

POWER

LCC600

600 Watts Conduction Cooling

Data Sheet

Total Power: 600 W
of Outputs: Single
Outputs: 12, 28, 36, 48 Vdc

SPECIAL FEATURES

- 600 W full power at elevated temperatures
- Wide operating temperature range (-40 °C to 85 °C baseplate)
- Adjustable output
- Remote output On/Off
- AC_OK; DC_OK signals
- 5 V standby voltage
- Active current share
- Conduction-cooled/fanless
- I²C / PMBus
- Medical and ITE Safety³
- Suited for BF-type applications
- Active power factor correction
- Optional IP65 variant
- Optional 277 Vac input variant

COMPLIANCE

- EMI Class B
- EN61000 Immunity

SAFETY

- UL + CSA:** 62368-1 2nd Ed.
ANSI ES60601-1³
UL 8750⁵
CSA-C22.2 No. 250.13⁵
- TÜV:** 62368-1 2nd Ed.
60601-1 3rd Ed.³
EN 61347-1; -2-13⁵
- CB Scheme:** IEC 60950-1
IEC 60601-1
IEC 61347-1; -2-13⁵
- China** CCC
- CE Mark**



Electrical Specifications

| Input | | | | | | | | | | | | | |
|-------------------------------|---|-----------|----------|----------|----------|---------------------|-----------|--------------|---------------------|-----------|--------------|---------------------|-----------|
| Input range | U Suffix: 90 - 264 Vac (Safety rating: 100 - 240 Vac) 127 - 374 Vdc ⁴ H Suffix: 180 - 305 Vac (Safety rating: 200 - 277 Vac) 254 - 420 Vdc ⁴ | | | | | | | | | | | | |
| Frequency | 47 - 63 / 440 Hz (Safety rating: 50/60 Hz) | | | | | | | | | | | | |
| Input fusing | Internal fuse on both L and N lines (12.5 A - U suffix; 7 A - H suffix) | | | | | | | | | | | | |
| EMI/RFI | FCC Class B, CISPR22/EN55022 Class B | | | | | | | | | | | | |
| MIL-STD-461F EMI ¹ | Compliance to CE101, 102; CS101, 114, 115, 116 (with external filter ¹) | | | | | | | | | | | | |
| Inrush current | ≤ 25 A peak | | | | | | | | | | | | |
| Power factor | 0.99 typical | | | | | | | | | | | | |
| Harmonics | Meets EN61000-3-2 Class A and Class C ² | | | | | | | | | | | | |
| Input current | < 10 Arms @ 100 Vac | | | | | | | | | | | | |
| Hold up time | 20 ms min for Main Output (230 Vac) @ 100% Load | | | | | | | | | | | | |
| Efficiency | 93.3% typical @ 230 Vac; 100% Load; 28 Vdc | | | | | | | | | | | | |
| Leakage current ³ | U Suffix: 115 µA typical (< 200 µA max per ANSI/ES60601-1 264 Vac split-phase / 60 Hz) 387 µA typical (< 500 µA max per IEC60601-1; 264 Vac / 50Hz) H Suffix: 0.2 mA typical (< 3.5 mA max per ITE 62368-1 Standard) | | | | | | | | | | | | |
| Isolation voltage | <table border="0"> <tr> <td></td> <td>U Suffix</td> <td>H Suffix</td> </tr> <tr> <td>PRI-SEC:</td> <td>4,000 Vac (2X MOPP)</td> <td>3,000 Vac</td> </tr> <tr> <td>PRI-Chassis:</td> <td>1,500 Vac (1X MOPP)</td> <td>2,000 Vac</td> </tr> <tr> <td>SEC-Chassis:</td> <td>1,500 Vac (1X MOPP)</td> <td>1,500 Vac</td> </tr> </table> | | U Suffix | H Suffix | PRI-SEC: | 4,000 Vac (2X MOPP) | 3,000 Vac | PRI-Chassis: | 1,500 Vac (1X MOPP) | 2,000 Vac | SEC-Chassis: | 1,500 Vac (1X MOPP) | 1,500 Vac |
| | U Suffix | H Suffix | | | | | | | | | | | |
| PRI-SEC: | 4,000 Vac (2X MOPP) | 3,000 Vac | | | | | | | | | | | |
| PRI-Chassis: | 1,500 Vac (1X MOPP) | 2,000 Vac | | | | | | | | | | | |
| SEC-Chassis: | 1,500 Vac (1X MOPP) | 1,500 Vac | | | | | | | | | | | |

