ABS400 Series

400 W AC-DC Power Supplies
Sealed IP67





The ABS400 Series of AC-DC power supplies provides up to 400 W of regulated output power through wide input voltage range 90 – 264 VAC in single outputs of 12, 24, 36 or 48 VDC.

The ABS400 Series comes in a 83.0 x 212.0 x 42.0 mm form factor, offering 12 and 5 VSB standby outputs and a full set of protection features. Available control signals include Power Good (Power_OK), remote On/off (PS_ON) and remote sense (+RS).

The sealed and full potted package allows an IP67 ingress protection index and can be installed in contact with thermo-conductive part of the system to transfer heat by conduction.

The ABS400 Series complies with the latest international safety standards for Audio Video and IT equipment and displays the CE-Mark for the European Low Voltage Directive (LVD).

Key Features & Benefits

- Universal input voltage range (90 – 264 V_{AC})
- Input surge current limiting
- 400 W rated power (440 W peak up to 10 s)
- High efficiency up to 94%
- Low stand-by consumption (<0.5 W)
- 12, 24, 36 and 48 V standard output voltages
- Active PFC, EN61000-3-2 compliant (Class C, >25% load).
- Low earth / touch leakage current
- Over temperature protection, OV, OC and SC protections
- Stand by +5 V, 2 A and auxiliary / fan 12 V_{DC}, 1 A outputs.
- Remote On / Off signal
- Power good and remote sense signals
- Sealed, potted package IP67 rated, fits 1U applications
- UL/IEC 60950-1 and UL/IEC 62368-1 safety approval
- RoHS 3 compliant (Directive 2015/863/EU)
- 4000 m altitude operation
- Optional heatsink accessory available (HSKIT-400-XBS)
- Suitable for harsh environments

RoHS Compliant

c US D CE

Applications

- Video Wall Displays
- Entertainment Lighting
- Industrial & Process Control
- Telecommunications
- Laboratory Equipment
- Test & Measurement Equipment
- Class II outdoor signage

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1. MODEL SELECTION

MODEL NUMBER	PACKAGE & COOLING	INPUT VOLTAGE RANGE [VAC]	NOM. OUTPUT VOLTAGE [VDC]	MAX. OUTPUT POWER [W]	MAX. OUTPUT CURRENT [A]	DIMENSIONS
ABS400-1012	Sealed Chassis Convection / Conduction	90 - 264	12	400	33.3	Dimensions without heatsink: 83.0 x 212.0 x 42.0 mm 3.27 x 8.34 x 1.65 in
ABS400-1024	Sealed Chassis Convection / Conduction	90 - 264	24	400	16.7	
ABS400-1036	Sealed Chassis Convection / Conduction	90 - 264	36	400	11.1	Dimensions with heatsink: 83.0 x 212.0 x 70.1 mm 3.27 x 8.34 x 2.76 in
ABS400-1048	Sealed Chassis Convection / Conduction	90 - 264	48	400	8.3	
HSKIT-400-XBS	- Heatsink accessory (optional) Mounting kit includes 4x screws, M4x10, and the thermally conductive graphite sheet					

2. INPUT SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION		MIN	NOM	MAX	UNIT
AC Input Voltage	PS starts and operates at 90 V_{AC} at all load conditions		90	100-240	264	V_{RMS}
DC Input Voltage			170	-	270	V_{DC}
Input Frequency			47	50/60	440	Hz
Input Current	RMS at 180 V_{AC}, maximum load, 50 / 60 Hz RMS at 90 V_{AC}, maximum load, 50 / 60 Hz		-	-	2.5 5.0	A
Inrush Current	265 V_{AC}, 25 °C ambient, cold start.				20	A
Fusing	2x Time Lag 6.3 A, 250 V on both L and N		-	-	6.3	A
Efficiency	At 115 V_{AC}	20% rated load	90	-	-	%
		100 % load	92	-	-	
	At 230 V_{AC}	20% full load	90	-	-	
		50 – 100 % full load	94	-	-	
Input Power Consumption	Power on, 115-230 V_{RMS}, no load Stand by, 115-230 V_{RMS}, no load		- -	1 0.4	1.5 0.5	W
Power Factor	At full rated load, 115 VAC, 60 Hz and 230 VAC, 50 Hz input voltages		0.95	-	-	-
Harmonic Current Fluctuations and Flicker	Complies with EN-61000-3-2 Class C at 230 VAC 50 Hz, load >50 W. Complies with EN-61000-3-3 at nominal voltages and full load.					
Leakage Current	Normal conditions, 240 V_{RMS}, 60 Hz.				300	µA

