

# ADLPS35-150

## Manual

rev. 1.0



150W Power Supply Card



# Contents

0	Document History .....	4
1	Introduction .....	5
1.1	Important Notes .....	5
1.2	Technical Support .....	5
1.3	Warranty .....	5
1.4	Return Authorization.....	5
1.5	Description of Safety Symbols .....	6
1.6	RoHS.....	6
2	Features.....	7
3	Input Noise Filtering.....	8
4	Connectors .....	9
4.1	Power Input .....	9
4.2	Power Output .....	10
5	Status LEDs.....	11
5.1	LED: Reverse Voltage.....	11
5.2	LED: Input Voltage .....	12
5.3	LED: Output Voltage .....	13
6	Electrical Characteristics .....	14
6.1	Input Power Characteristics .....	14
6.2	Temperature Derating .....	15
7	Mechanical Drawings .....	16
7.1	PCB: Outer Dimensions .....	16
7.2	PCB: Mounting Holes .....	17
7.3	PCB: Pin 1 Dimensions.....	18
7.4	PCB: Thermal Solution.....	19

## 0 Document History

Version	Changes
0.1	first pre-release
0.2	added paragraph on thermal solution
0.3	added dimensional drawings
1.0	added paragraph on input noise filtering, added drawing for thermally critical spots, added graph showing input power characteristics, several more additions and rearrangements



### **NOTE**

All company names, brand names, and product names referred to in this manual are registered or unregistered trademarks of their respective holders and are, as such, protected by national and international law.

# 1 Introduction

## 1.1 Important Notes

Please read this manual carefully before you begin installation of this hardware device. To avoid Electrostatic Discharge (ESD) or transient voltage damage to the board, adhere to the following rules at all times:

- You must discharge your body from electricity before touching this board.
- Tools you use must be discharged from electricity as well.
- Please ensure that neither the board you want to install, nor the unit on which you want to install this board, is energized before installation is completed.
- Please do not touch any devices or components on the board.



### **CAUTION**

As soon as the board is connected to a working power supply, touching the board may result in electrical shock, even if the board has not been switched on yet. Please also note that the mounting holes for heat sinks are connected to ground, so when using an externally AC powered device, a substantial ground plane differential can occur if the external device's AC power supply or cable does not include an earth ground. This could also result in electrical shock when touching the device and the heat sink simultaneously.

## 1.2 Technical Support

Technical support for this product can be obtained in the following ways:

- By contacting our support staff at +1 858-490-0597 or +49 (0) 271 250 810 0
- By contacting our staff via e-mail at [support@adl-usa.com](mailto:support@adl-usa.com) or [support@adl-europe.com](mailto:support@adl-europe.com)
- Via our website at [www.adl-usa.com/support](http://www.adl-usa.com/support) or [www.adl-europe.com/support](http://www.adl-europe.com/support)

## 1.3 Warranty

This product is warranted to be free of defects in workmanship and material. ADL Embedded Solutions' sole obligation under this warranty is to provide replacement parts or repair services at no charge, except shipping cost. Such defects which appear within 12 months of original shipment of ADL Embedded Solutions will be covered, provided a written claim for service under warranty is received by ADL Embedded Solutions no less than 30 days prior to the end of the warranty period or within 30 days of discovery of the defect – whichever comes first. Warranty coverage is contingent upon proper handling and operation of the product. Improper use such as unauthorized modifications or repair, operation outside of specified ratings, or physical damage may void any service claims under warranty.

## 1.4 Return Authorization

All equipment returned to ADL Embedded Solutions for evaluation, repair, credit return, modification, or any other reason must be accompanied by a Return Material Authorization (RMA) number. ADL Embedded Solutions requires a completed RMA request form to be submitted in order to issue an RMA number. The form can be found under the Support section at our website: [www.adl-usa.com](http://www.adl-usa.com) or [www.adl-europe.com](http://www.adl-europe.com). Submit the completed form to [support@adl-usa.com](mailto:support@adl-usa.com) or fax to +1 858-490-0599 for the USA office, or to [rma@adl-europe.com](mailto:rma@adl-europe.com) or fax to +49 (0) 271 250 810 20 to request an RMA from the European office in Germany. Following a review of the information provided, ADL Embedded Solutions will issue an RMA number.

## 1.5 Description of Safety Symbols

The following safety symbols are used in this documentation. They are intended to alert the reader to the associated safety instructions.



If you do not adhere to the safety advise next to this symbol, there is immediate danger to life and health of individuals!



If you do not adhere to the safety advise next to this symbol, there is danger to life and health of individuals!



If you do not adhere to the safety advise next to this symbol, there is obvious hazard to individuals, to environment, to materials, or to data.