¹Artesyn Filter PN: 700-014447-0000 (Zhongguang PN: ZGLPG-10-02M).

²Meets Class C ≥ 50% load.

³U suffix have both ITE and Medical Safeties. H suffix carries ITE approval only.

⁴DC input rating not part of product's Safety approval.

⁵LED Lighting approvals apply to all 48 V output variants.

** LCC600 tested according to the medical standard IEC 60601-1-2 4th Edition.

Electrical Specifications

| Output | | |
|-------------------------------|---|---|
| Output rating | See Ordering Information table | |
| Standby output | 5.0 Vdc @ 1.5 A Max | |
| Set point | ± 0.5% | Factory set point |
| Total regulation | Main Output: ± 2.0% 5 Vsb: ± 5% | Combined Line / Load / Temperature |
| Rated load | 600 W maximum | 600 W from -40 °C to 85 °C Baseplate Temp. Derate output to 28 W @ 95 °C Baseplate Temp |
| Minimum load | 0 A | For both Main and 5 Vsb Outputs |
| Output voltage adjust range | See Ordering Information table | Max power limited to 600 W |
| Output noise | Main Output: 1.0% max p-p 5 Vsb: 60 mV max p-p | Measured with 0.1 µF Ceramic and 10 µF Tantalum Cap, 20 MHz BW |
| Remote sense | Compensation up to 500 mV | Pin 10: +Vout_RS / Pin4: -Vout_RS |
| Overcurrent protection | 105 - 130% of full load current | Default is Shutdown mode with Auto-retry every 2-4 sec. Output latches after 20 sec of continuous OCP fault presence. Restart after latch possible through AC recycle, Inhibit toggle or through PMBus. |
| Overvoltage protection | 125 - 145% Vo, nom Main Output 125 - 130% 5 Vsb | Latching / AC Recycle or Inhibit toggle required for PSU restart |
| Overtemperature protection | > 95 °C Baseplate temperature | Output Shutdown / Auto-recovery |
| AC_OK | Open Collector; 0.8 Vdc max / 10 mA | Active low when AC is present |
| DC_OK | Open Collector; 0.8 Vdc max / 10 mA | Active low when Main Output is within regulation |
| Remote inhibit | Contact Closure | Pin 19: Open/Float = ON; Close/Ground = OFF |
| # Units in parallel operation | Qualified up to 5 units in parallel. Consult factory if more than 5 are required. | Pin 5: IShare pin for main output only. |
| Output dimming | 0-10 Vdc external voltage; 0-100 kOhm external resistance | Consult with productsupport.ep@artesy.com |

Environmental Specifications

| | |
|-----------------------------|---|
| Operating temperature range | -40 °C to +85 °C Baseplate temperature |
| Storage temperature | -40 °C to +85 °C |
| Humidity | 10% to 95% |
| Altitude | 16,402 ft (Operating) / 50,000 ft (Non-Operating) |
| Shock | MIL-STD-810F 516.5 Procedure I, VI |
| Vibration | MIL-STD-810F 514.5 Cat. 4, 10 |
| Ingress protection | IP65 (for suffix "-4P") |
| MTBF (calculated) | >2M Hrs, 25 °C per SR-332 Issue 3 |
| Electromagnetic immunity | Designed to meet EN61000-4-3, -4, -5, -8, -11 (Level 3); EN61000-4-2 (Level 4); EN60601-1-2 and EN55024 |
| | For H suffix, Level 4 for EN61000-4-5 |

