AL-PSE-4D
Managed Power Distribution Panel for 4 x 96 Watts Class 2 Power, DAbus data

Product Description - AL-PSE-4D

This structured wiring panel provides Class 2 power to 4 power outputs. Ideal for up to 60 light fixtures and up to 32 light switches.

No output can exceed the power supplied by any one input – input power is NOT consolidated, therefore regardless of the number of supplies attached, the output current per port remains Class 2 assuming that the input power supply is class 2 (100 watts) per NEC 2017 requirements.

It has four power inputs, with relay power failover management. It is housed in a case ideal for structured wiring panels. The power inputs are relay routed to 4 outputs providing failover.

It uses quick connect 5 pin, 5 amp rated connectors. The inputs are the DIN 4 connectors. Voltage range is 44 to 56 volts.. Earth connection is provided for static discharge management.

Ideally matched with 4 pcs of the AL-PS-51v96w, the AL-PSE-4D is a member of the ATX SML family for quick installation in Media Panels.

Failover Power

The Power Distribution has 4 inputs – apply the number of 48 or 51 volt power supplies to reach the power budget for the project. If a 300 watt project has 4 power supplies – then an outage will have no impact.

If a 400 watt project has one power supply fail – then 2 output connectors will have to share one 100 watt supply, and the other 2 will have 100 watts available for each. Status LEDs display the reserve power for each of the 4 outputs.. Use with solar installations is possible.

A (input) powers A output block directly
B (input) powers B output block directly
C (input) powers C output block directly
D (input) is the failover supply for A, B and C, and the supply for block D

Should B not have power, power for B will come from D.
Should C not have power, power for C will come from D.
Should A not have power, power for A will come from D.
Should D not have power, power for D will come from either A, B or C – but only one. Operation with one power supply is possible.
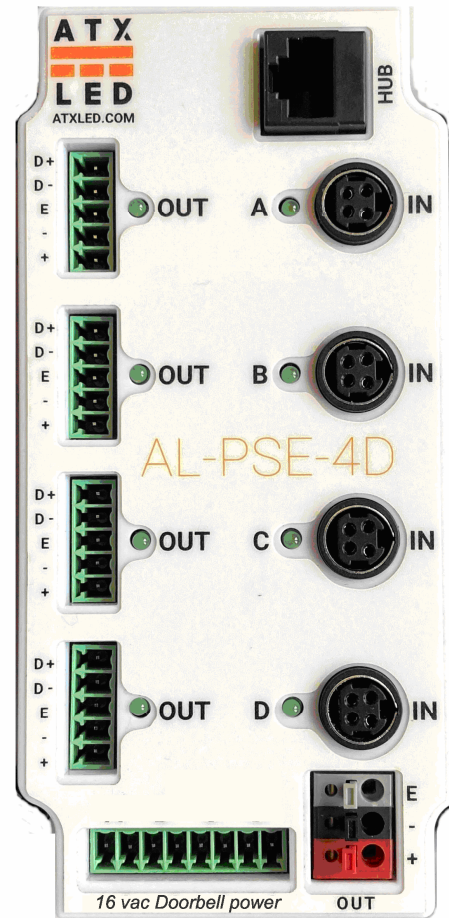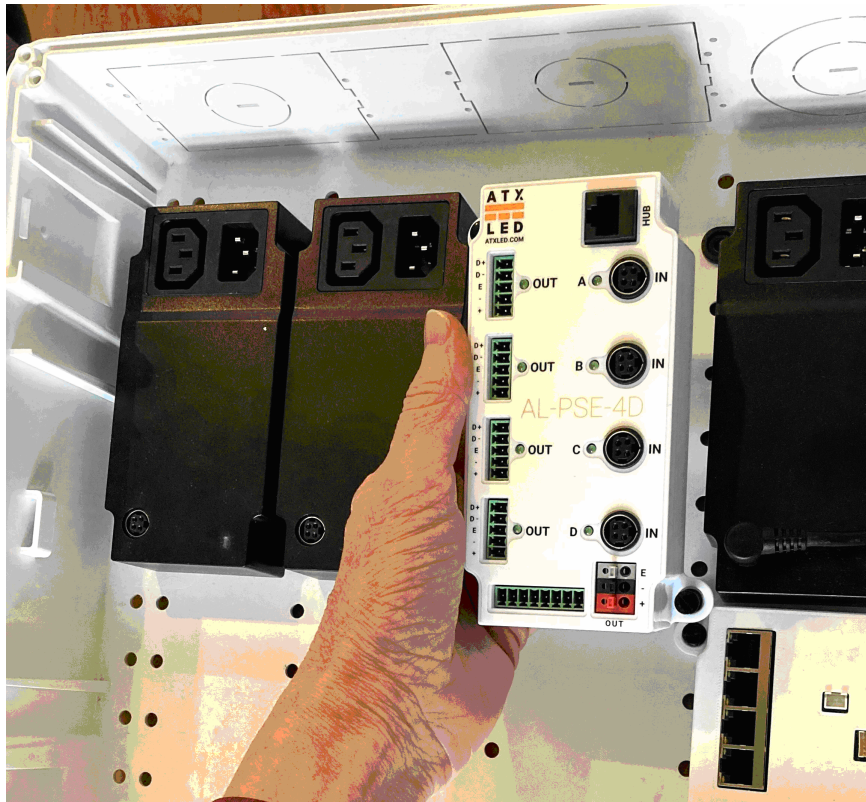
sml Format