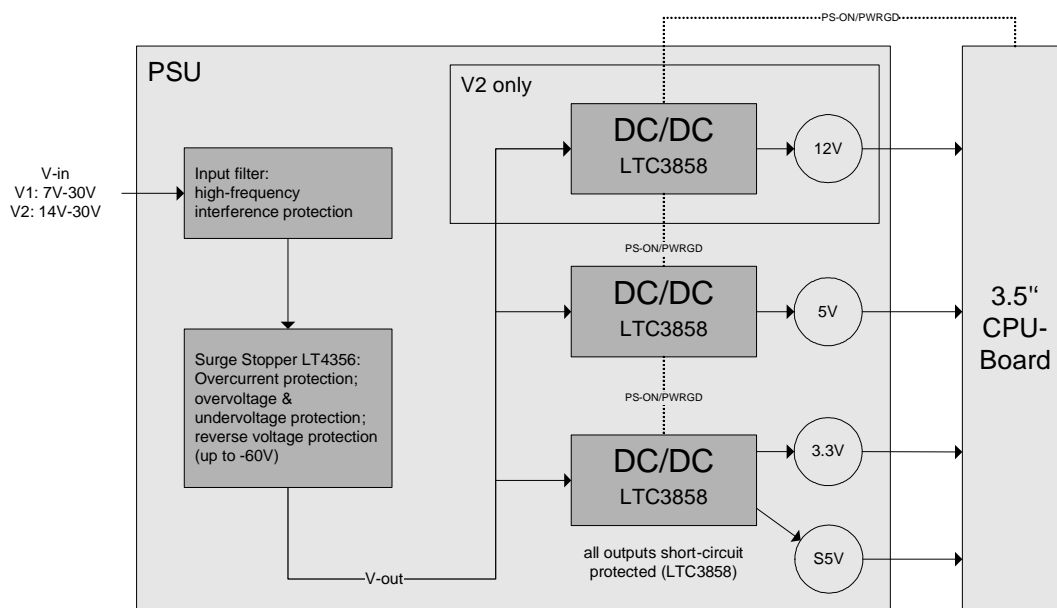
This symbol indicates information that contributes to better understanding.

## 1.6 RoHS

The PCB and all components are RoHS compliant (RoHS = Restriction of Hazardous Substances Directive). The soldering process is lead free.

## 2 Features

The ADLPS35-150 is a 150W PSU card for use with industrial motherboards, e.g. in the 3.5-inch form factor. Based on Linear Technology®'s LTC3858 two-phase DC/DC converter, it is available in two product variants, V1 allowing an input voltage ranging from 7V to 30V, and V2 allowing 14V to 30V. Both variants offer S5V/4A, 5V/20A and 3.3V/5A outputs with V2 offering an additional 12V/10A output. All other features are the same between both variants such as the max. input current of 15A and several protections on the input and on the output side (see list below). ATX compliant signals provide effective communication with the motherboard. The standard temperature range is 0-60° C. Extended temperature range is available with derating starting at 70° C. Regarding EM radiation, the module complies with the EN61000-6-2 and EN61000-6-4 industrial codes.



- Max. 150W power supply card
- Typical application: 3.5" motherboards
- Two variants V1 and V2
- Input voltage range V1: 7V-30V
- Input voltage range V2: 14V-30V
- Outputs: S5V/4A, 5V/20A, 3.3V/5A
- Additional output of 12V/10A (V2 only)
- All outputs except S5V switchable by asserting/de-asserting PS-ON
- Based on Linear Technology®'s LTC3858 two-phase DC/DC converter
- Input current limited to 15A
- Input protections: Overcurrent, overvoltage/undervoltage/surge, reverse voltage
- Output protections: Out-of-range voltage (monitored via PWRGD), short-circuit
- No on-board UPS capability
- ATX compliant signals available (PWRGD, PS-ON etc.)
- Temperature range: 0-60° C
- Extended temperature range on request (with derating)
- Format: 102mm x 50mm