Ordering Information

| Model Number* | AC Input | Output Setpoint | Setpoint Tolerance | Output Current [A] | | Max O/P Power [W] | Typical Efficiency** | Standby Output | Combined Line/Load Regulation | Output Ripple |
|-------------------------------|-----------|-----------------|--------------------|--------------------|-------|-------------------|----------------------|----------------|-------------------------------|---------------|
| | | | | Min | Max | | | | | |
| LCC600-48U-4PD ⁽¹⁾ | 90 - 264 | 54 V | ±0.5% | 0 | 11.1 | 600 | 93.0% | 5 Vdc @ 1.5 A | 2% | 1% |
| LCC600-48U-9P | 90 - 264 | 48 V | ±0.5% | 0 | 12.5 | 600 | 93.0% | 5 Vdc @ 1.5 A | 2% | 1% |
| LCC600-48H-9P | 180 - 305 | | | | | | | | | |
| LCC600-36U-9P | 90 - 264 | 36 V | ±0.5% | 0 | 16.7 | 600 | 92.0% | 5 Vdc @ 1.5 A | 2% | 1% |
| LCC600-36H-9P | 180 - 305 | | | | | | | | | |
| LCC600-28U-9P24 | 90 - 264 | 24 V | ±0.5% | 0 | 25 | 600 | 93.0% | 5 Vdc @ 1.5 A | 2% | 1% |
| LCC600-28U-9P | 90 - 264 | 28 V | ±0.5% | 0 | 25*** | 600 | 93.5% | 5 Vdc @ 1.5 A | 2% | 1% |
| LCC600-28H-9P | 180 - 305 | | | | | | | | | |
| LCC600-12U-9P | 90 - 264 | 12 V | ±0.5% | 0 | 50 | 600 | 92.3% | 5 Vdc @ 1.5 A | 2% | 1% |
| LCC600-12H-9P | 180 - 305 | | | | | | | | | |

*Change suffix "-9P" to "-4P" for IP65 rated enclosure with fly lead wires

*Change suffix "-4P" to "-4PR" for IP65 rated enclosure with right angle fly lead wires (applies to 28, 36, 48 Vdc)

*Change suffix "-4P" to "-4PV" to omit the control cable (applies to 28, 36, 48 Vdc)

*Add suffix "24" after "P" to designate output voltage factory set to 24V (only on 28V models like LCC60028H-4P24CC)

*Add suffix "CC" for Constant Current setting (e.g. "-4PCC"; "-9PCC").

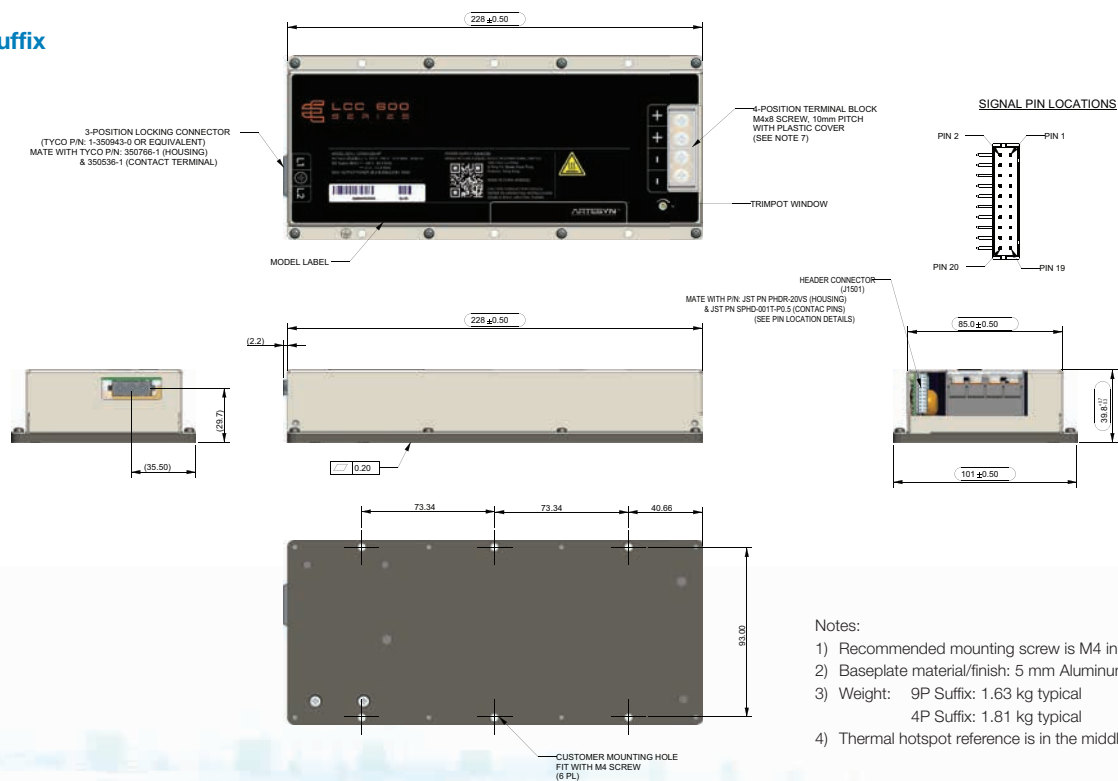
**Typical efficiency at high line, factory default voltage and full load