This device is a member of the ATX LED sml family for Structured Media Panels. This allows 8 devices in a 14x14 panel. Other devices include our 51v 96w power supply, AL-DA-8 distribution panel, Raspberry Pi hat, and DAbus controlled PoE Switch.

LED status display

There are 2 LEDs per channel. The input LED is the presence of voltage on inputs A thru D. The output (left) LED indicates available current to that output With no load, it is fully bright. As the load reaches the Class 2 limit of 2 amps – the LED will be off off.

The 4 input voltages are monitored by an external device like the ATX LED Hub using pins 4 and 5 of the RJ45 connector

Specifications

Power source	DIN4 (4 individual) connectors for the AL-PS-51v96w
Output Connectors	4 positions, 5 wires each. Wago 714-105 or KF12EKN-5P
PoE power output	1 KF246 type with power from output D – up to 96 watts power for PoE is taken from the power available on the D output
Hub power and data	RJ45 connector has 15 watts of power from any input, also DAbus signals
IEC 62386* interface	2 lines per output allow for DAbus data
Doorbell Camera Power	16 VAC output for up to 4 Doorbell Cameras and chimes
Failover – zero loss	Relays from 4 DC power inputs assures all outputs are live with low loss
Failover - emergency	Should 3 of 4 power supplies fail, a Diode circuit will assure all outputs remain active – note: power is shared
Failover Detection	Built in processor to assure failover and communicate status
Failover management	Processor can be enabled to broadcast a reduction in brightness to shared outputs
Input voltage range	44 to 56 volts (24 volt model available on request)
Current Limit	This device relies on the Class 2 current limit from the power source. For example: the AL-PS-51v96w. Only one Class 2 power supply per channel is permitted to be connected
Voltage, Currant, Wattage Measurement	The PSE-4D can read the power used by each output, and can be used with the ATX LED ZWD hub software package to build a topology of the wiring, and to proactively detect faults
Management	The PSE-4D has an internal processor with safety override, to manage the failover should one input not be powered. It communicates via IEC 62386 to| the Hub for advanced features
Internal Power	250 milliwatts standby with all power inputs active
Protection	Reverse protection and static protection
Operating Temperature	0°C ~ 50°C
Size	70 mm x 147mm x 30mm plus 2x 10mm interleaving tabs on the 70mm side
Horizontal between tabs	76.2mm
Vertical between tabs	127mm
Hot Swap	Yes – can unplug and connect input power live
Earth Ground	Connection for earth grounding
Failover Detection	Cutover at less than 44 volts
Mouting Kit	Leviton 47615-NYL push pins
DIN Rail	Din Rail adapters are available.

