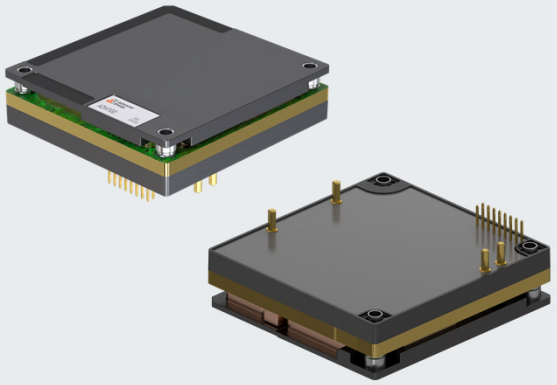
ADH1100380S50B SERIES

1100 W Half-Brick DC-DC High Voltage Input Converter



PRODUCT DESCRIPTION

Advanced Energy's ADH1100380S50B is an isolated output digital control DC-DC converter. It delivers up to 1100 W with 50 VDC output voltage. Ultra high peak efficiency of 96.9% and excellent thermal performance makes it an ideal choice to supply power to a power amplifier in telecom and data-com. It can produce full power over an operating temperature range of -20^{O}C to 85^{O}C with forced air cooling. A PMBus™ interface is also provided for flexible digital control and monitoring.

AT A GLANCE

Total Power

1100 W

Input Voltage

350 to 420 Vdc

# of Outputs

Single

SPECIAL FEATURES

- 1100 W continuous power
- Ultra-high efficiency 96.9% peak
- Input range: 350 to 420 Vdc
- Base-plate for contact cooling
- Excellent thermal performance
- Power good function
- No minimum load requirement
- Separately parallel operation, active current sharing
- Separately series operation
- Remote control function (negative logic)
- Remote output sense
- PMBus™ function
- High reliability
- RoHS 3.0
- Reinforced insulation
- Pin length option: 4.8mm
- 2 years warranty (consult factory for extended terms)
- Input under voltage lockout
- Input over voltage lockout
- Output over current protection
- Output over voltage protection
- Over temperature protection

SAFETY

- IEC/EN/UL/CSA 62368-1
- CE Mark

TYPICAL APPLICATIONS

- Industry
- Datacom
- Telecom
- Computing and storage

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SECTION 1 MODEL NUMBERS

Standard	Output Voltage	Output Current	Logic	PMBus™
ADH1100380S50B4LI	50Vdc	22A	Negative Enable	Yes

Order Information

ADH1100	380	S	50		B	4	L	I	X
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

①	Model series	ADH: high efficiency half brick series, 1100: output power 1100W
②	Input voltage	380: 350V to 420V input range, rated input voltage 390V
③	Output number	S: single output
④	Rated output voltage	50: 50V output
⑤	Remote ON/OFF logic	Blank: negative logic P: positive logic
⑥	Baseplate	B: with baseplate
⑦	Pin length	4: 4.80mm±0.5mm
⑧	RoHS status	L: RoHS 3.0
⑨	PMBus™ interface Option	I: With PMBus
⑩	Other options	X = Omit this digit for standard version. X can be one character to note difference variants.

Options

None

SECTION 2 ELECTRICAL SPECIFICATIONS

2.1 Absolute Maximum Ratings

Stress in excess of those listed in the "Absolute Maximum Ratings" may cause permanent damage to the power supply. These are stress ratings only and functional operation of the unit is not implied at these or any other conditions above those given in the operational sections of this TRN. Exposure to any absolute maximum rated condition for extended periods may adversely affect the power supply's reliability.

Table 1. Absolute Maximum Ratings

Parameter	Model	Symbol	Min	Typ	Max	Unit
Input Voltage Operating-Continuous	All models	$V_{IN,DC}$	-	-	420	Vdc
Maximum Output Power	All models	$P_{O,max}$	-	-	1100	W
Isolation Voltage[1,2] Input to Output Input to Baseplate	 All models All models		 - -	 - -	 4000 2500	 Vdc Vdc
Ambient Operating Temperature	All models	T_A	-20	-	+85	^{O}C
Storage Temperature	All models	T_{STG}	-55	-	125	^{O}C
Voltage at Remote ON/OFF Pin	All models		-	-	12	Vdc
Control Pins Voltage (to Sig_gnd): ADDR , CLK, DATA, ACNOK, BNOK, UART_RX, UART_TX, Salert, Trim	All models		-0.3	-	3.6	Vdc
Humidity (non-condensing) Operating Storage	 All models All models		 - -	 - -	 90 95	 % %
Altitude Operating	All models				3048	m

Note 1 - Ensure three mounting holes of baseplate maintain reliable connection with earth.
Note 2 - Input to output is reinforced insulation, its isolation voltage is tested without baseplate. Input to baseplate is basic insulation. 1mA for 60s, slew rate of 1500V/10s. pollution degree 2.