***When Vout is adjusted down to 24 V, the supply can deliver 25 A max (600 W max). At 28 V default output setting, max lout is 21.43 A (600 W max).

⁽¹⁾ "D" suffix for 0-10 Vdc analog external volatge dimming (11.1 A CC limit). Consult Technical Reference Notes for additional details.

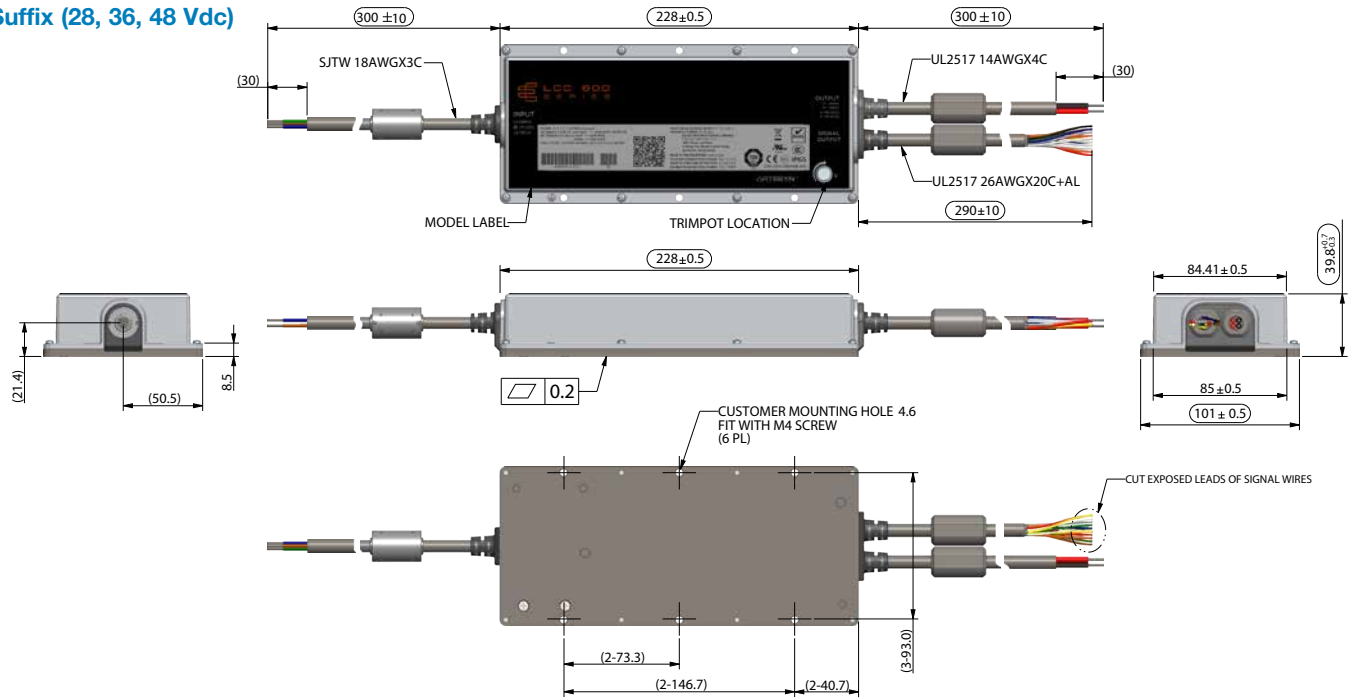
Mechanical Drawings

-9P Suffix

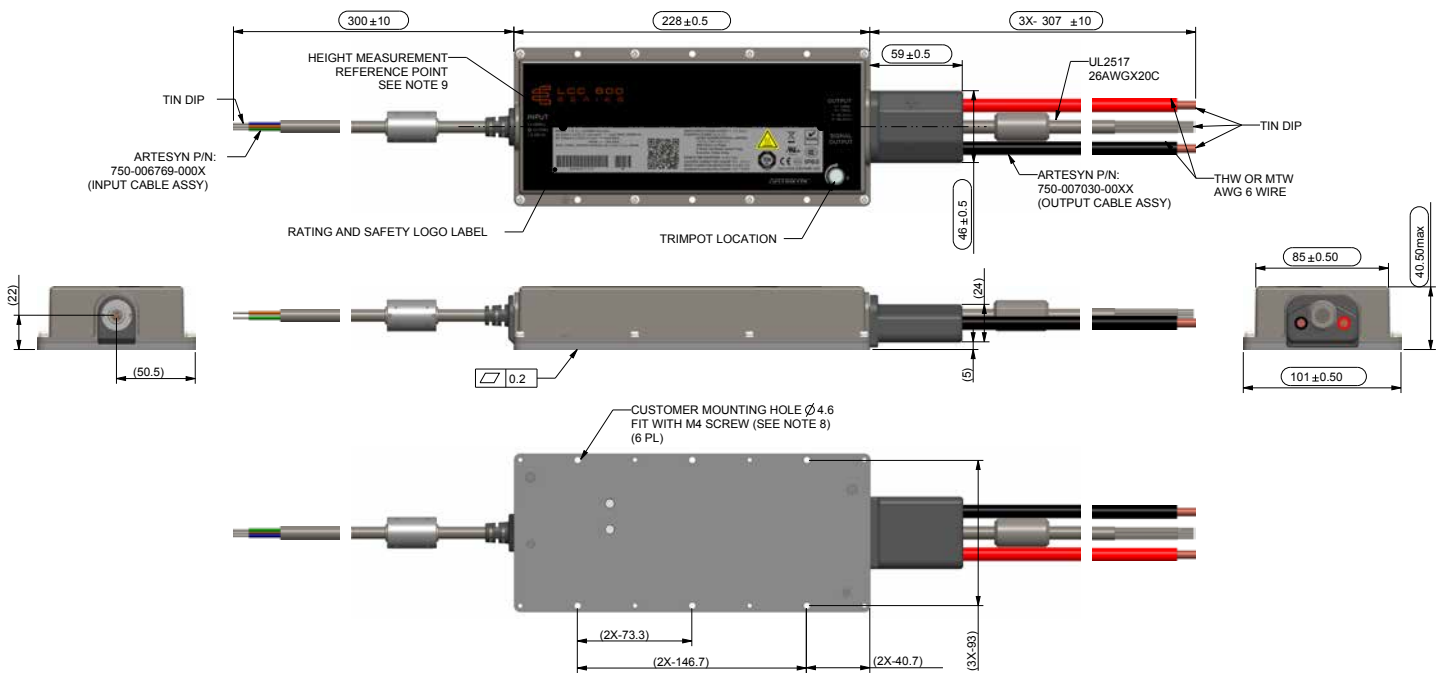


Mechanical Drawings

-4P Suffix (28, 36, 48 Vdc)

