-------------------------|--|-----|------|------|-------|
| Operating Temperature | Derate output power linearly above 50°C by 3% per °C. At 100% load At 40% load | 0 | | 50 | °C |
| | | | | 70 | °C |
| Storage Temperature | | -40 | | 85 | °C |
| Temperature Coefficient | 0°C to 50°C (after 15 minute warm-up). 24 hours after warm-up. | | 0.1 | 0.3 | %/°C |
| | | | -0.3 | +0.3 | % |
| Shock | Operating. | | | 20 | GPK |
| Vibration | Random vibration from 10Hz to 2kHz, 3 axis. | | | 6.15 | GRMS |

INTERNATIONAL SERIES LINEARS

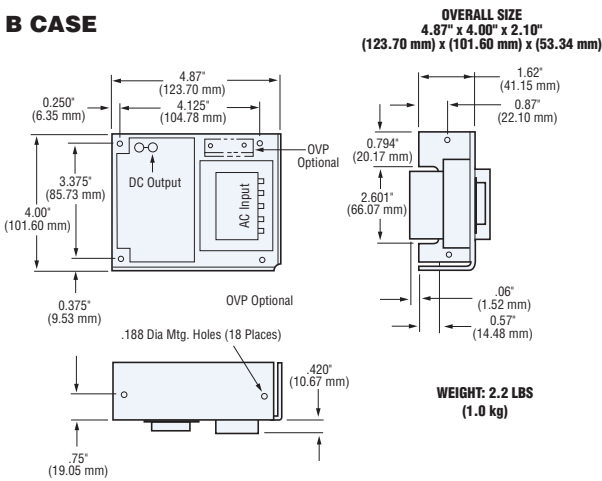
AA CASE



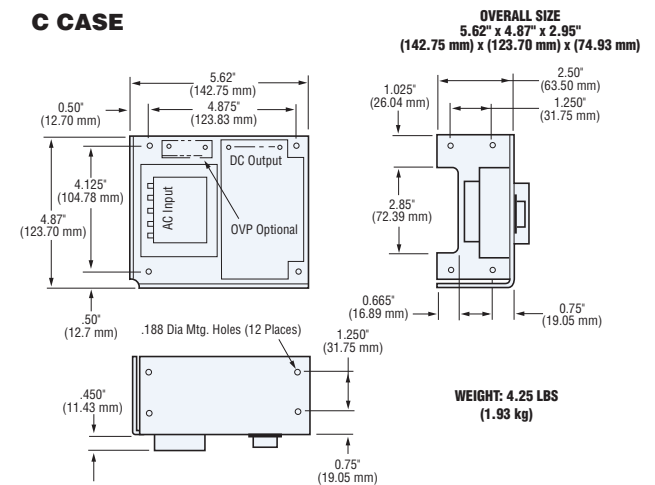
BAA CASE



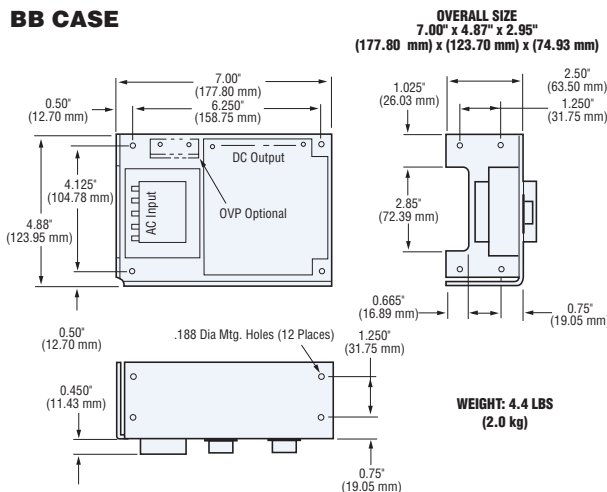