SECTION 2 ELECTRICAL SPECIFICATIONS

2.2 Input Specifications

Table 2. Input Specifications

Parameter	Condition[1]	Symbol	Min	Typ	Max	Unit
Operating Input Voltage, DC	All	$V_{IN,DC}$	350	390	420	Vdc
Turn-on Voltage Threshold	All	$V_{IN,ON}$	-	335	349	Vdc
Turn-off Voltage Threshold	All	$V_{IN,OFF}$	-	320	345	Vdc
Input Over Voltage Protection	All		430	450	-	Vdc
Maximum Input Current	$V_{IN,DC}$ = 350Vdc $I_O = I_{O,max}$	$I_{IN,max}$	-	-	3.6	A
No Load Input Current	$V_{IN,DC}$ = 390Vdc		-	15	-	mA
Standby Input current	Remote OFF		-	15	-	mA
Recommended Input Fuse	Fast blow external fuse recommended		-	-	10	A
Recommended External Input Capacitance[2]	Low ESR capacitor recommended	C_{IN}	330	-	-	uF
Operating Efficiency	READ_TEMP1 = 25^{O}C $V_{IN,DC}$ = 390Vdc $I_O = I_{O,max}$	η	-	96.9	-	%

Note 1 - Tested with the application circuit as Figure 17. Ta = 25 ^{O}C, Vin = 390Vdc, nominal Vout unless otherwise indicated.
Note 2 - If hold-up time is 20ms, at 25^{O}C Ta, 390Vin, Vonom, and full load, the input capacitance must be greater than 900uF.

SECTION 2 ELECTRICAL SPECIFICATIONS

2.3 Output Specifications

Table 3. Output Specifications

Parameter		Condition[1]	Symbol	Min	Typ	Max	Unit
Factory Set Voltage		$V_{IN,DC}$= 390Vdc I_O = 50% $I_{O,max}$	$V_{O,factory}$	49.5	50	50.5	Vdc
Output Voltage Total Regulation		All	$\%V_O$	-5	-	+5	%
			V_{AUX}	9.6	-	13	Vdc
Output Voltage Line Regulation			V_O	-	20	350	mV
Output Voltage Load Regulation			V_O	-	400	1000	mV
Output Voltage Temperature Regulation		All	$\%V_O$	-	-	0.02	%/°C
Output Voltage Adjustment Range[2]		380V≥ $V_{IN,DC}$ ≥350 V 420V≥ $V_{IN,DC}$ >380 V	%Vo %Vo	-5 -5	- -	5 12	% %
Output Ripple, PK-PK[3]		20MHz Bandwidth	$V_{O,ripple}$	-	-	700	mV_{PK-PK}
Output Current		Without AIH03	I_O	0	-	22	A
		With AIH03	I_O	0	-	20	A
			$I_{O,AUX}$	0	-	0.1	A
Output DC current-limit inception[4]				23	-	50	A
Vo Load Capacitance[5]		All	C_O	906	-	4000	uF
			C_{AUX}	22	-	450	uF
Dynamic Response Peak Deviation		I_O = 20% to 70% to 20% Io_nom, 1A/uS	$\%V_O$	-	±5	-	%
Turn-on Transient	Rise Time	I_O = $I_{O,max}$	T_{rise}	-	-	300	mS
	Turn-on Delay	By DC input	-			1000	mS
	Turn-on Delay	By Enablel	-	-	-	500	mS
	Turn-on Overshoot	All	Vo	-	-	2500	mV
Remote ON/OFF control (Negative default, positive available) Off-state voltage On-state voltage		 All All		 2.4 -0.3	 - -	 12 0.8	 Vdc Vdc
Output Over-voltage Protection[6]		All	Vo	57	-	68	Vdc
Output Over-temperature Protection[7]		Baseplate	$T_{Baseplate}$	95	-	130	°C
Power Good Function[8] (Positive Logic) Power Not-good State Power-good State Sink Current		 All All All		 -0.3 2.4 -	 - - -	 0.8 12 10	 Vdc Vdc mA

Note 1 - Tested with the application circuit as Figure 17. Ta = 25°C, Vin = 390Vdc, nominal Vout unless otherwise noted.

Note 2 - When the output voltage is increased, the maximum output power does not exceed 1100W. When the output voltage is decreased, the maximum output current does not exceed 22A.

Note 3 - Tested with the circuit of Figure 17.

Note 4 - Latch after 3 times hiccup. If the module works normally for more than 2s after OCP restart, the count is cleared.

Note 5 - High frequency and low ESR are recommended.

Note 6 - Latch off. When the module is Latched, the module can be restored by the following methods: Turn off the Vin power and wait until the Aux VCC (Pin 21) drops below 1V, then turn on the Vin power to restart the module.

Note 7 - Auto recovery. Temperature protect (OTP) test point is the middle of baseplate. Vin=390V.

Note 8 - The Power Good function will exhibit a logic-High when the unit is operating correctly and a logic-Low when the unit is in fault condition and not supplying power. The Power Good function is open drain need external pull-up resistor.