3. OUTPUT SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION		MIN	NOM	MAX	UNIT
V1 Output Voltage	±0.5% set point accuracy on all outputs		- - - -	12 24 36 48	- - - -	V
V1 Output Power Rating	All models, convection cooling All models, conduction cooling / heat sink All models, peak power (≤ 10 s)		- - -	- - -	350 400 440	W
V1 Output Current	* Conduction (with heatsink)	V1: 12 V_{DC} V1: 24 V_{DC} V1: 36 V_{DC} V1: 48 V_{DC}			33.3 16.7 11.1 8.3	A
	** Convection (without heatsink)	V1: 12 V_{DC} V1: 24 V_{DC} V1: 36 V_{DC} V1: 48 V_{DC}			29.2 14.6 9.7 7.3	A
V1 Voltage Adjustment Range			±5	-	-	%V1
V1 Load-Line-Cross Regulation	V_{AC}: 90 – 264 V_{RMS}	V1 Load: 0 – 33.3 A (12 V) 0 – 16.7 A (24 V) 0 – 11.1 A (36 V) 0 – 8.3 A (48 V) V2 Load: 0 – 1 A $5V_{SB}$ Load: 0 – 2 A	-	-	±2	%V1
V1 Line Regulation	V_{AC}: 90 – 264 V_{RMS}		-	-	±0.1	%V1
Transient Response (Voltage Deviation) V1, $5V_{SB}$	25% load changes at 1 A/µs 12 V at 2200 µF Load / I_{OUT}> 0.5 A 24 V at 1000 µF Load / I_{OUT}> 0.5 A 36 V at 820 µF Load / I_{OUT}> 0.5 A 48 V at 560 µF Load / I_{OUT}> 0.5 A $5V_{SB}$ at 560 µF Load / I_{OUT}> 0.1 A		-	-	±5	%V1 %$5V_{SB}$
V1 Ripple & Noise	All models, Peak-to-peak, 20 MHz BW. 100 nF ceramic and 10µF tantalum to the load.		-	-	1	%V1
Start-up Rise Time	90<V_{IN}<264, any load conditions.		5	-	85	ms
Start-up Delay	V1 in regulation after PS_ON is asserted V1 in regulation after AC is applied $5V_{SB}$ in regulation after AC is applied		-	-	200 750 500	ms
Turn-on Overshoot	At 500 mA output current, V1 in regulation within 50 ms.		-	10 10 10	-	%V1 %V2 %V_{SB}
Hold-up Time	At nominal V_{IN}, 400 W, for all outputs At nominal V_{IN}, 365 W, for all outputs At nominal V_{IN}, 200 W, for all outputs		- - -	16 20 35	- - -	ms
Minimum Load ***	All models; V1, V2 and $5V_{SB}$		0	-	-	A
Maximum Load Capacitance	At nominal V_{IN}, 25 °C ambient	12 V 24 V 36 V 48 V	- - - -	- - - -	33000 16000 10000 7000	µF
Temperature Drift			-1.2	-	+1.2	mV/°C
V2 Output Voltage	All versions. Load on V2: from 5 to 1000 mA Load on V1: from 0.1 to 16.7 A		11.25	12.5	13.75	V
V2 Output Current	All models, convection/forced air cooling		-	-	1	A
V2 Ripple	Peak-to-Peak measured at 20 MHz Bandwidth.				240	mV
$5V_{SB}$ Output Voltage	All models (3% set point accuracy)		-	5	-	V
$5V_{SB}$ Output Current	All models, convection cooling All models, conduction cooling / heat sink		- -	- -	1.5 2	A