Quick Connect Power outputs

The KF12EKN 5 pin connector is provided to source 51 volts the Lighting system, on 4 outputs. Each output is connected to the corresponding DIN connector input, unless that input has no power.   In case of missing power, internal relays will switch the input power to the outputs.   The same connector also has the DAbus and earth ground.
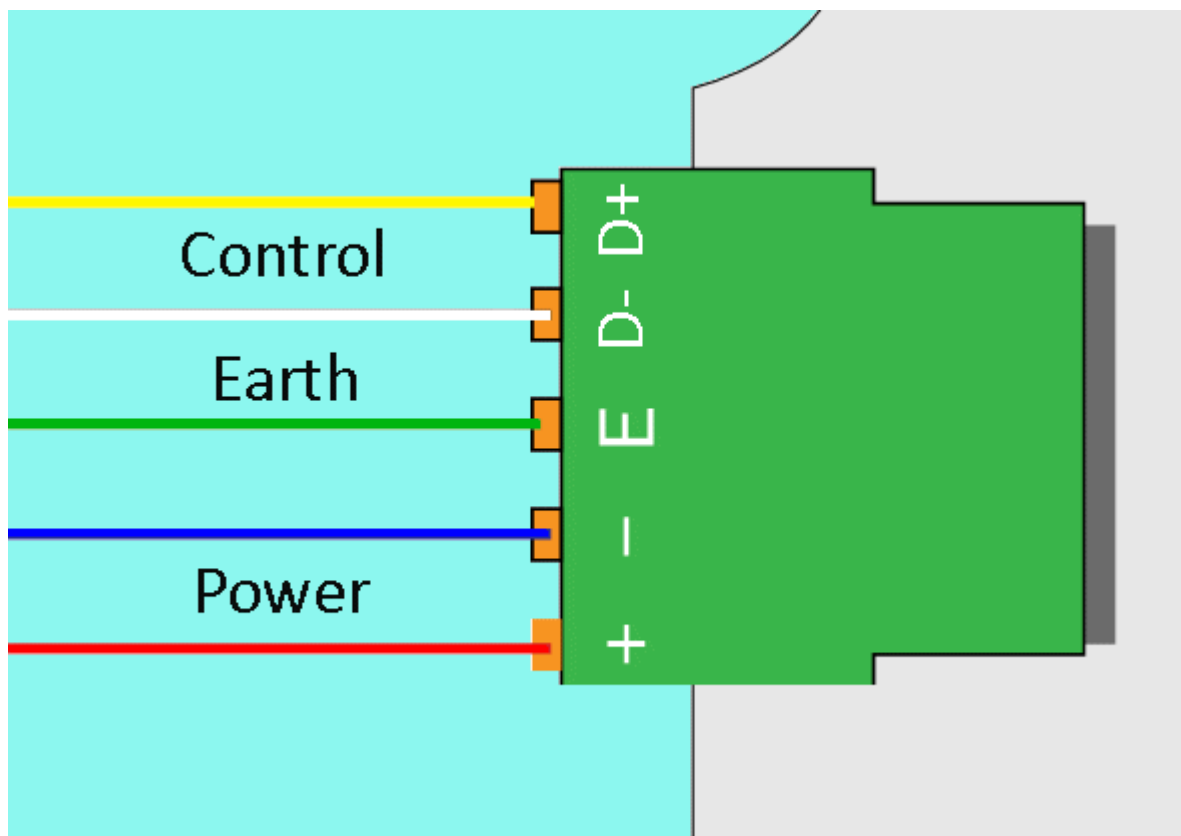
# Earth Grounding

Earth grounding is recommended for static discharge of people using the wall switches.   In a proper installation with the AL-51v96w power supply – the 120vac power socket should have an earth ground.   That earth ground flows thru the DIN4 connector to the outputs.   In cases where the AL-PS-51v96w is not used – connect a awg18 wire from the gray connector to an earth ground.