ELECTRICAL SPECIFICATIONS

ADH1100380S50B4LI Performance Curves

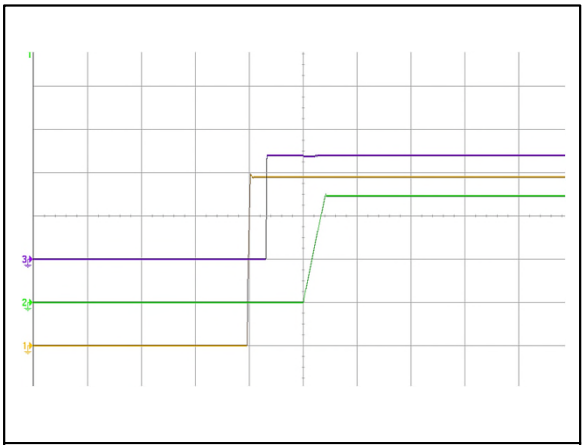


Figure 1: Output voltage startup by power on
(500mS/div) Vin=390V, Io=22A
Ch 1: Vin (100V/div) Ch 2: Vo (20V/div) Ch 3:Vaux(5V/div)

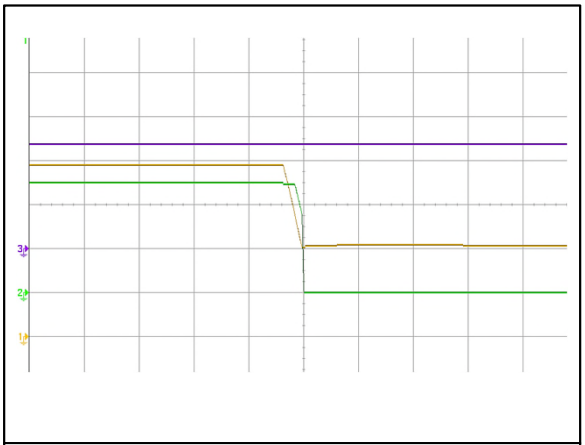


Figure 2: Output voltage shut down by power off
(50mS/div) Vin=390V, Io=22A
Ch 1: Vin (100V/div) Ch 2: Vo (20V/div) Ch 3:Vaux(5V/div)

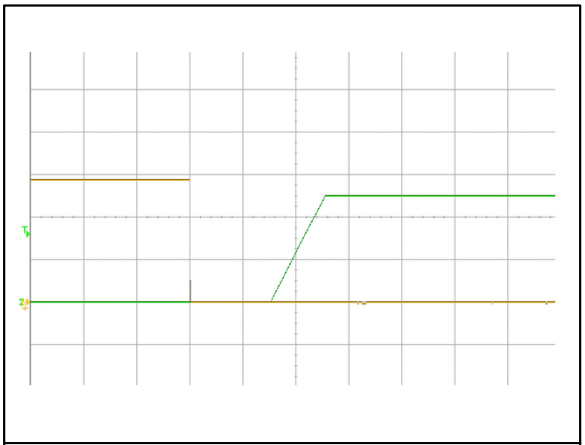


Figure 3: Output voltage startup by remote ON
(200mS/div) Vin=390V, Io=22A
Ch 1: Remote ON (1V/div) Ch 2: Vo (20V/div)

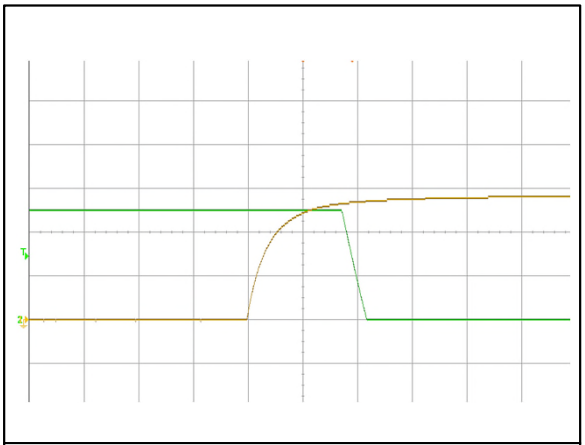


Figure 4: Output voltage startup by remote OFF
(10mS/div) Vin=390V, Io=22A
Ch 1: Remote OFF (1V/div) Ch 2: Vo (20V/div)

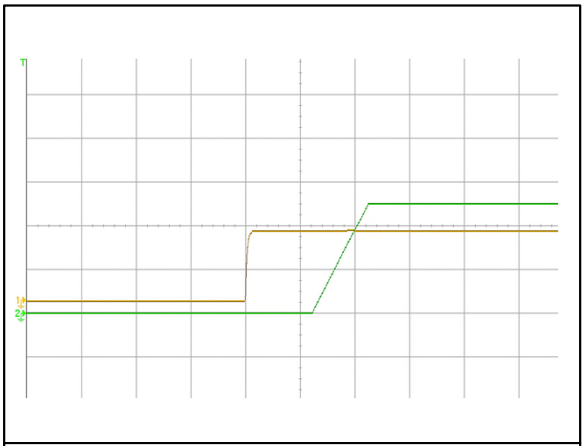


Figure 5: Output voltage startup by BNOK ON
(200mS/div) Vin=390V, Io=22A
Ch 1: BNOK ON (2V/div) Ch 2: Vo (20V/div)