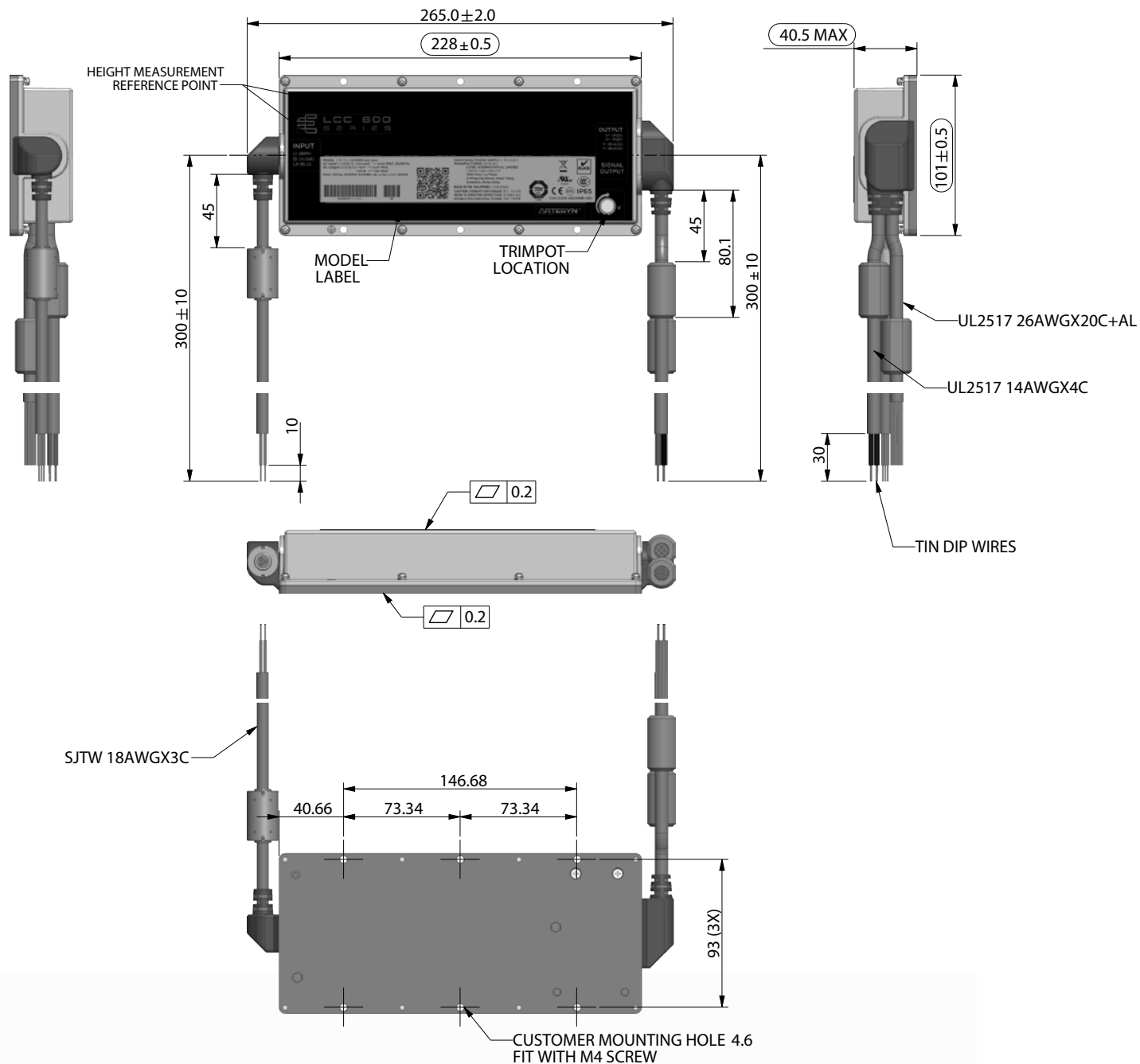


-4P Suffix (12 Vdc)