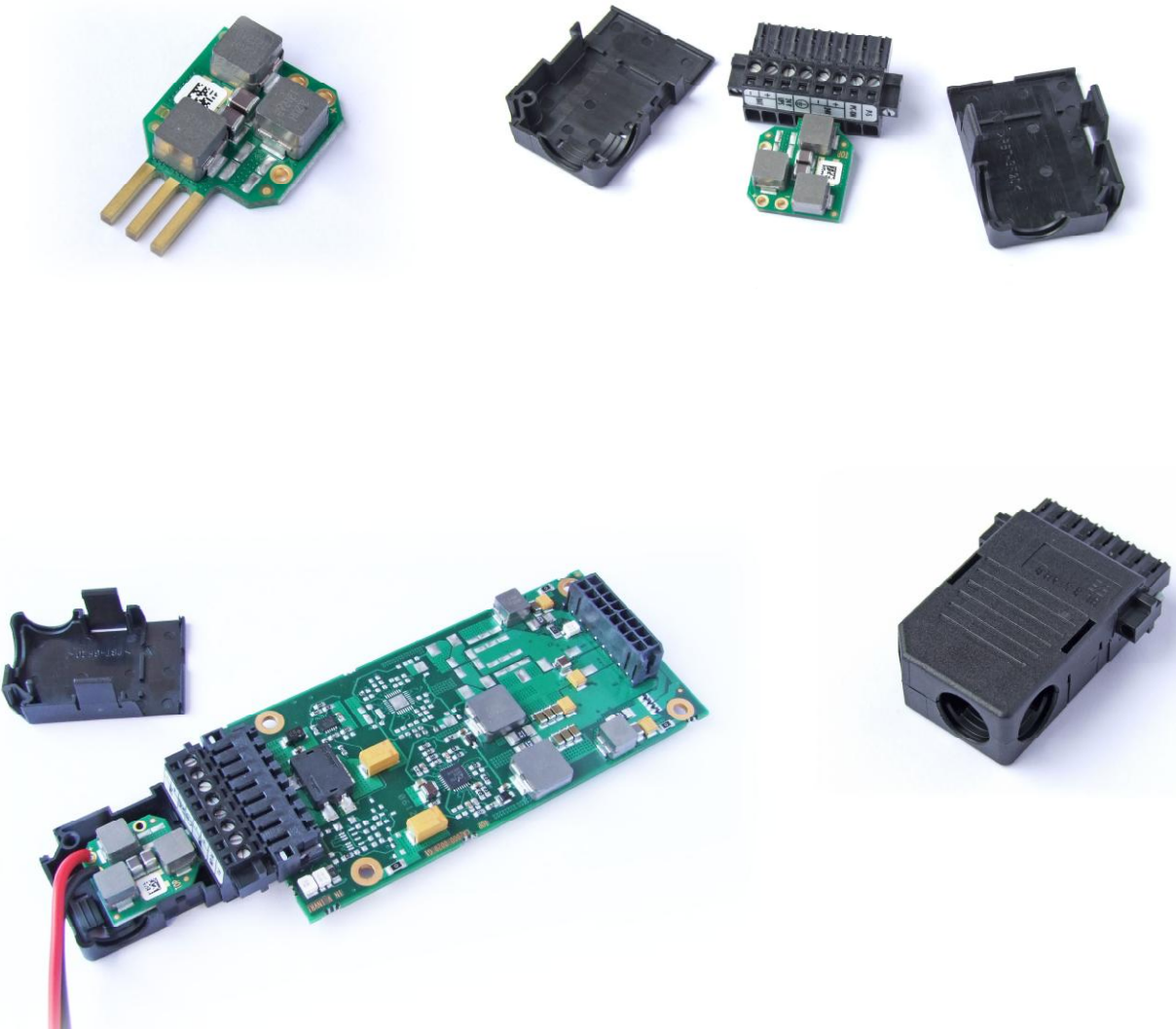
### 3 Input Noise Filtering

In some applications, the EM radiation emitted from the input power lines needs to be further reduced. For these situations there is a noise filter module available which integrates into the Weidmüller cable plug used for the input power connection. The combination of ADLPS35-150 and the filter module is suitable for devices which aim to comply with the EN55022 class B code (use in residential homes). The module and assembly are shown in the photographs below (Weidmüller plug 1615840000, housing 1745630000). Please contact your sales representative for obtaining this material.



#### **NOTE**

With the filter module installed, the assembly sustains currents of up to 5A. System designers must make sure that the temperature inside their device does not exceed the ADLPS35-150's specified temperature range.





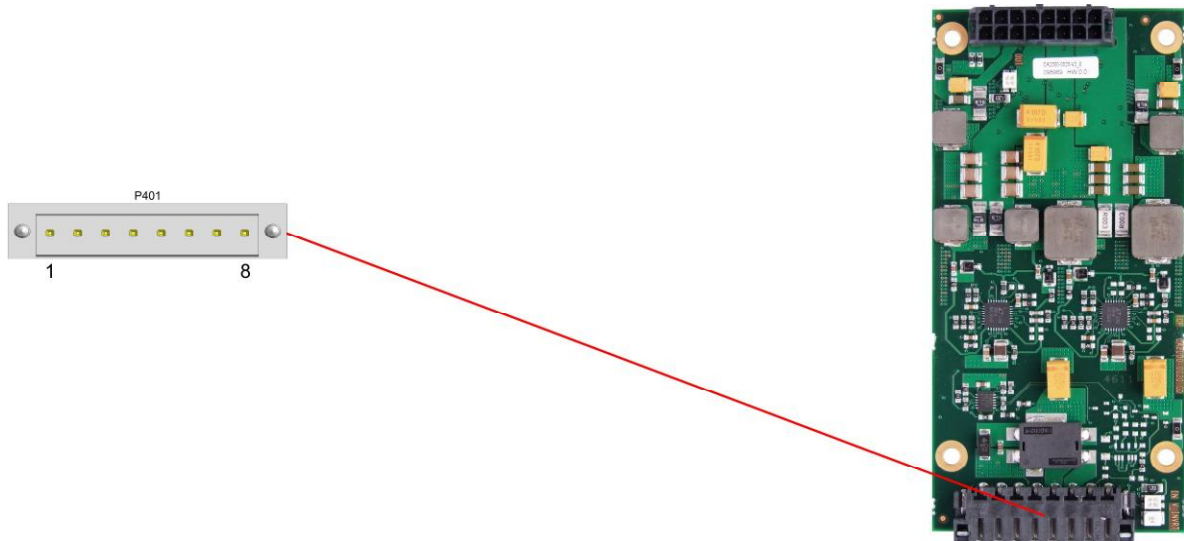
## 4 Connectors

### 4.1 Power Input

The input power supply of the ADLPS35-150 is realized via an 8pin connector (Weidmüller 1805370000), with the actual input voltage coming in at pins 5 and 6. Pin 7 provides ATX-PWRBTN functionality, which is best being used with GND (pin 1), rather than S\_GND. Pin 8 signals the current power status (high = ON, low = OFF).