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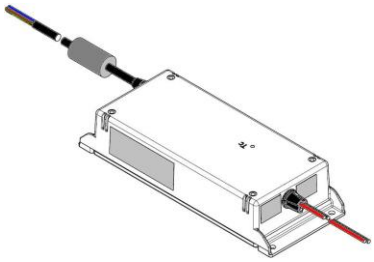
$5V_{SB}$ Load-Line-Cross Regulation	V_{AC}: 90 – 264 V_{RMS}	V1 Load: 0 – 33.3 A (12 V) 0 – 16.7 A (24 V) 0 – 11.1 A (36 V) 0 – 8.3 A (48 V) V2 Load: 0 – 1 A $5V_{SB}$ Load: 0 – 2 A	-	-	±5	$\%5V_{SB}$
$5V_{SB}$ Ripple	Peak-to-Peak measured at 20 MHz Bandwidth.				50	mV

* The combined output power of V1, V2 and $5V_{SB}$ for all models, when conduction cooled or convection cooled with heat sink mounted, must not exceed 400 W up to 50 °C, and 300 at 70 °C ambient temperature.

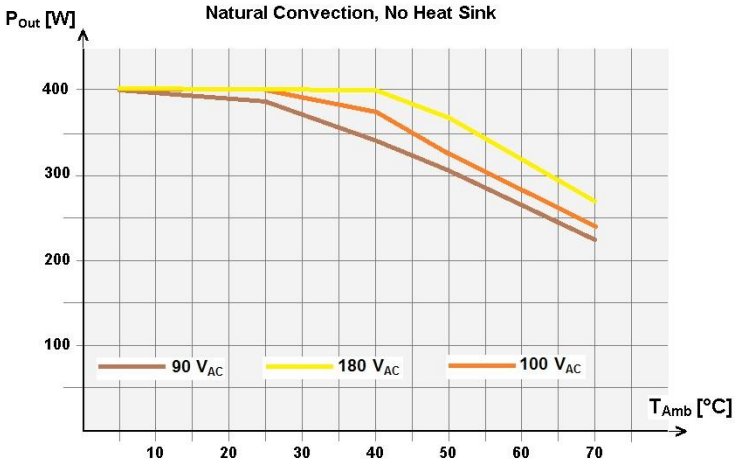
** The combined output power of V1, V2 and 5 V_{SB} for all models, when convection cooled and $V_{IN} \geq 180$ V_{RMS}, must not exceed 350 W up to 50 °C, and 240 W at 70 °C ambient temperature. See de-rating curves below.

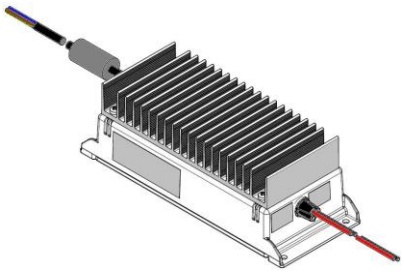
*** When the load on the main output is less than 100 mA, V2 output voltage might regulate below its minimum value. Contact Bel for details.