Mechanical Drawings

-4PR Suffix (28, 36, 48 Vdc)



Pin Assignment (INPUT)

| DESCRIPTION | -9Px Suffix | | -4Px Suffix | |
|-------------|-------------|--|-------------|---|
| | DESIGNATION | NOTES | DESIGNATION | NOTES |
| Live | L1 | Mating Connector: 350766-1 (Housing); 350536-1 (Contact Terminals) | Brown | SJTW 18AWGX3C; PVC jacket; 105 °C / 300 V |
| Neutral | L2 | | Blue | |
| Ground | G | | Y/GR | |

Pin Assignment (MAIN OUTPUT)

| DESCRIPTION | -9Px Suffix | | -4Px Suffix (28, 36, 48 Vdc) | | -4Px Suffix (12 Vdc) | |
|---------------------------|-------------|--|------------------------------|--|----------------------|---|
| | DESIGNATION | NOTES | DESIGNATION | NOTES | DESIGNATION | NOTES |
| Main Output | +Vout | 4 Position Terminal Block: M4 Screw/10mm Pitch; 12kgf-cm Torque; Accepts 14-16AWG Ring Tongue - Spade Terminals MOLEX BB-124-08 (19141- 0058) or EQUIVALENT | Red | 14AWGX4C; PVC jacket; 105 °C / 300 V | Red | 6AWG Multi-Strand; PVC jacket; 105 °C / 600 V |
| Main Output Return GND | -Vout | | Black | | Black | |
| | | | Black | | | |

Pin Assignment

| J1501 - Signal & Control | | -9Px Suffix | | -4Px Suffix | |
|--------------------------|--|-------------|---|--------------|--|
| SIGNALS | DESCRIPTION | PIN # | NOTES | WIRE COLOR | NOTES |
| A2_OUT | EEPROM Address | 1 | J1501 Mating Connector: JST PN PHDR-20VS Contact Pins: JST PN SPHD- 001T-P0.5 | BLACK | 26AWGX20C+AL; PVC jacket; 105 °C / 300 V |
| GND | Ground | 2 | | BROWN | |
| A1_OUT | EEPROM Address | 3 | | RED | |
| -VOUT_RS | Remote Sense Return (Main O/P) | 4 | | ORANGE | |
| ISHARE | Load Share Voltage | 5 | | YELLOW | |
| A0_OUT | EEPROM Address | 6 | | GREEN | |
| SDA | Serial Data Signal (I ² C) | 7 | | BLUE | |
| SPARE_1 | Spare/Unused Pin (Dimming input for "-4PD" suffix) | 8 | | VIOLET | |
| SCL | Serial clock Signal (I ² C) | 9 | | GRAY | |
| +VOUT_RS | Remote Sense (Main O/P) | 10 | | WHITE | |
| 5VSB | 5V Standby (1.5A Max) | 11 | | PINK | |
| SGND | 5V Standby Return | 12 | | LIGHT BLUE | |
| SPARE_2 | Spare/Unused Pin | 13 | | WHITE/VIOLET | |
| G_DCOK_C | Global DC_OK Collector | 14 | | WHITE/YELLOW | |
| WP | EEPROM Write Protect | 15 | | WHITE/ORANGE | |
| G_DCOK_E | Global DC_OK Emitter (GND) | 16 | | WHITE/BLACK | |
| GND | Return GND for O/P Signal and I ² C communication | 17 | | WHITE/RED | |
| G_ACOK_C | Global AC_OK Collector | 18 | | WHITE/BROWN | |
| INH_EN | Output Inhibit_Enable Pin (turns output off) | 19 | | WHITE/GREEN | |
| G_ACOK_E | Global AC_OK Emitter (GND) | 20 | | WHITE/BLUE | |

Thermal Sensing

| Location | PMBus ADDR | Max Temp |
|--|------------|----------|
| Internal Secondary Output (near base plate) | 8Dh | 111 °C |
| Internal Primary Hotspot (at FET Heatsink) | 8Eh | 124 °C |
| Internal Primary Input Hotspot (near base plate) | 8Fh | 101 °C |