Compatible input power:
AL-PS-51v96w Power Brick

The AL-PS-51v96w power supply was designed for use with the AL-PSE-4D.   It fits the SML standard case format.
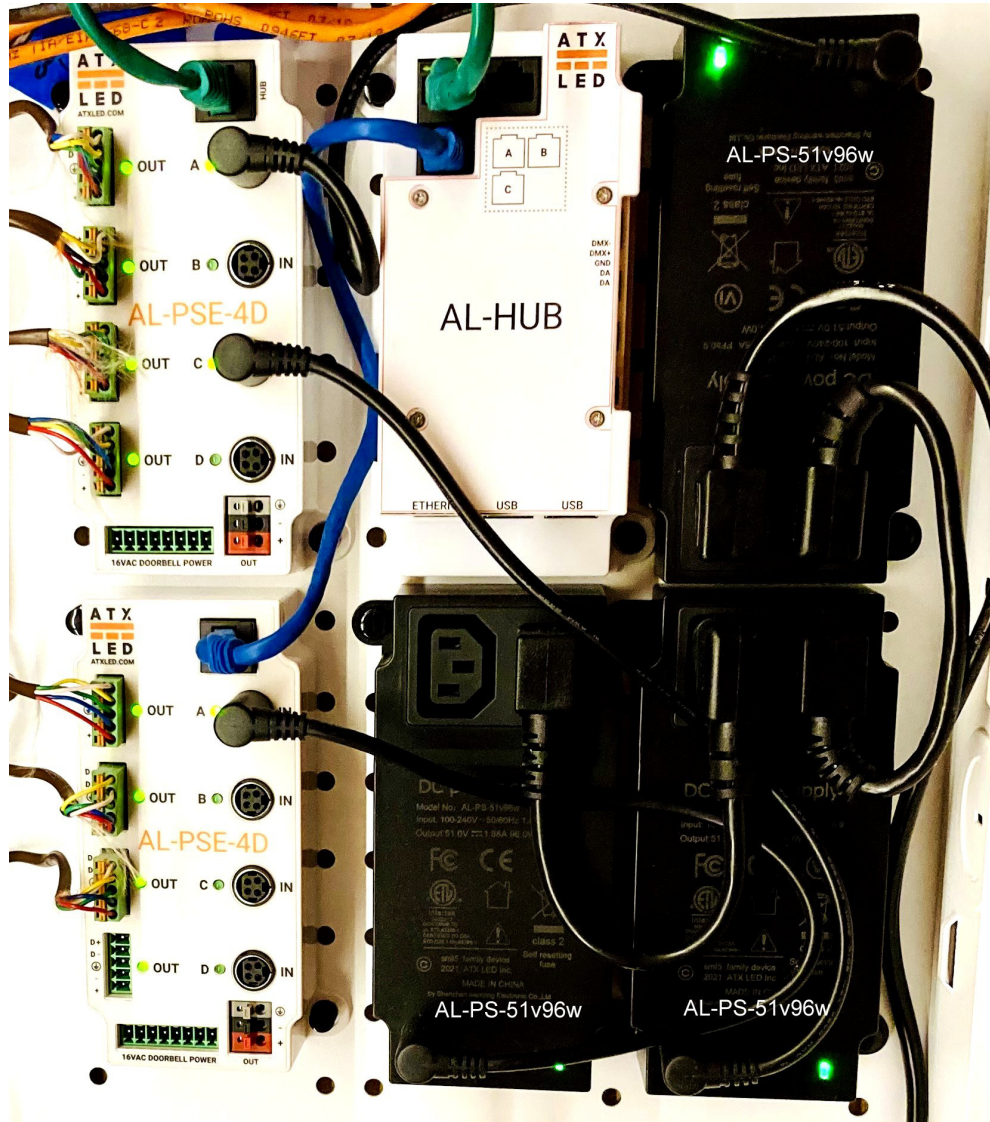
Min. DIN 4 Pin
(female)

