POWER

LCC600

600 Watts Conduction Cooling

Data Sheet

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

PMBus®
Power Management. Defined.

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 Safety[3]
- 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 ES60601-1[3]
  UL 8750[5]
  CSA-C22.2 No. 250.13[5]
- TÜV: 62368-1 2nd Ed.
  60601-1 3rd Ed.[3]
  EN 61347-1; -2-13[5]
- CB Scheme: IEC 60950-1
  IEC 60601-1
  IEC 61347-1; -2-13[5]
- China CCC
- CE Mark

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

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	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

[1]Artesyn Filter PN: 700-014447-0000 (Zhongguang PN: ZGLPG-10-02M).
[2]Meets Class C ≥ 50% load.
[3]U suffix have both ITE and Medical Safeties. H suffix carries ITE approval only.
[4]DC input rating not part of product's Safety approval.
[5]LED Lighting approvals apply to all 48 V output variants.

ARTESYN™
An Advanced Energy Company

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 Recyle 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@artesyn.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

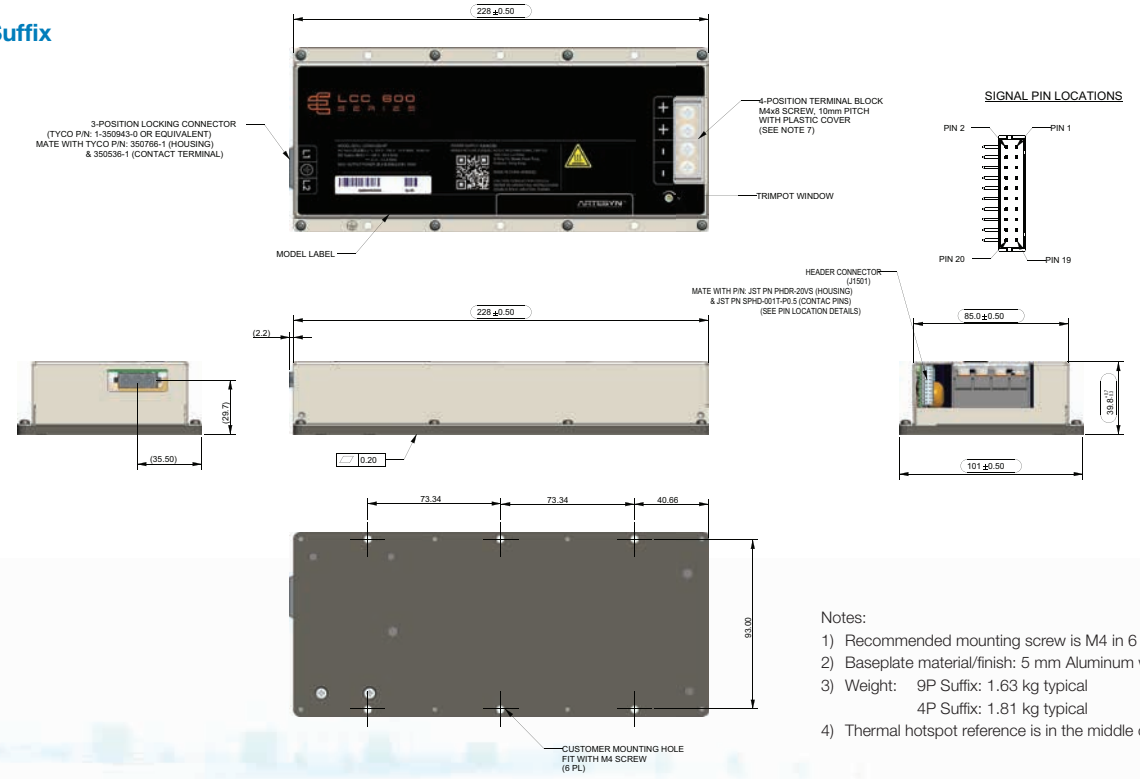
Ordering Information

Model Number*	AC Input	Output Setpoint	Setpoint Tolerance	Output Current [A]		Max O/P	Typical Efficiency**	Standby Output	Combined Line/Load Regulation	Output Ripple
				Min	Max	Power [W]				
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 Iout 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