**i** **NOTE**

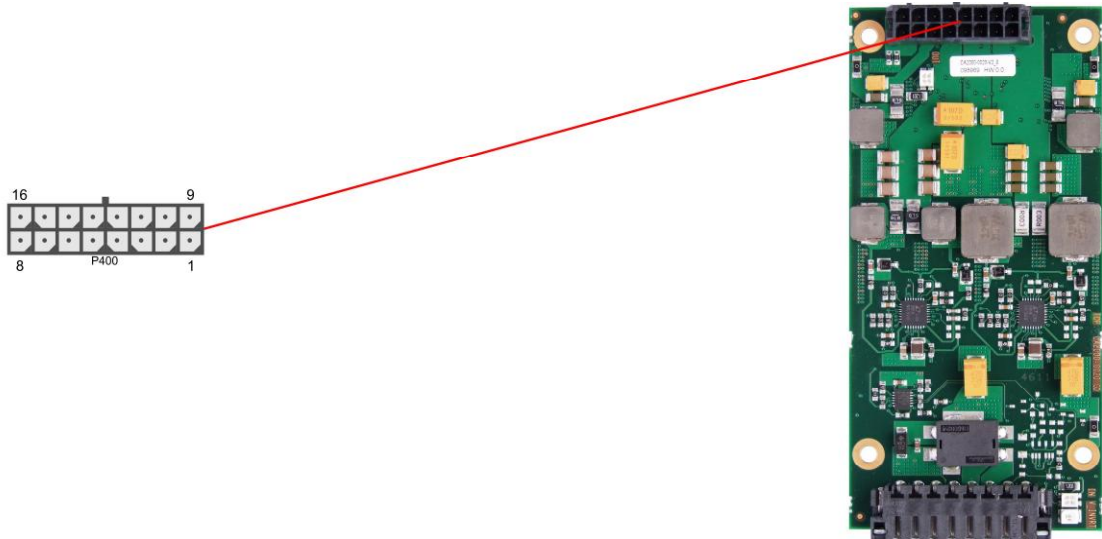
If PWRSTAT is set to "high", then this will be 5V on a V1 board and 12V on a V2 (max. 1A each).



Pin	Name	Description
1	GND	ground
2	N/C	reserved
3	N/C	reserved
4	S_GND	ground (shield)
5	P_VIN#	power supply -
6	P_VIN	power supply +
7	PWRBTN	power button
8	PWRSTAT	power status

## 4.2 Power Output

The output power is provided via a 2x8-pin connector (Molex PS 43045-16xx, mating connector: Molex PS 43025-16xx). The pinout corresponds to the 2x8-pin power connectors on many of our 3.5-inch motherboards, with the exceptions of pins 8 and 16 which are used to provide 3.3V output.



Description	Name	Pin	Name	Description	
5 volt supply	VCC	1	9	VCC	5 volt supply
5 volt supply	VCC	2	10	VCC	5 volt supply
ground	GND	3	11	GND	ground
ground	GND	4	12	GND	ground
12 volt supply	12V	5	13	12V	12 volt supply
standby-supply 5V	SVCC	6	14	PWRBTN#	powerbutton PSU
ATX power good	PWRGD	7	15	PS-ON	PSU on
3.3 volt supply	3.3V	8	16	3.3V	3.3 volt supply

### NOTE

Product variants allowing an input voltage range from 7V to 30V will not have 12V output available. Pins 5 and 13 are "Reserved" on those variants.

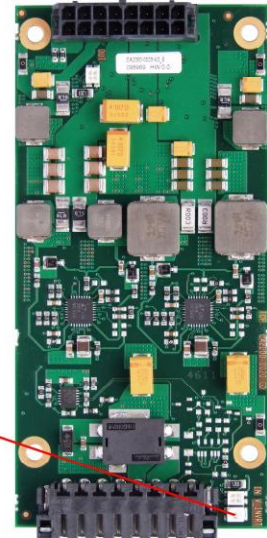
### NOTE

Should 3.3V not be needed, there's a soldering option available which disconnects pins 8 and 16 from the 3.3V line. The pins are then not connected to each other.

## 5 Status LEDs

### 5.1 LED: Reverse Voltage

Reverse voltage on the input side is signalled by a dedicated LED (solid red).