Pin Assignment	
PIN No.	Output
1	+Vo
2	-Vo
3	+Vo
4	-Vo

Class 2 Safety

The AL-PSE-4D passes the power from a UL Listed, Class 2 power supply, thru the device out to the loads. The Class 2 specifications are preserved thru this device. Hardware lockouts prevent multiple inputs from being combined into power for one output. The device also enforces the Class 2 by shutting any output down if power demand exceeds the 100 watt limit for more than 1 minute.

Doorbell Camera Power

Power up to 4 Ring™ or similar Doorbells - The AL-PSE-4D provides 16 VAC power for doorbell operation. This makes the low voltage cabinet the center of the home automation system. This output is 16 V RMS – presented as a 250 mA current limited 32v peak to peak square wave, which will measure as 16vac.

# PoE (51v) general purpose Power output

The KF246 connector (Red, Black, Gray) is provided to source 51 volts for 802.3at and similar PoE switches. This output is shared with the D output. It is intended to be used to power a PoE switch or other 48v device. Red is +51v, black is -51v, gray is earth ground.

IEC 62386 DAbus control

The failover logic is coded into a microprocessor with a DAbus. This allows the system to precisely control the handling of any power outage, and notify cloud services in the event of any outage. Support for this device is built into ZWD; see our DAbus programming manual if you wish to write your own code. See the DALI Alliance web page for more info. All voltages and current can be read back This provides a great wealth of detail about the status of the devices on the power bus.

Topology

The AL-PSE-4D can work with the AL-WS-DR2 and other ATX LED switches to automatically learn and document the schematic of a house, with the wiring diagram created by monitoring the loads and connections. After a bus reset command, the PSE-4D will scan the DAbus, and detect any changes in the power used on each output connector, will record those wattages, resulting in a list of devices on each output.
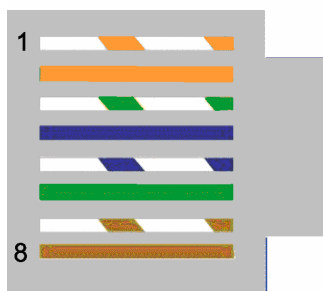
Hub Connector

Pin	Function
1	DA +
2	DA – (gnd)
3	NC
4	+ V (350 mA)
5	+ V (350 mA)
6	Ground
7	Ground
8	Ground

RJ45 pinout

RJ45 Connector and Status LEDs

The RJ45 connector is used to power the ATX LED hub and provide DALI data, it uses passive PoE.   Do not plug a laptop or router into this connector.   The Orange LED indicates that DALI power is available.   It will flash with traffic.   The Green LED indicates that internal power is operational.

Open and Short detection

The AL-PSE-4D will detect open outputs and leave them in low power standby until a load is detected.

If an output is shorted, it will be left connected to the input power supply.   Therefore, it is best to use a short circuit protected, current limited, power supply, such as the AL-PS-51v96w.   We cannot switch to a backup failover supply since that will impact other outputs.

A fuse is provided inside the device for unexpected shorted situations in failover mode when input A is not powered. If it blows, then the AL-PSE-4D will be limited to 1 amp in failover mode.   The fuse does not affect operation if input A is powered.

Failover

The AL-PSE-4D will operate with from 1 to 4 power supplies attached.   For full 400 watt operation, 4 power supplies are needed.   In the event that any input is not present (or fails) then the power will be routed to all 4 output connectors.

Suggested use:

The Top input (A) is for the reserve power or battery power in off-grid applications.   Power from A will be routed to the other outputs if any power is missing.   As B, C and D are powered, their output power will come directly from that input.   If B, C or D is missing, then the output power for B, C, D will be shared with A.   The load calculation will be represented in the rate of the LED blinking. Therefore, failover for each output will come from the A input.