B CASE



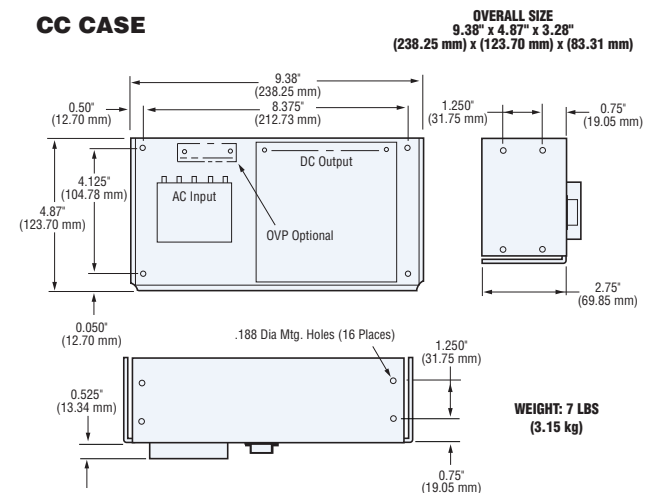
C CASE



BB CASE



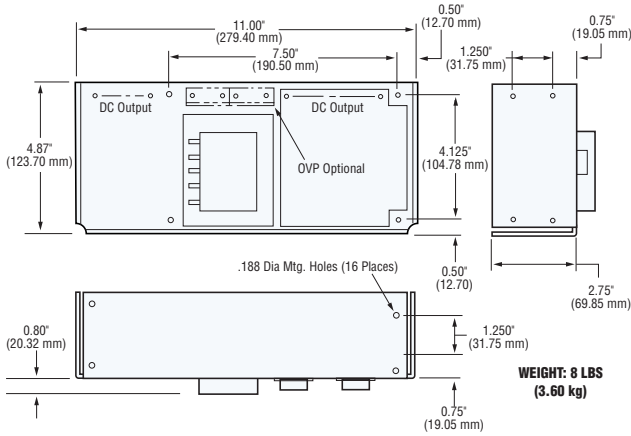
CC CASE



INTERNATIONAL SERIES LINEARS

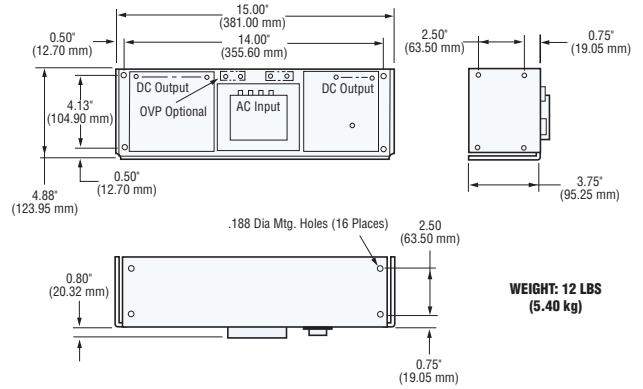
CBB CASE

OVERALL SIZE
11.00" x 4.87" x 3.28"
(279.40 mm) x (123.70 mm) x (83.91 mm)



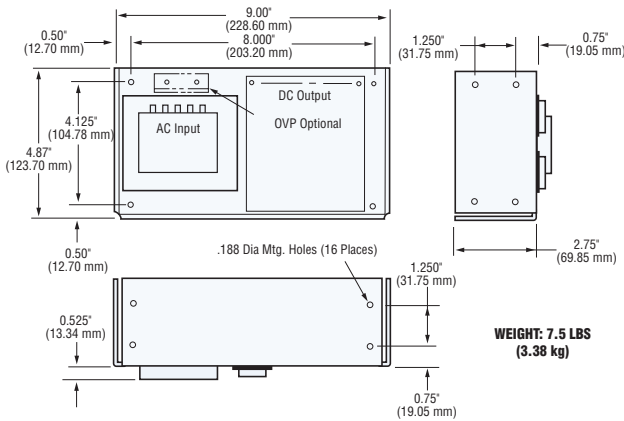
DCC CASE

OVERALL SIZE
15.00" x 4.88" x 4.55"
(381.00 mm) x (123.95 mm) x (115.57 mm)



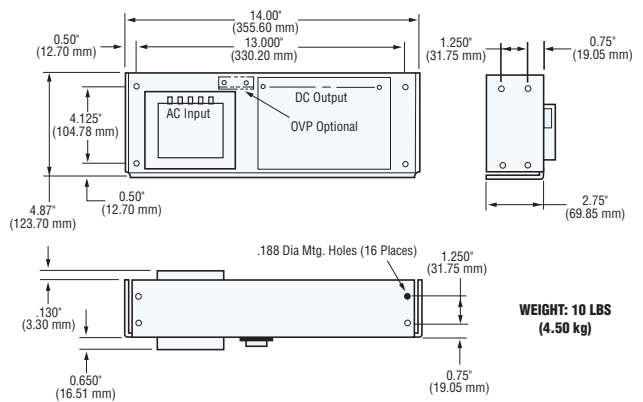
D CASE

OVERALL SIZE
9.00" x 4.87" x 3.28"
(228.60 mm) x (123.70 mm) x (83.31 mm)



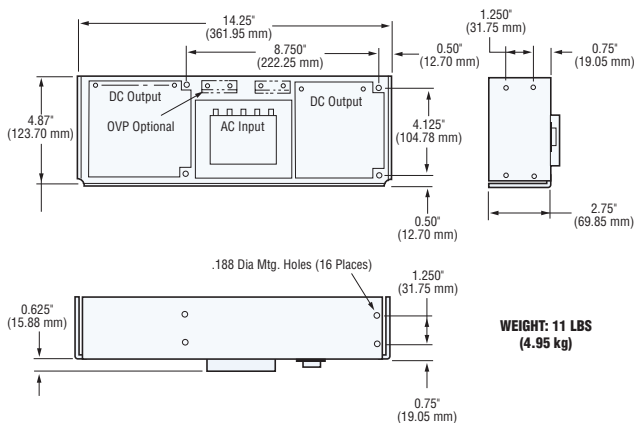
E CASE

OVERALL SIZE
14.00" x 4.87" x 3.53"
(355.60 mm) x (123.70 mm) x (89.66 mm)