3.1 OUTPUT POWER DE-RATING CURVES



Sealed Box without Heatsink





Sealed Box with Heatsink

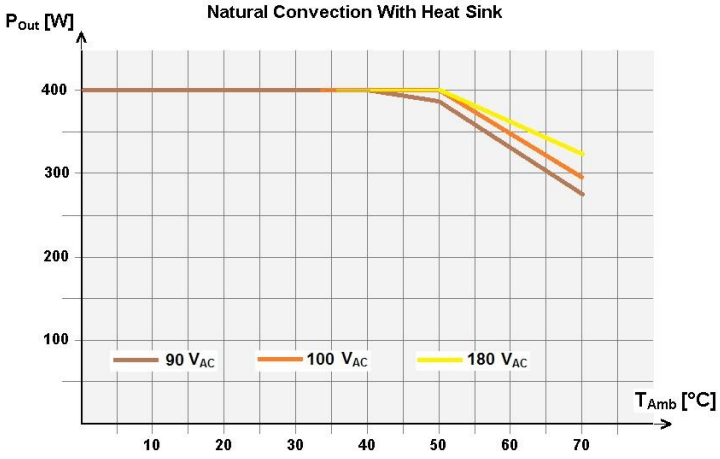
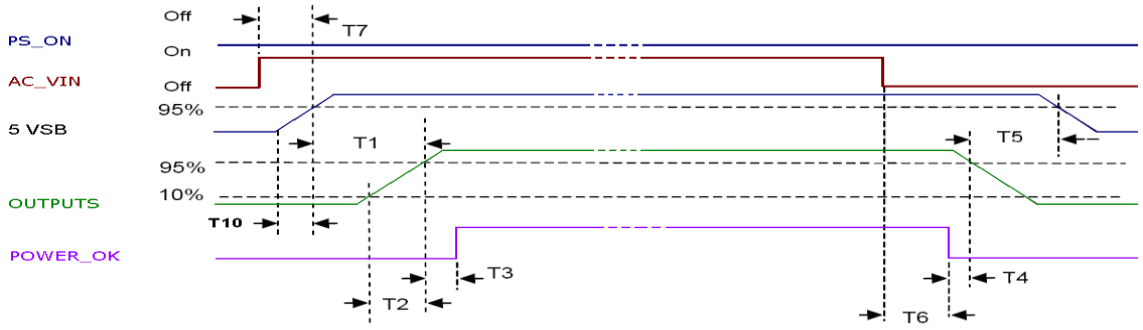


Figure 2. Power Derating Curves

4. SIGNALS, CONTROLS & TIMING SPECIFICATIONS

Base signals and controls are accessible from signal connector P204.

SIGNAL	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
PS_ON	Active low, +5 V TTL signal compatible. Input low voltage	0	-	2.0	V
	Input high voltage (I_{IN} = 200 µA)	3.0	-	-	V
	V1 and V2 disabled when PS_ON is open				
	$5V_{SB}$ not affected by PS_ON				
	V1 and V2 enabled with PS_ON connected to RTN				
P_OK	+5 V TTL compatible				
	Logic level low (<10 mA sinking)	-	-	0.7	V
	Logic level high (100 µA sourcing)	2.4	-	5	V
	Low to high time after V1 in regulation	0.05	-	0.1	s
	Power down warning time	1	-	-	ms
$5V_{SB}$ output	Active and in regulation after a 90<V_{AC}<264 is applied	-	-	200	ms
	$5V_{SB}$ not affected by PS_ON				



Above waveforms are expected with AC Input ON/OFF:

Standby on - Main outputs on	50 ms ≤ T1 ≤ 250 ms
Main output Rise Time	5 ms ≤ T2 ≤ 110 ms
5 V_{SB} rise time	4 ms ≤ T10 ≤ 20 ms
Main outputs On – P_OK delay	25 ms ≤ T3 ≤ 100 ms
Power down warning [1]	T4 ≥ 1 ms
Main Output off – Standby off [2]	T5 ≥ 1.2 s
Hold-up time (AC off – P_OK low)	T6 ≥ 15 ms (115/ 230 VAC)
AC_ON - Standby turn on time	T7 ≤ 500 ms

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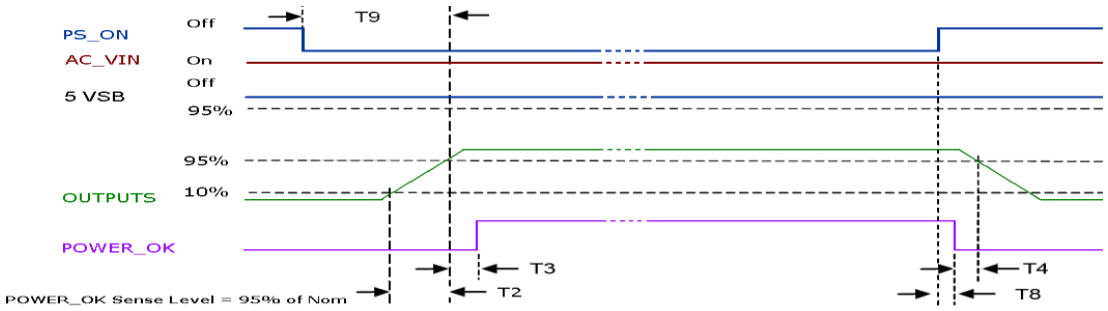