If A power is missing, then the failover will come from B, C or D.   The AL-PSE-4D will route input power to all outputs, and calculate the sharing.

Load Shedding, Failover mode

If the AL-PSE-4D detects that the output load is greater than 2000 mA, it will send a reduced power command to the Al-WS-DR type devices attached.   This will be automatic and requires the topology to be known. If load shedding fails to bring the load below 2000 mA, then the Topology scan will be initiated.   Load shedding operates best in failover mode, but will also be triggered during normal operation if needed.

Load Shedding, Battery operation

If a backup battery is being used, use the ATX LED Hub to set the maximum current for the A input to match the power available. Default is 2000 mA (100 watts)

LED Status Display

Each Input/Output pair has 2 status LEDs. These green LEDs show the status as follows:

Input LED	Output LED	Status
Off	Off	Output shorted
On Dim	Off	Input has no power Output has no load
Off	On *	Output has power from a failover input
On	Off	Fault
On	On *	Operation Normal

* the output LEDs blink to indicate percentage of load available.   If mostly ON, then 2000 mA (typically) is available, if OFF, then 2000 mA is being used. Between full and no load, the On/Off ratio changes.

* Fast blinking indicates that Failover is requested but not possible.

DALI Commands Supported
Base Address

Notes: * = must be sent twice in 100ms,

ARC	ARC level 0-254		See OUTPUT brightness if Remote
32	Reset to defaults (don't change Short Address)		
42	Set all 8 inputs to this Max level		Default 254
43	Set all 8 inputs to this Min level		Default 0
			See DALI fade time table
46	Set OUTPUT On Time		15 = always on

128	Set Short Address		
129	Enable Memory Write		
144	Read Status		
145	Ping address	255	
147	Query On/Off of input # from DTReg2		
149	Query reset state		
150	Query missing short address	255 is missing	
151	Dali Version	1	
152	Read current DTReg		
153	Query DALI ballast type supported	6	
155	Query power fail status	255 if rebooted	
156	Query DTReg1		
157	Query DTReg2		
160	Query ARC Level of input # from DTReg2		
161	Query Max level of input # from DTReg2		
162	Query Min level of input # from DTReg2		
165	Query Fade Time	Setting * 16	
166	ATX OUTPUT HW Type	10	
194	Query Random High bits		
195	Query Random Middle bits		
196	Query Random Low bits		
197	Query Memory Bank address DTR1:DTR		
	Global DALI commands		Hex
256	Terminate		A1
257	Set DTR		A3
258	Initial Addressing Mode		A5
259	Randomize		A7
260	Compare Random Address		A9
261	Withdraw from Random Addressing		AB
264	Set High Byte		B1
265	Set Middle Byte		B3
266	Set Low Byte		B5
267	Set Short Address if match		B7
268	Query Short Address		B9
269	Query Long Address Match		BB
273	Set DTReg1		C3
274	Set DTReg2		C5
275	Write Data at Memory Bank DTR1:DTR	Send confirm	C7
276	Write Data at Memory Bank DTR1:DTR	no response	C9

Memory Bank 0

Address	Bank 0 Name	Bank 0 Value
0	Bytes per Bank (minus 1)	63
1	Checksum	Calculated
2	Number of Banks (minus 1)	3
3	UPC code – msb	722512407350
4	UPC code	
5	UPC code	
6	UPC code	
7	UPC code	
8	UPC code – lsb	
9	FW Version	
10	HW Version	
11	Serial Number – msb	Assigned by Master
12	Serial Number	
13	Serial Number	
14	Serial Number – lsb	
16	# of inputs	1, 2, 3, 4, or 8
21-24	MaxCurrent	Current Limit / 10 default is 200 (2000 mA)
37-63	User data	