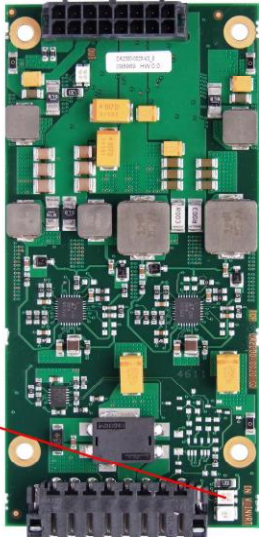


Status Codes LED:

Color	Interval	Meaning
none	solid	Input voltage: polarity OK (or Power Off)
Red	solid	Input voltage: polarity inverted

## 5.2 LED: Input Voltage

A two-colored LED indicates the status of the input voltage.

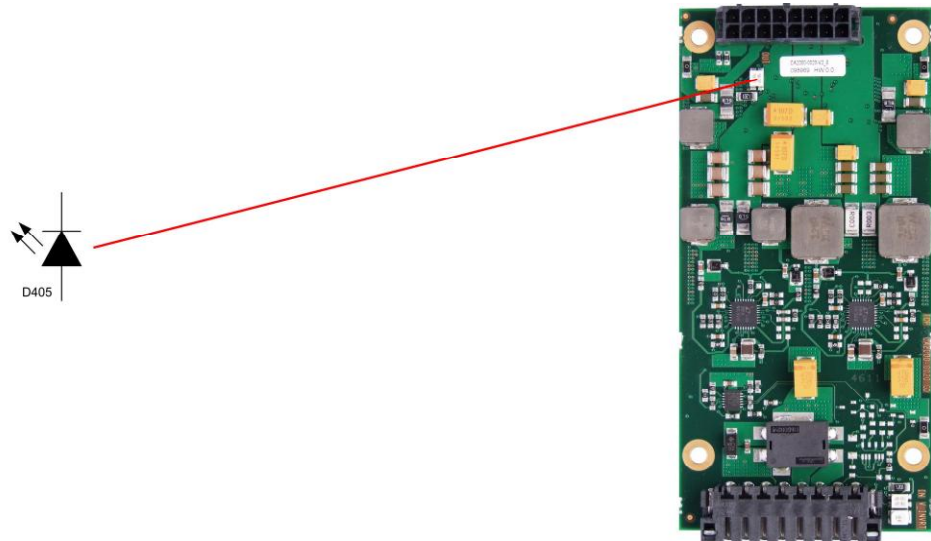


Status Codes LED:

Color	Interval	Meaning
none	solid	Power Off
Green	solid	Input voltage OK
Green & Red	flashing	Input voltage too high
Red	solid	Input voltage too low

### 5.3 LED: Output Voltage

Status information regarding the output voltage is provided by a two-colored LED.



Status Codes LED:

Color	Interval	Meaning
none	N/A	Power Off or S5V OK while PWRGD de-asserted
Green	solid	All Output voltages OK
Red	solid	S5V is Off



#### **NOTE**

The green color is triggered by the ATX-PWRGD signal. If, for whatever reason, the CPU board de-asserts PWRGD, the green color will cease to show, even though the PSU works just fine.

## 6 Electrical Characteristics

### 6.1 Input Power Characteristics

The ADLPS35-150 has the following output power limits:

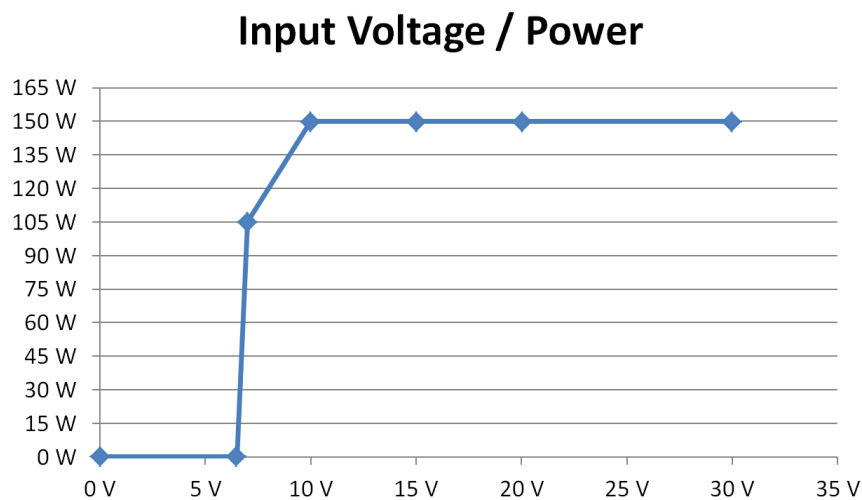
- 5V: max. 4A
- 5V: max. 20A
- 3.3V: max. 5A
- (V2:) 12V: max. 10A

If input power is provided, 5V will always be there. All other voltages can be switched on or off via PS-ON.