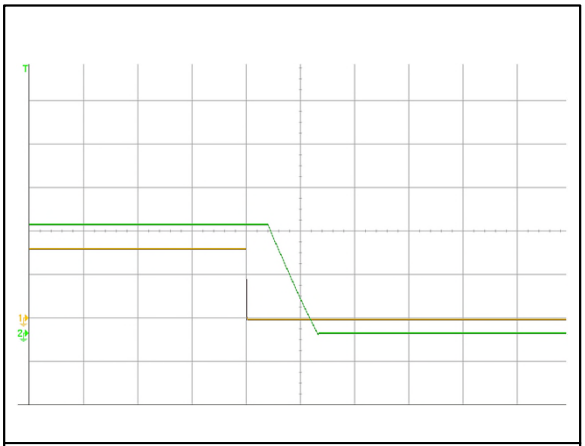


Figure 6: Output voltage startup by BNOK OFF
(5mS/div) Vin=390V, Io=22A
Ch 1: BNOK OFF (2V/div) Ch 2: Vo (20V/div)

ELECTRICAL SPECIFICATIONS

ADH1100380S50B4LI Performance Curves

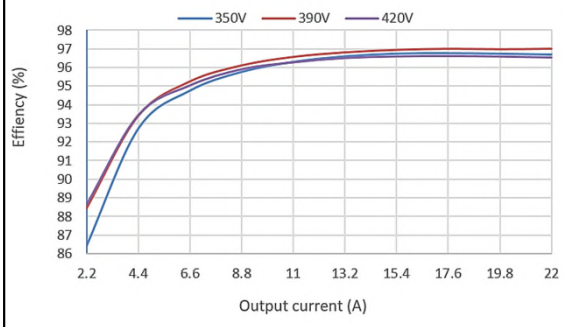


Figure 7: Efficiency vs Output Power

Ta=25°C,Vin=350V, Vin=390V,Vin=420V

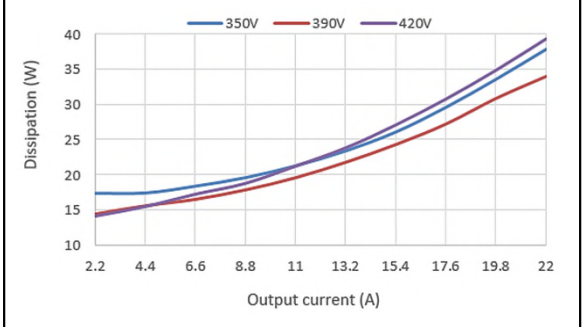


Figure 8: Power Loss vs Output Power

Ta=25°C,Vin=350V, Vin=390V,Vin=420V

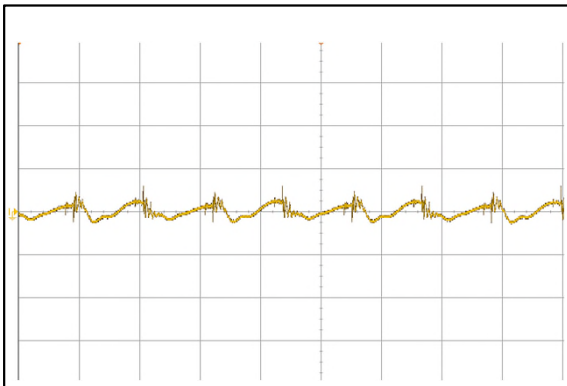


Figure 9: Ripple and Noise Measurement

Ch1 : Vo (2uS/div, 20mV/div) Vin=390V, Io=22A

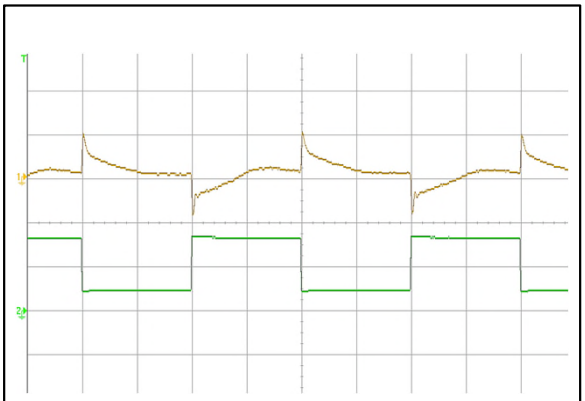


Figure 10: Transient Response (2mS/div)
50% load step(20%~70%~20%) , 1A/μs slew rate Vin=390V
Ch 1: Vo (500mV/div) Ch 2:Io (10A/div))