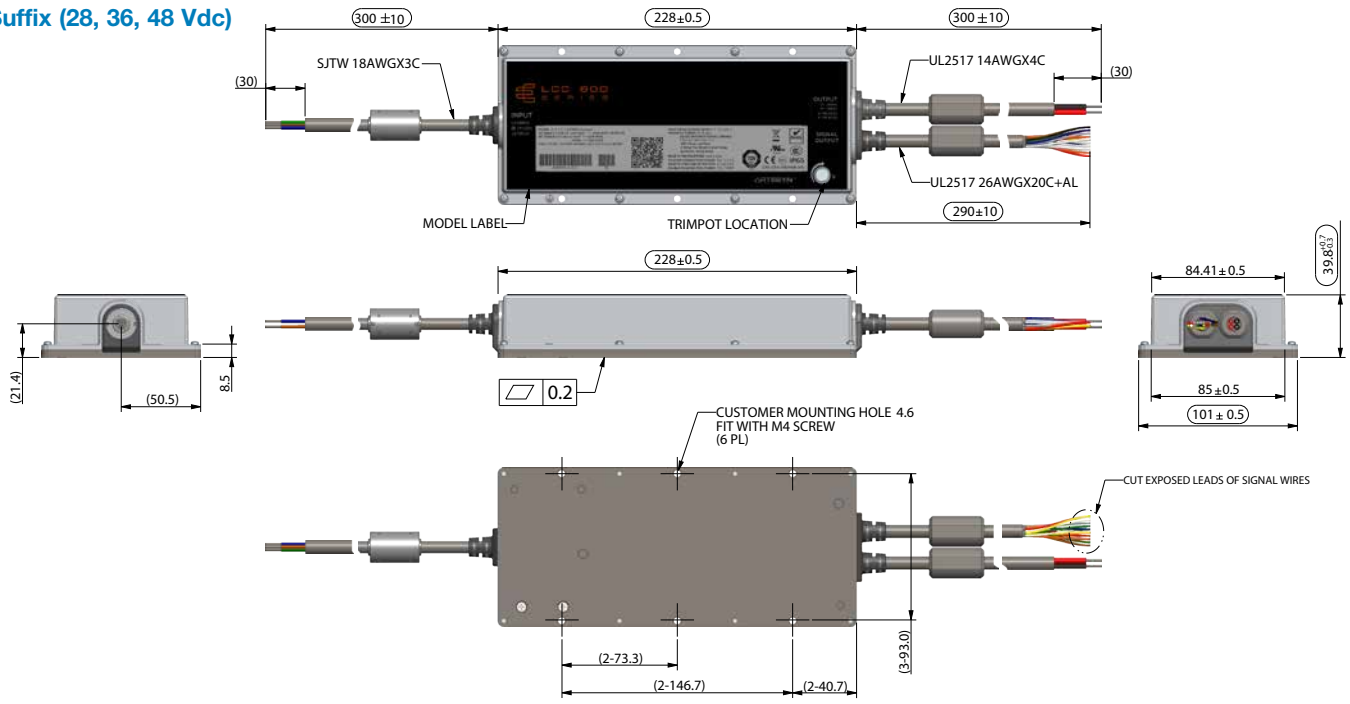
-9P Suffix



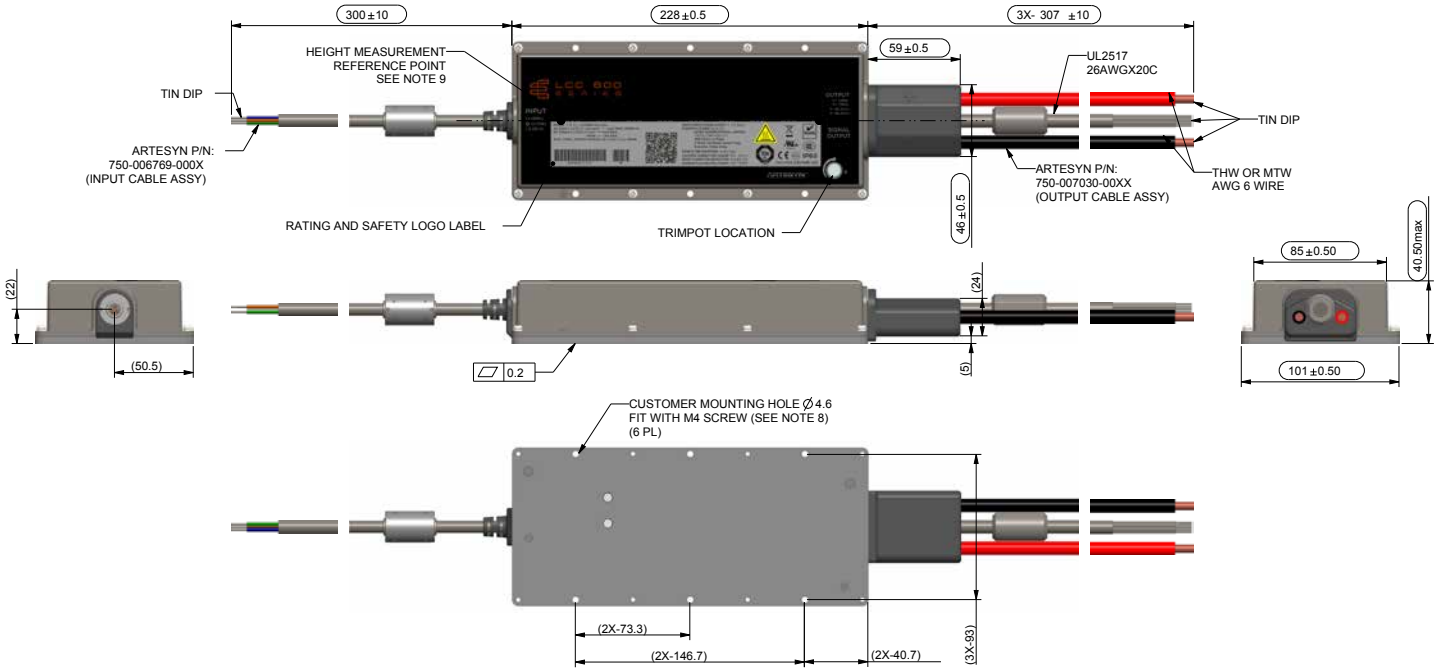
Notes:
1) Recommended mounting screw is M4 in 6 locations; 8-10 kgf-cm torque.
2) Baseplate material/finish: 5 mm Aluminum with Black Anodized.
3) Weight: 9P Suffix: 1.63 kg typical
   4P Suffix: 1.81 kg typical
4) Thermal hotspot reference is in the middle of the baseplate.