Above waveforms are expected with PS_ON Signal ON/OFF state change:

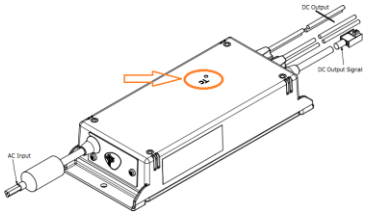
Main Output Rise Time	5 ms ≤ T2 ≤ 110 ms
Main Outputs on – P_OK delay	25 ms ≤ T3 ≤ 100 ms
Power down warning [1]	1 ms ≤ T4 ≤ 5 ms
PS_ON - Main Output (off) Timing	T8 ≤ 1 ms
PS_ON - Main Output (on) Timing	T9 ≤ 200 ms

[1] T4 parameter measurement setup will assume at least 10% of the maximum load on each output.
[2] T5 parameter measurement setup will assume 50% of the maximum load on $5V_{SB}$.

5. PROTECTION SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
Input Under Voltage	Auto-recovering, hiccup mode.	60	75	-	V_{AC}
Input Fuse	2x Time Lag 6.3 A, 250 V on L and N	-	-	6.3	A
Over Current	At nominal input voltages. V1: Hiccup mode. auto-recovering. V2: PTC limiting, auto-recovering. $5V_{SB}$: Hiccup mode, auto-recovering.	110	-	155	$\%I1_{MAX}$
Short Circuit	At nominal input voltages. V1: Hiccup mode. auto-recovering. V2: PTC limiting, auto-recovering. $5V_{SB}$: Hiccup mode, auto-recovering.	-	-	-	
Over Voltage	12V 24V 48V $5V_{SB}$ Shut down, latch-off.	110	-	136	$\%V_{NOM}$
Over Temperature (on primary stage)	Shut down, latch off.	-	-	-	
Over Temperature (on secondary side)	Hiccup mode, auto-recovering.	-	-	-	
Isolation Primary to Secondary	Reinforced (2x MoPP)	5660 4000	- -	- -	V_{DC} V_{AC}
Isolation Input to Earth	Basic (1x MoPP)	1500			V_{AC}
Isolation V1 to V2	Functional	100	-	-	V_{DC}
Isolation Output to Earth	Basic (1x MoPP)	1500	-	-	V_{AC}

6. ENVIRONMENTAL SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
Operating Temperature Range	PS starts up at -30 °C See graphs above for output power de-rating against T_{Amb} and V_{In}.	-20	-	70	°C
Storage Temperature Range		-40	-	85	°C
Humidity	RH, Non-condensing Operating Non-operating	-	-	90 95	% %
Operating Altitude		-	-	4000	m
Shock	**EN 60068-2-27** Operating: Half sine, 30 g, 18 ms, 3 axes, 6x each (3 positive and 3 negative). Non-Operating: Half sine, 50 g, 11 ms, 3 axes, 6x each (3 positive and 3 negative).				
Vibration	**EN 60068-2-64** Operating: Sine,10 – 500 Hz, 1 g, 3 axes, 1 oct/min., 60 min. Random, 5 – 500 Hz, 0.02 g^2/Hz, 1 g_{RMS}, 3 axes, 30 min. Non-Operating: 5 – 500 Hz, 2.46 g_{RMS} (0.0122 g^2/Hz), 3 axes, 30 min.				
MTBF	Full Load, 120 V_{AC}, 50 °C ambient 70% Duty cycle, Telcordia Issue 1	400000	-	-	Hours
Cooling	Convection with or without heat sink and conduction providing an adequate thermal path between the unit and the external environment. Case hot spot temperature, Tc, should not exceed 90 °C in any working condition.				
Useful Life	Low line range, 200 W, 40 °C ambient, natural convention.	-	4	-	Years