SECTION 2 ELECTRICAL SPECIFICATIONS

2.4 PMBus™ Signal Interface Characteristics

Table 4. PMBus™ Signal Interface Characteristics[1]					
Parameter	**Conditions**	**Min**	**Typ**	**Max**	**Unit**
Input High Voltage (Clock, Data, ACNOK, BNOK, UART_RX, UART_TX)		2.1	-	3.6	V
Input Low Voltage (Clock, Data, ACNOK, BNOK, UART_RX, UART_TX)		0	-	0.8	V
Input High Level Current (Clock, Data, ACNOK, BNOK, UART_RX, UART_T)		-2.5	-	2.5	mA
Output Low Voltage (Clock, Data, Salert)	I_O = 2mA	0	-	0.4	V
PMBus Operation Frequency		100			kHz

Note 1 - Reading accuracy and resolution at typical Vonom and typical Vin when the temperature above 20^{O}C.

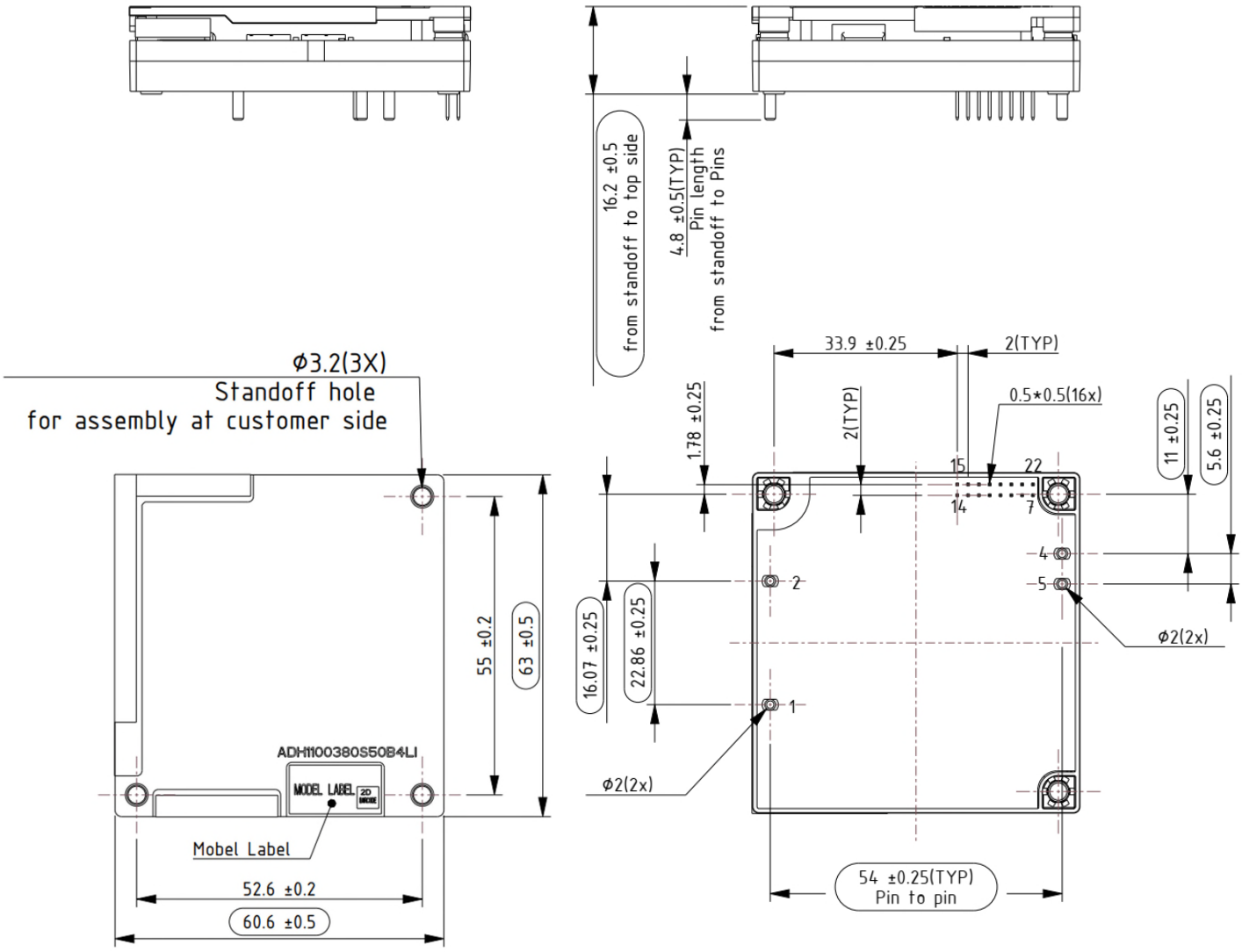
2.5 Measurement System Characteristics

Table 5. Measurement System Characteristics					
Parameter	**Conditions**	**Min**	**Typ**	**Max**	**Unit**
Output Current Reading Accuracy[1]	I_O = 0% to 100% Io_nom	-2.5	-	2.5	A
Output Voltage Reading Accuracy[1]		-2	-	2	%
Input Voltage Reading Accuracy[1]		-5	-	5	%
Temperature Reading Accuracy	T_A > 0^{O}C	-5	1	5	^{O}C
Temperature Reading Resolution	T_A > 0^{O}C	-	1	-	^{O}C

Note 1 - Reading accuracy and resolution at typical Vonom and typical Vin when the temperature above 20^{O}C.