Mechanical Drawings

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

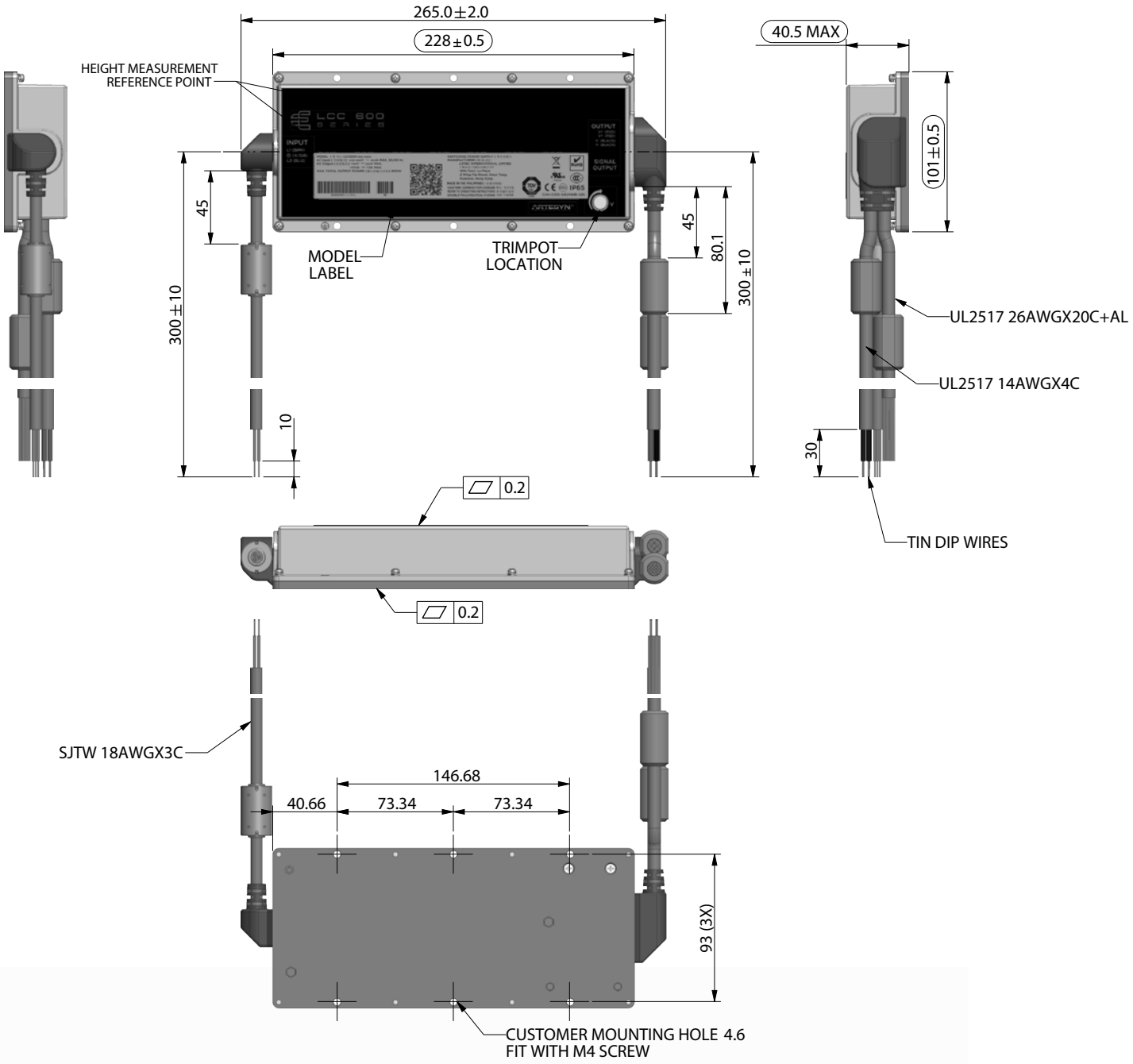


-4P Suffix (12 Vdc)



Mechanical Drawings

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



Pin Assignment (INPUT)

	-9Px Suffix		-4Px Suffix	
DESCRIPTION	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)

	-9Px Suffix		-4Px Suffix (28, 36, 48 Vdc)		-4Px Suffix (12 Vdc)	
DESCRIPTION	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
			Red			
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 (I²C)	7		BLUE	
SPARE_1	Spare/Unused Pin (Dimming input for "-4PD" suffix)	8		VIOLET	
SCL	Serial clock Signal (I²C)	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 I²C 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