Memory Bank 1-3

Address	Name	Value
0	Bytes per Bank (minus 1)	63
1	Checksum	Calculated
2	Number of Banks (minus 1)	3
3-63	User Storage	

Memory Bank 4

Address	8 or 16 bit	Name	Value
3	16	Up Time	Hours (8 years max)
7, 9, 11, 13	16	Volts In (D, C, B, A)	0 – 53000 mV
15, 17, 19, 21	16	Volts Out (D, C, B, A)	0 – 53000 mV
23, 25, 27, 29	16	Current Out (D, C, B, A)	0 – 2500 mA
31, 33, 35, 37	16	Current In (D, C, B, A)	0 – 2500 mA
39, 41, 43, 45	8	Relay State	Notes
40, 42, 44, 46	8	UPS State	Last UPS value
47, 49, 51, 53	16	dWatts (D, C, B, A)	0 – 1000 dWatts

Memory Bank 5

Address	Name	Value
0-255	Raw EEprom Data	

Memory Bank 6 - Topology

Address	Name	Value
0-63	Watts Recorded at this short address	Watts
64-127	Channel discovered	0=D, 1=C, 2=B, 3=A

Memory Bank 7

Address	Name	Value
0-15	Power On Self Test	All 0 expected
17, 18	AltV	0 to 51000 mV
19, 20	16 VAC rail P-P	0 to 25000 mV
21, 22	GFCI	0 to 52000 mV
23, 24	Vin (Max)	0 to 52000 mV
25, 26	Watts Total	0 to 400 Watts

Advanced individual Input Modes

DALI Commands Supported
at address/groups assigned to inputs

ARC	Copy ARC Level for 3-way processing for Address, Groups, Broadcast	
0	Status OUTPUT Off	
1	Status OUTPUT UP 8 steps	
2	Status OUTPUT Down 8 steps	
3	Status OUTPUT UP one step but don't turn on	
4	Status OUTPUT Down one step but not off	
5	Status OUTPUT Set to MAX level	
6	Status OUTPUT Set to Min level	
7	Status OUTPUT Down one step and Off if needed	
8	Status OUTPUT Up one step or on if needed	
33	Save level in DTReg	
42	Store DTR as new Max Level	
43	Store DTR as new Min Level	
96-111	Add to Group	For 3-way sync
112-127	Remove from Group	For 3-way sync
171	Query presence of AL-DALI-IO16 at this address, report level	
172	Query the DALI short address of the Relay8 hosting this address	
257	Load DTR	
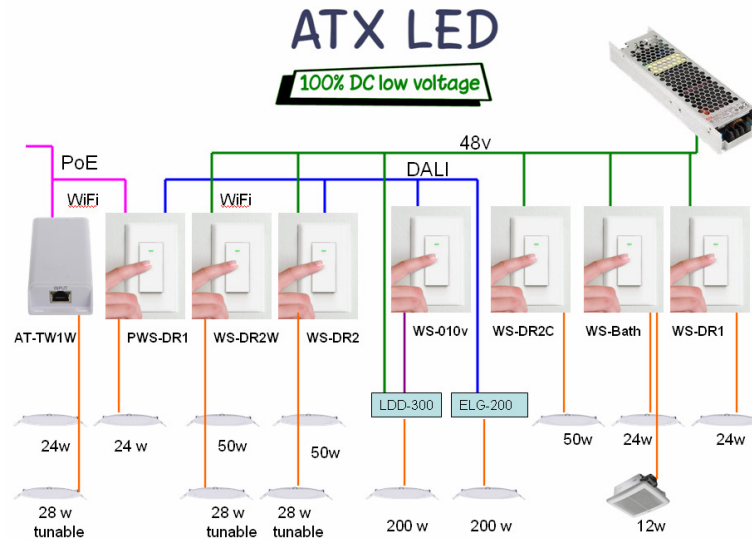
Ordering part numbers

Model	UPC Code
AL-PSE-4D	722512407350