SECTION 3 MECHANICAL SPECIFICATIONS

3.1 Mechanical Pin Dimension (unit: mm)



UNIT: mm (inch) L=4.80mm

TOLERANCE: X.X mm±0.5mm [X.XX in.± 0.02in.]
X.XX mm±0.25mm[X.XXX in.±0.01in.]
Pin 1,2, 3(empty),4,5,6(empty) : 2.0mm DIA
Pin 7~22: 0.5mm DIA
Height: 16.2mm, 16.5mm max, 15.7mm min

Note: Dimensions within the box are critical dimensions.

Figure 11： Mechanical Diagram

SECTION 3 MECHANICAL SPECIFICATIONS

3.3 Pin Definitions

Pin No	Name	Function
1	Vin+	Positive Input Voltage
2	Vin-	Negative Input Voltage
3	NC	NC
4	Vo-	Negative Output Voltage
5	Vo+	Positive Output Voltage
6	NC	NC
7	S-	Negative Remote Sense
8	PG	Power Good
9	Sig_gnd	PMBus Interface
10	SDA	PMBus Interface
11	Salert	PMBus Interface
12	SCL	PMBus Interface
13	ACNOK	PFC OK After Isolated
14	BNOK	PFC Bulk Voltage OK After Isolated
15	UART_RX	Communication with PFC Module
16	UART_TX	Communication with PFC Module
17	Addr	PMBus Interface
18	Ishare	Current Share
19	Trim	Output Voltage Trim
20	Remote ON/OFF	Remote Control
21	Aux VCC	Aux O/P
22	S+	Positive Remote Sense

3.4 Pin Size

Device Code Suffix	Pin Size
4	4.8mm±0.5mm
6	3.8mm±0.5mm
8	2.8mm±0.5mm
None	5.8mm±0.5mm

SECTION 4 ENVIRONMENTAL SPECIFICATIONS

4.1 EMC Immunity

ADH1100380S50B series power supply is designed to meet the following EMC immunity specifications.

Table 6. EMC Immunity

Test Item	Standard	Test Level	Criteria
Conducted Emission	EN55032 DC Input	/	Class A

4.2 Input Fusing

ADH1100380S50B fuse is fast blow type. An external fuse is recommended. To meet international safety requirements, a 500Vdc rated fuse should be used. Recommended rating is maximum 10A for the converter. .

4.3 Safety Certifications

The ADH1100380S50B series module is intended for inclusion in other equipment and the installer must ensure that it is in compliance with all the requirements of the end application. This product is only for inclusion by professional installers within other equipment and must not be operated as a stand alone product.

Table 7. Safety Certifications for ADH1100380S50B

Standard	Agency	Description
UL/CSA62368-1	UL+CUL	US and Canada Requirements
IEC62368-1	CB	International Requirements
CE		CE Marking

SECTION 4 ENVIRONMENTAL SPECIFICATIONS

4.4 Operating Temperature

The ADH1100380S50B series module will start and operate within stated specifications at an ambient temperature from -20°C to 85°C under all load conditions. The storage temperature is -55°C to 125°C.

4.5 Thermal Considerations - Baseplate Module

The converter can operate without forced air convection. Cooling of the converter is achieved mainly by conduction from the baseplate to a big heatsink. Below Figure 13 shows the derating output current vs baseplate temperature at 390V Vin@Vonom, Ta≤ 85℃, READ_TEMP1 ≤ 101 ℃. The baseplate temperature test point is the middle of baseplate, ambient temperature test point Ta see below Figure 12.