7. ELECTROMAGNETIC COMPATIBILITY (EMC) – EMISSIONS

PARAMETER	DESCRIPTION / CONDITION	STANDARD	PERFORMANCE CLASS
Conducted	115 V_{RMS}, 230 V_{RMS}. Maximum load. 4 dB minimum margin	EN 55022 (ITE) EN 55011 (ISM)	B
Radiated	At 10 m distance	EN 55022 (ITE) EN 55011 (ISM)	B
Line Voltage Fluctuation and Flicker	At 20%, 50% and 100% maximum load. Nominal input voltages.	EN 61000-3-3	
Harmonic Current Emission	Nominal input voltages. Output load > 50 W.	EN 61000-3-2	C

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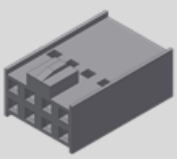
8. ELECTROMAGNETIC COMPATIBILITY (EMC) – IMMUNITY

PARAMETER	DESCRIPTION / CONDITION	STANDARD	TEST LEVEL	CRITERIA
	Reference standards for ITE	EN 55024		
ESD	15 kV air discharge, 8 kV contact, at any point of the system.	EN 61000-4-2	4	A
Radiated Field	3 V/m, 80-1000 MHz, 1 KHz/2 Hz 80% AM. Dwell time is 3 sec for 2 Hz modulation Dwell time is 1 sec for 1KHz modulation	EN 61000-4-3	3	A
Electric Fast Transient	±2 kV on AC power port for 1 minute; ±1 kV on signal/control lines	EN 61000-4-4	3	A
Surge	± 2kV line to line; ± 4 KV line to earth; on AC power port; ±0.5 kV for outdoor cables	EN 61000-4-5	3	A B
Conducted RF Immunity	3 V_{RMS}, 0,15-80 MHz, 1 KHz/2 Hz 80% AM	EN 61000-4-6	3	A
Dips and Interruptions	Dip to 30% for 5 cycle (10 ms) Dip to 40% for 5 cycles (100 ms) Dip to 70% for 25 cycles (500 ms) Drop-out to 5% for 10 ms Interrupts > 95% for 5 s	EN61000-4-11 EN61000-4-11 EN61000-4-11 EN61000-4-11 EN61000-4-11		A B B B B

9. SAFETY AGENCIES APPROVALS

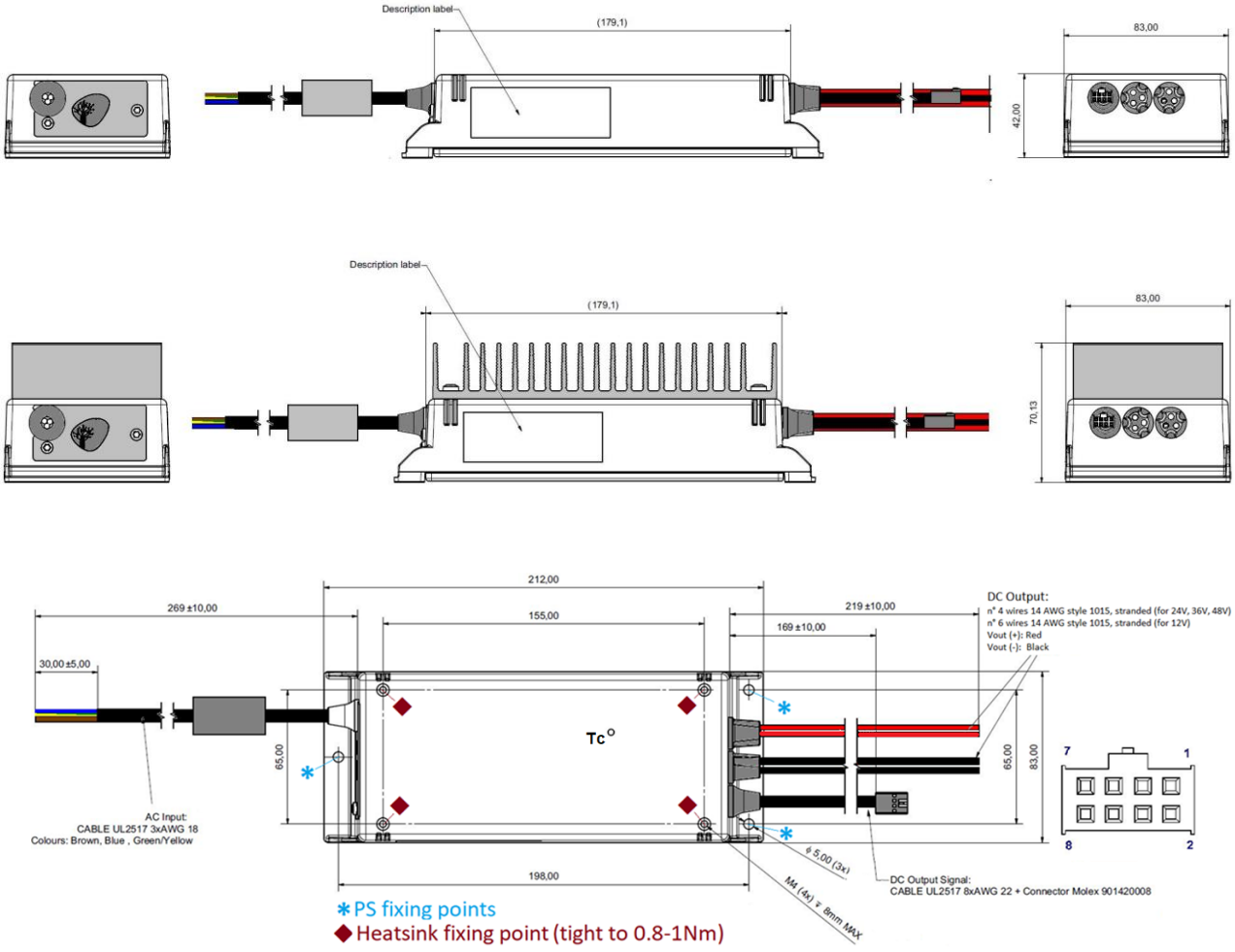
CERTIFICATION BODY	SAFETY STANDARDS	CATEGORY
CSA/UL	CSA C22.2 No. 60950-1, UL 60950-1 and UL 62368-1	Audio Video and Information Technology Equipment
IEC IECEE CB Certification	IEC/EN 60950-1 and IEC/EN 62368-1	Audio Video and Information Technology Equipment
CE	Low Voltage Directive (LDV) 2006/95/EC	Audio Video and Information Technology Equipment