Input power limits are as follows:

- Max. Voltage: 30V
- Max. Current: 15A
- Max. Power: 150W

For the V1 variant (7V-30V input), this leads to a profile as shown in the following graph:



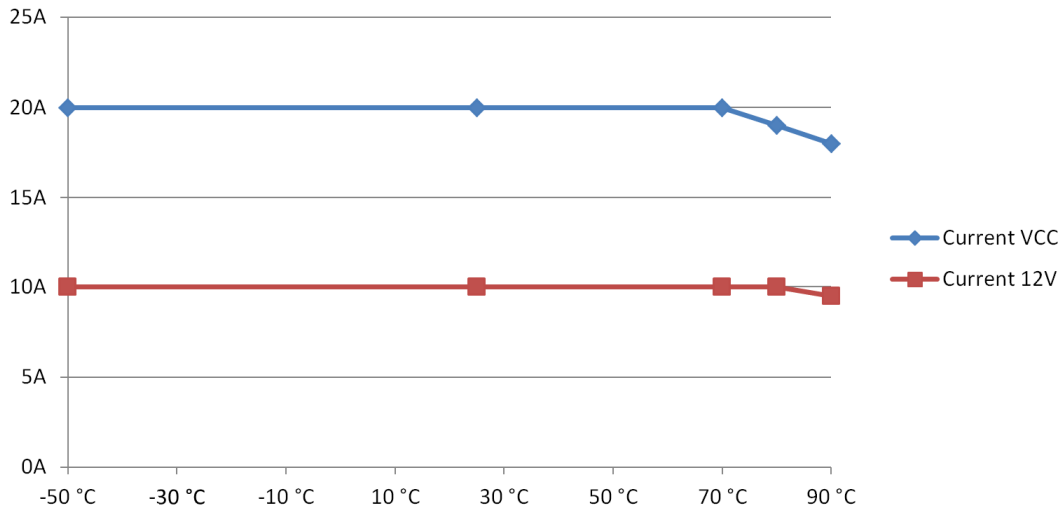
#### **CAUTION**

While the module is protected against Surge and Burst as defined in the EN55024 and EN61000-6-4 industrial codes, exceeding the 30V input voltage limit for longer periods of time will inevitably result in damage and, ultimately, destruction of the module.

## 6.2 Temperature Derating

The ADLPS35-150 can be ordered for operation in an extended ambient temperature range of -25° C to 85° C. In this case, derating applies for temperatures above 70° C as follows:

Temperature	S5V	3.3V	5V	12V
70° C	4A	5A	20A	10A
80° C	4A	5A	19A	10A
90° C	4A	5A	18A	9.5A



### NOTE

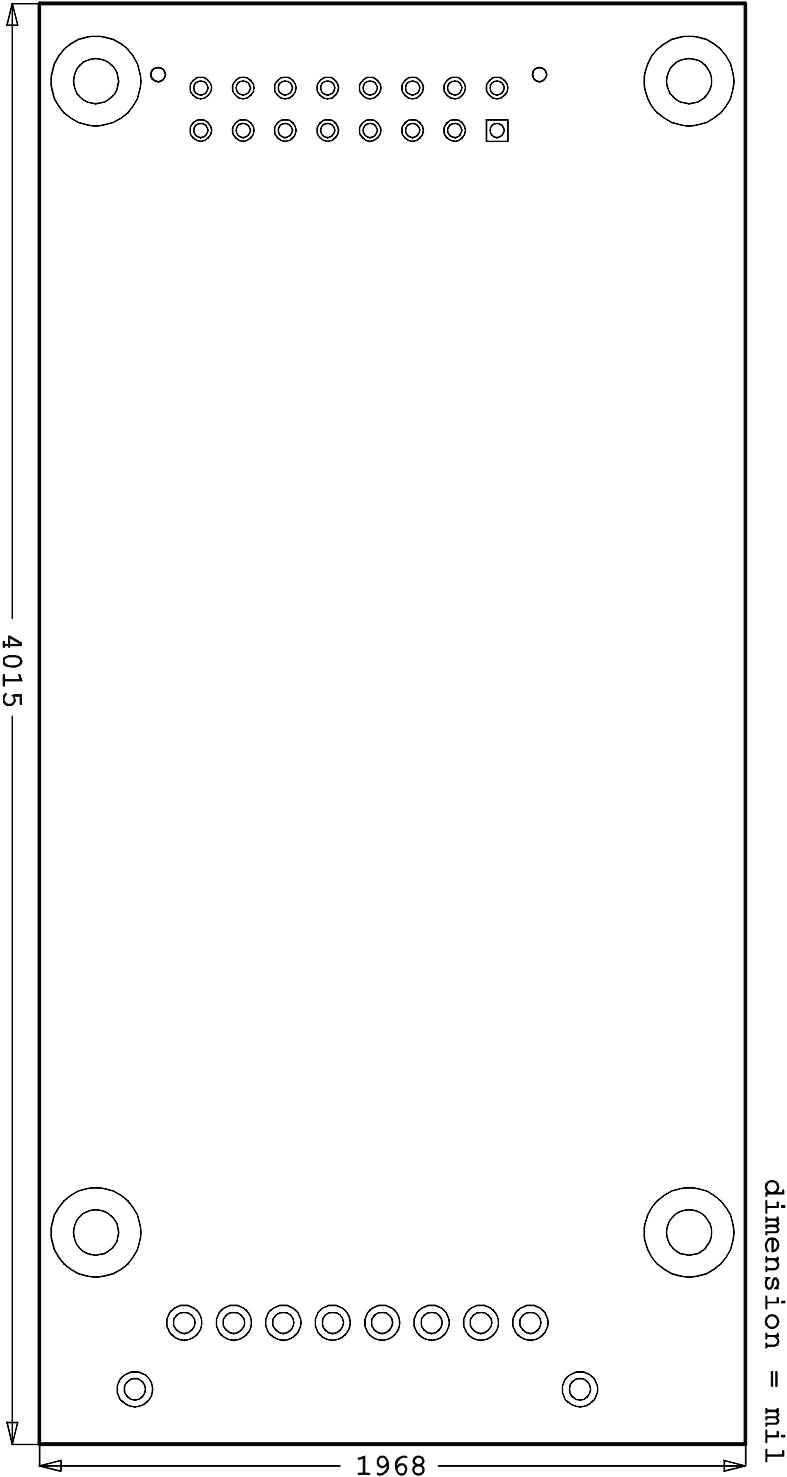
These figures will deteriorate drastically if an insufficient thermal solution is used for the power transistors.