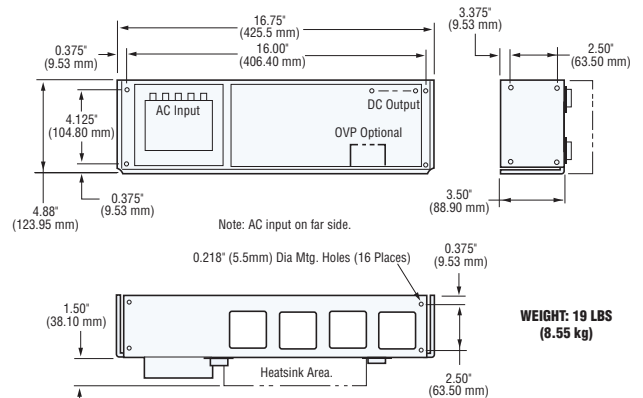
DBB CASE

OVERALL SIZE
14.25" x 4.87" x 3.38"
(361.95 mm) x (123.70 mm) x (85.85 mm)



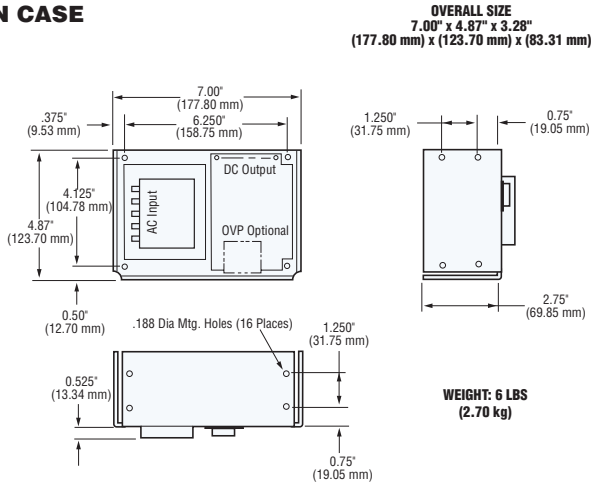
F CASE

OVERALL SIZE
16.75" x 4.88" x 5.00"
(425.5 mm) x (123.95 mm) x (127.00 mm)

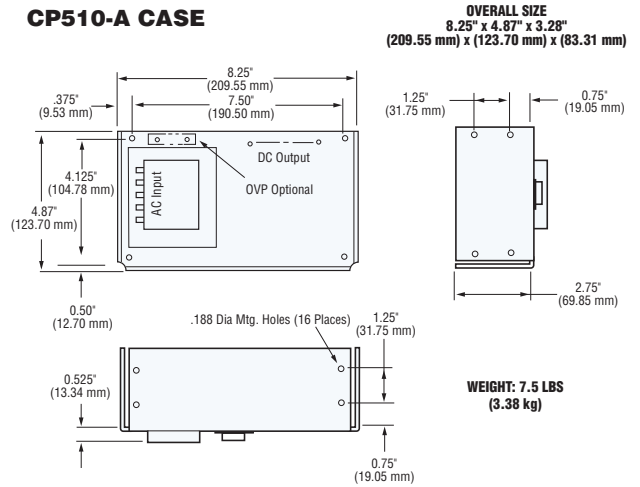


INTERNATIONAL SERIES LINEARS

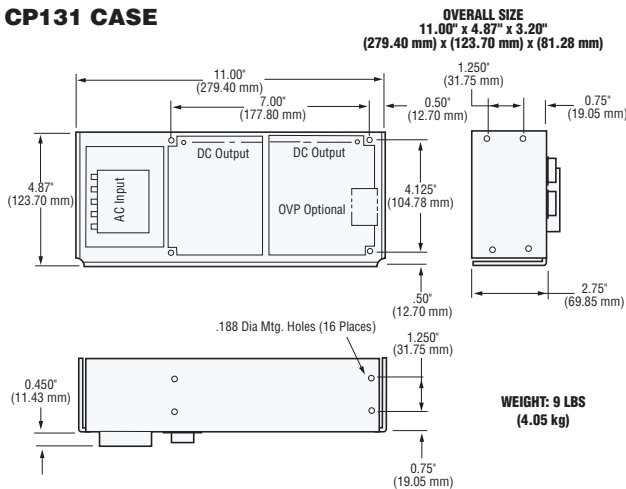
N CASE



CP510-A CASE



CP131 CASE



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