10. CONNECTIONS AND PIN DESCRIPTION

CONNECTIONS	WIRES GAUGE AND LENGTH	ASSIGNMENT	COLOUR/PIN
AC Input	3x 18 AWG, black external insulation, 300 V, 105°C, UL2517 cord, 310 ± 10 mm extension from grommet.	Live (L)	Brown
		Neutral (N)	Blue
		Protective Earth (PE)	Green Yellow
DC Output	12 V version: 6 x 14 AWG, Style 1015, 600 V, 105°C, 260±10 mm 24, 48 V versions: 4x 14 AWG, Style 1015, 600 V, 105°C, 260±10 mm	3x (2x) +V1 Output (+V1)	Red
		3x (2x) V1 Return (RTN)	Black
Auxiliary Voltages Control Signals 	Wires: 8x 22 AWG, black external insulation, 300 V, 105°C, UL2517 cord, 220 ± 10 mm extension from grommet to connector. Housed by Connector: Molex 90142-0008 Terminals: Molex 90119-0109 (Tin plating) Mates with Molex 90130-1106 or equivalent. Terminals: Tin plating termination	+5 V Stand-by Output (+5V_{SB})	Red / 1
		Output Power Good (P_OK)	Green / 2
		- Fan Voltage (-V2)	Brown / 3
		Remote On/Off (PS_ON)	Grey / 4
		+ Terminal Remote Sense (+RS)	Yellow / 5
		Stand-by/Signals Return (RTN)	Blue / 6
		+ Fan Voltage (+V2)	White / 7
		Stand-by/Signals Return (RTN)	Black / 8

11. MECHANICAL SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION
Weight	1300 g (2.87 lb) – without heatsink 1665 g (3.67 lb) – with heatsink
Overall Dimensions	83.0 x 212.0 x 42.0 mm (3.27 x 8.34 x 1.65 in) - without heatsink 83.0 x 212.0 x 70.1 mm (3.27 x 8.34 x 2.76 in) - with heatsink



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