# 7 Mechanical Drawings

## 7.1 PCB: Outer Dimensions

**i** **NOTE**

All dimensions are in mil (1 mil = 0,0254 mm)

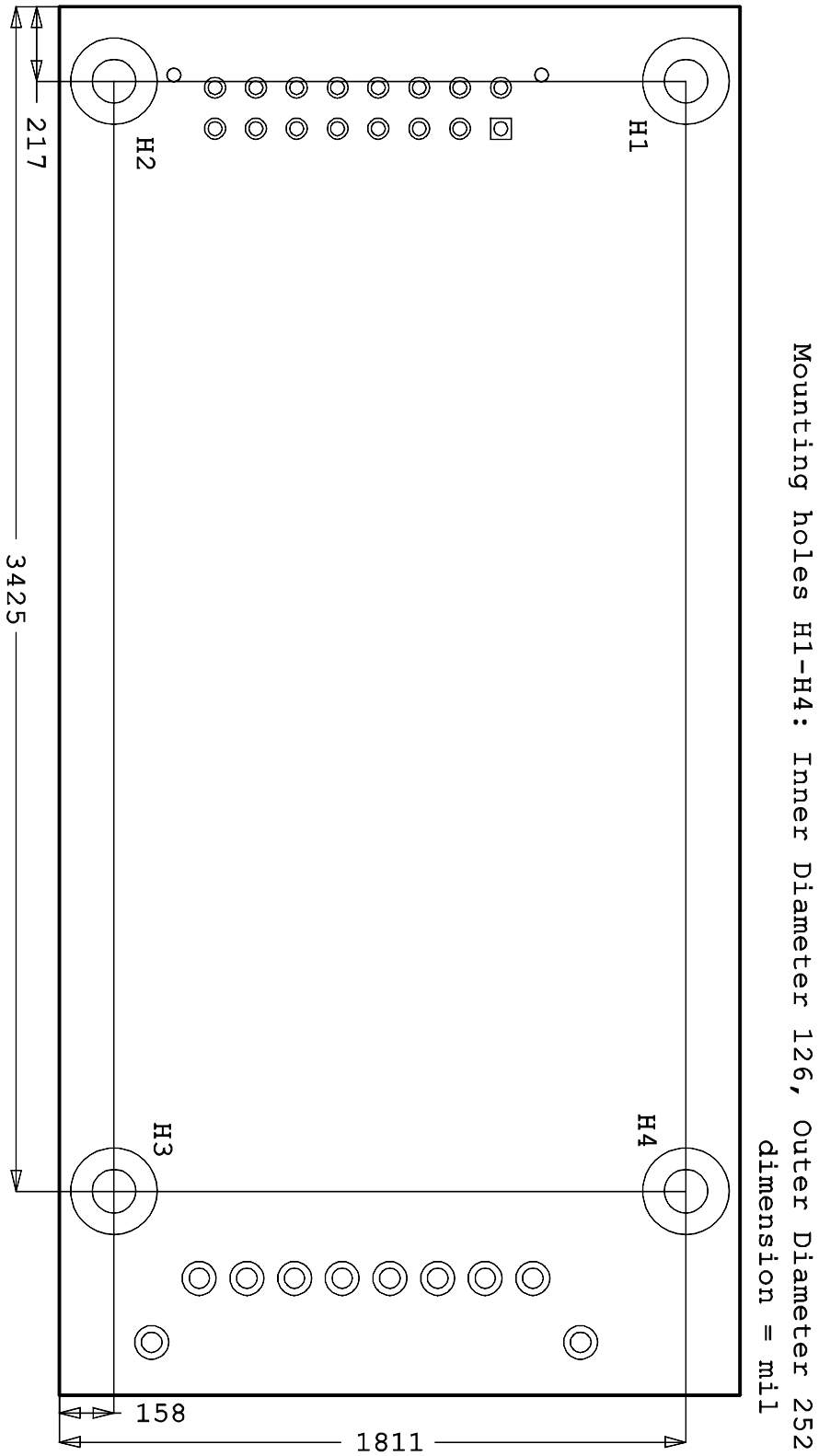




### 7.2 PCB: Mounting Holes

**i** **NOTE**

All dimensions are in mil (1 mil = 0,0254 mm)