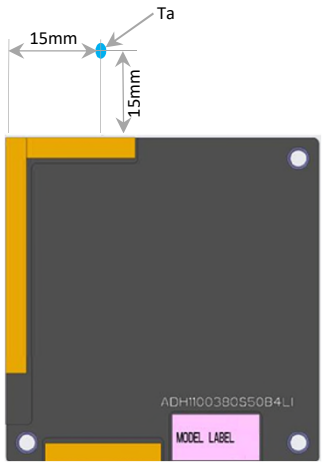


Figure 12 Thermal test points

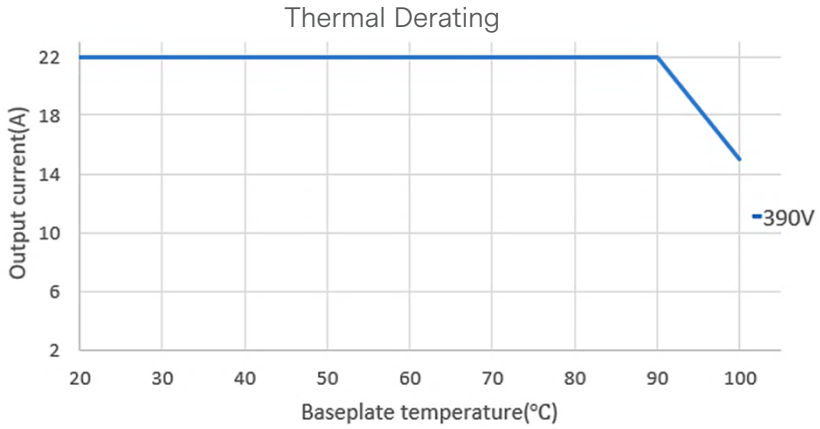


Figure 13 Available load current vs Base plate temperature Vo=50V

4.6 Qualification Testing

Parameter	Unit (pcs)	Test condition
HALT Test	2	Ta,min -20°C to Ta,max +25°C, 10°C step, Vin = min to max, 0 to 100% load. Vibration Limit: >25G.
Vibration	2	Frequency range: 5Hz to 20Hz, 20Hz to 200Hz, A.S.D: 1.0m2/s3, -3db/oct, axes of vibration: X/Y/Z. Time: 30min/axes. Non operational
Mechanical Shock	2	Half sine, Acceleration: 30g, 6mS, 3 axes, 6 directions, 3 time/direction. Non operational
Thermal Shock	3	-55°C to 125°C, Temp Dwell Time: 30min, Temp change rate: 20 °C/min, unit temperature 20 cycles. Non operational
Thermal Cycling	3	-40°C to 85°C, temperature change rate: 1°C/min, cycles: 2 cycles
Humidity	3	40°C, 95%RH, 48h
MTBF		Telcordia, SR332 Method 1 Case 1; 1.5MHrs Typically

SECTION 5 CONTROL SIGNAL DESCRIPTIONS

5.1 Aux O/P - (Pin 21)

The Aux O/P supports 12V 100mA logic driving but doesn't support current sharing. If using Aux O/P, please add Aux O/P load between pin 21 Aux VCC and pin 4 Vo-.

5.2 Power Good Function - (Pin 8)

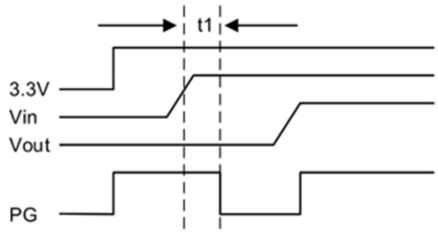
The ADH1100380S50B module has a Power Good function, the Power Good pin is open drain need external pull-up to high level.

When the unit is operating correctly, supplying power and all parameters are within specification, a logic-High voltage will be present on this pin.

When the unit is NOT operating correctly - either is under a mode of protection (over temperature, over current or over voltage) that is causing the unit to shut-down and not supply power, or, if the unit has failed, there will be logic-Low voltage present on this pin. The high level can not exceed 12V.

At the beginning of 30mS after Vin is applied to the module, PG maintain high although the Vout doesn't start up. After this 30mS, module internal MCU finish initialization and the PG indicate output voltage correctly.

If not using the Power Good feature, the pin can be left N/C.



5.3 ALERT - (Pin 11)

SMBALERT protocol is also supported by the module. SMBALERT is a wired-AND signal just as the CLOCK and DATA signals are, by which the module can alert the PMBus master that it has a fault condition via pulling the SMBALERT pin to an active low. The master's response to the ALERT will be that the master will communicate with the slave module using the programmed address, and using the various STATUS commands to determine the cause for the SMBALERT. The CLEAR_FAULTS command can de-assert the active SMBALERT.

5.4 Remote ON/OFF - (Pin 20)

Standard Negative remote ON/OFF logic is available in the module. The logic is CMOS and TTL compatible. Remote ON/OFF (ENABLE) can be controlled by an external switch between the on/off terminal and Sig_gnd. The switch can be an open collector or open drain. The voltage between pin Remote ON/OFF and pin Sig_gnd must not exceed the range listed in Table 3. Absolute Maximum Ratings to ensure proper operation. For the negative logic, if the remote ON/OFF (ENABLE) feature is not used, please maintain the ENABLE pin to Sig_gnd.

5.5 Remote Sense - (Pins 7 & 22)

If the load is far from the unit, connect S+ and S- to the terminal of the load respectively to compensate the voltage drop on the transmission line. Remote sense compensation voltage is total 0.2V max. If the sense compensate function is not necessary, the pin may be left N/C.

SECTION 5 CONTROL SIGNAL DESCRIPTIONS

5.6 Sig_gnd- (pin 9)

The signal ground (Sig_gnd) and Vo- (the Main Output Return) are tied together internally. All external control signals are referred to the Sig_gnd.

5.7 Current Share Function - (Pin 18)

The modules are capable of operating in parallel and realizing current sharing by active current sharing method. Please connect all current sharing pin together see below Figure 14. By connecting the Vin pin, the Vo pin, the Ishare pin of the parallel module together, the current sharing can be realized automatically. Max parallel module number is 4 (Parallel maximum load≤90% load for each module).