Power Derating Curves



Figure 1. Output Power vs. Baseplate Temperature



Figure 2. Output Power vs. Input Voltage

Efficiency Curves



Figure 3. Typical Efficiency for 28 V output



Figure 4. Typical Efficiency for 48 V output

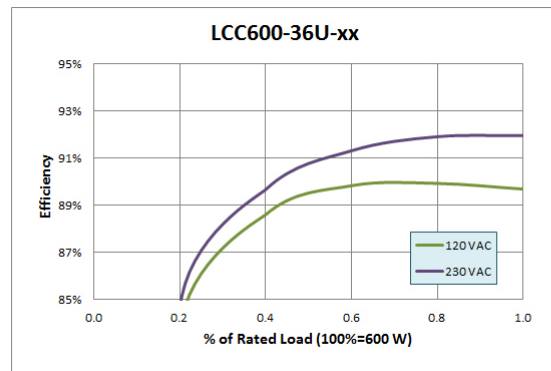


Figure 5. Typical Efficiency for 36 V output

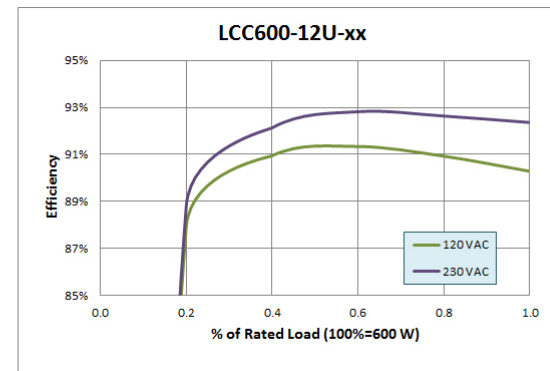

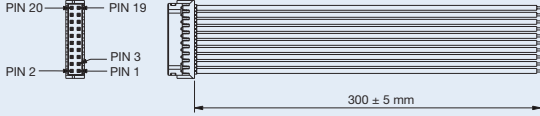
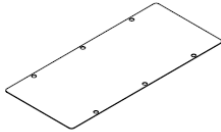


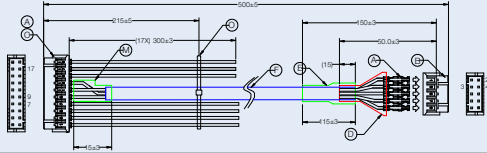
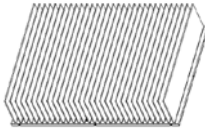


Figure 6. Typical Efficiency for 12 V output

MTBF vs. Ambient Temperature



| Ambient Temperature | MTBF |
|---------------------|-----------|
| 25 °C | 2,000,000 |
| 35 °C | 1,000,000 |
| 45 °C | 500,000 |
| 55 °C | 250,000 |
| 65 °C | 125,000 |
| 75 °C | 62,500 |
| 85 °C | 31,250 |

| ACCESSORIES | | |
|-----------------------|--|---|
| Orderable Part Number | Description | Diagram |
| 70-841-030 | For Suffix "-9P" AC Input Mating Connector Cable Assembly (w/ 0.3 m wire length) |  |
| 73-788-001 | J1501 (20 Pin Control Signal) Mating Connector with 0.3 m wires attached for "-9P" suffix |  |
| 70-841-031 | Pre-Cut thermal insulator (Laird TFLEX HR220FG) |  |
| 700-014447-0000 | MIL-STD-461F AC input In-line EMI filter (Zhongguang ZGLPG-10-02M) |  |
| 73-769-002 | USB to I²C High Speed Adaptor for PMBus Communication |  |
| 73-769-007 | J1501 (20 Pin) Mating connector with 10 Pin header termination for use with 73-769-002 |  |
| 466-003103-0000 | Test Heatsink for unit characterization. Size: 331 x 220 x 69 mm; Aluminum with natural finish; Weight = 1.7 kgs |  |

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