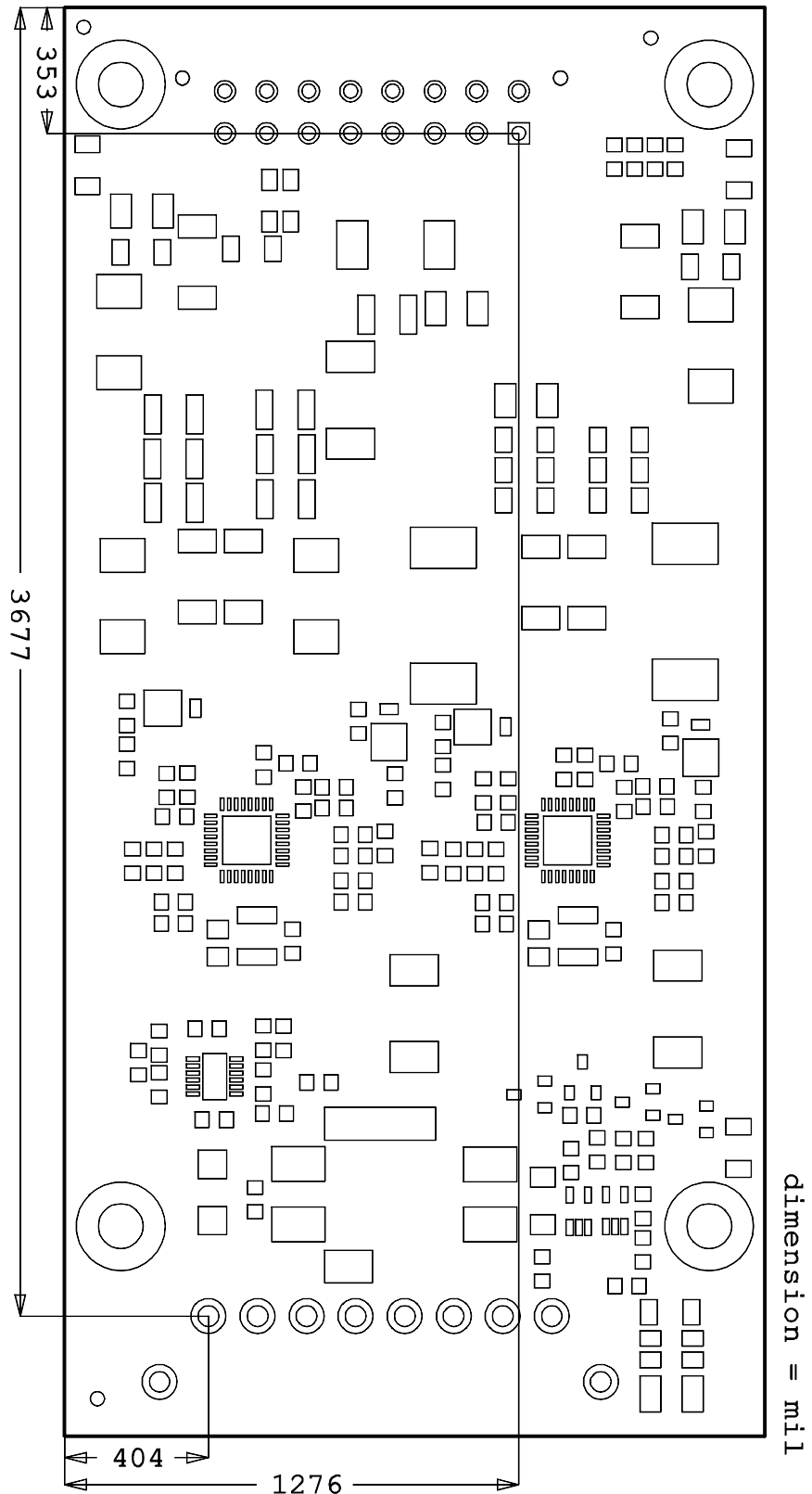


### 7.3 PCB: Pin 1 Dimensions



#### NOTE

All dimensions are in mil (1 mil = 0,0254 mm)



### 7.4 PCB: Thermal Solution

The ADLPS35-150 needs an appropriate cooling solution which mounts on the bottom side. The components which need attention are colored in the drawing below.

**i** **NOTE**

Most of these components carry a current on the outside of their metal housing. Therefore, only isolating materials can be used for the direct contact between cooling solution and component.

**i** **NOTE**

The drawing below is in TOP view. BOTTOM view would be mirror-inverted.