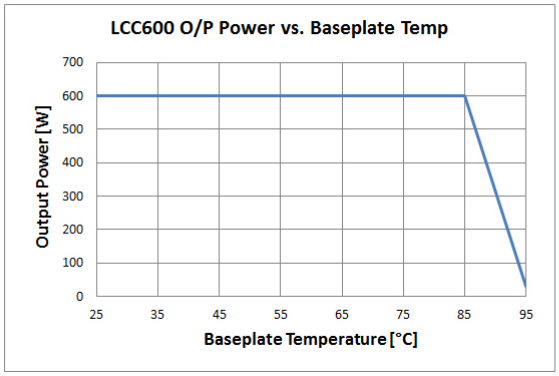


Figure 1. Output Power vs. Baseplate Temperature

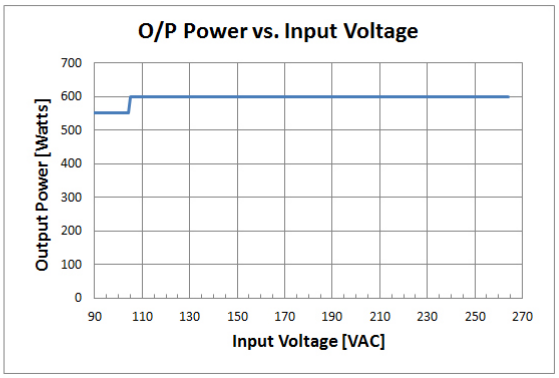


Figure 2. Output Power vs. Input Voltage

Efficiency Curves

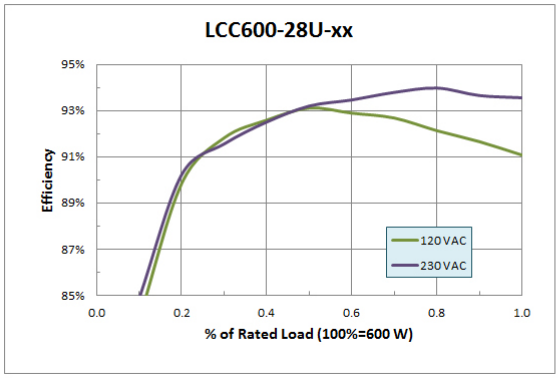


Figure 3. Typical Efficiency for 28 V output

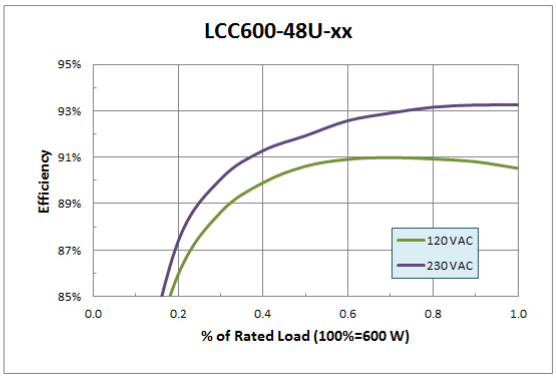


Figure 4. Typical Efficiency for 48 V output

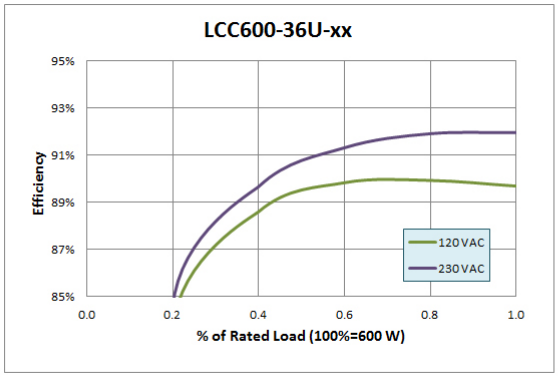


Figure 5. Typical Efficiency for 36 V output

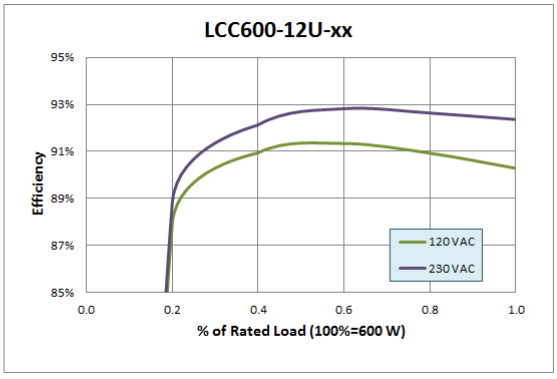
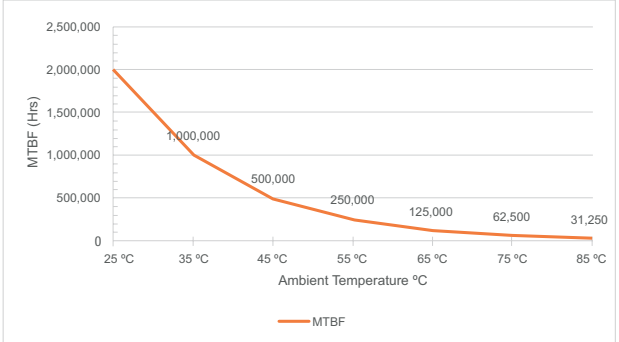


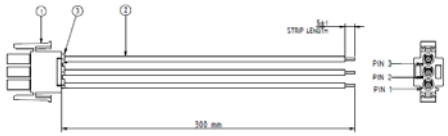
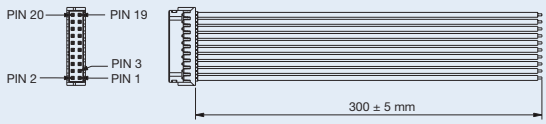
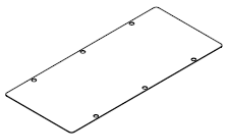
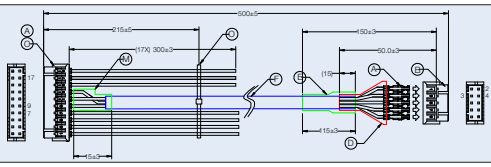
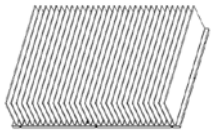
Figure 6. Typical Efficiency for 12 V output

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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