If system has no redundancy requirement, the module can be parallel directly for higher power without adding external Oring-mos; whereas, If the redundancy function is required, the external Oring-mos should be added.

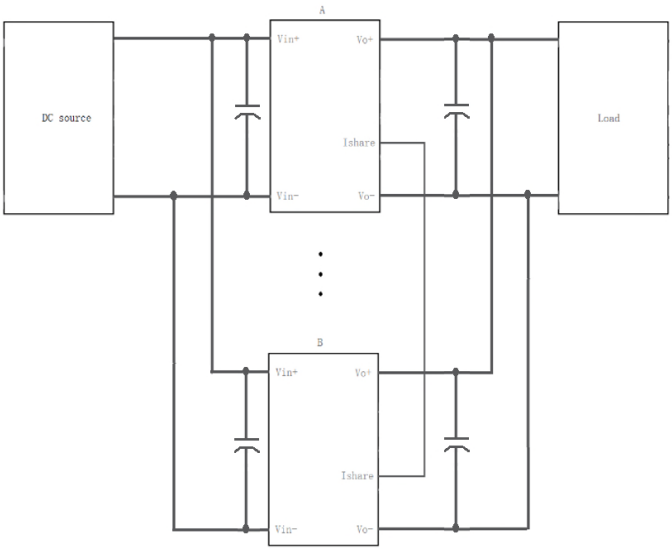


Figure 14 Current sharing function diagram

Ishare voltage see Figure 15.

Vishare=（8/22）*Io Io > 0.75A

Vishare=0.27V Io <= 0.75A

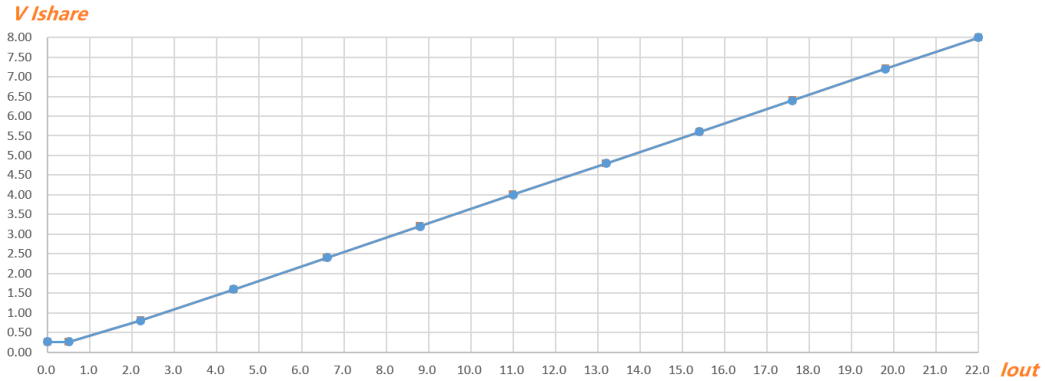


Figure 15 V Ishare vs Iout Vo=Vonom

SECTION 5 CONTROL SIGNAL DESCRIPTIONS

5.7 Current Share Function - (Pin 18) (Con't)

For a normal parallel operation, the following precautions must be observed:

1. The current sharing accuracy equation is:

   X% = | Io – (Itotal / N) | / Irated, Where,

   Io is the output current of per module;

   Itotal is the total load current;

   N is parallel module numbers;

   Irated is the rated full load current of per module.

2. To ensure a better steady current sharing accuracy, below design guideline should be followed:

   a) The inputs of the converters must be connected to the same voltage source; and the PCB trace resistance from Input voltage source to Vin+ and Vin- of each converter should be equalized as much as possible.

   b) The PCB trace resistance from each converter's output to the load should be equalized as much as possible.

   c) For accurate current sharing accuracy test, the module should be soldered in order to avoid the unbalance of the touch resistance between the modules to the test board.

   d) The total PCB trace resistance from each converter's output to the parallel point should be greater than or equal to 1mΩ.

3. To ensure the parallel module can start up monotonically without trigging the OCP circuit, below design guideline should be followed:

   a) Before all the parallel module finished start up, the total load current should be lower than the 50% rated current of 1 module.

   b) The ON/OFF pin of the converters should be connected together to keep the parallel modules start up at the same time.

   c) The under voltage lockout point will slightly vary from unit to unit. The dv/dt of the rising edge of the input source voltage must be greater than 1V/mS to ensure that the parallel module start up at the same time.

   d) Dynamic load of the parallel must start from n*10% Io rated.

SECTION 5 CONTROL SIGNAL DESCRIPTIONS

5.8 Output Voltage Adjustment - (Pin 19)

Use the 0xEC command to select SW PMBus or Trim pin to adjust output voltage. SW PMBus and Trim pins cannot be used simultaneously for output voltage adjustment.

Default output voltage adjustment is by SW PMBus, 0xEC command default value: 0xAA

If output voltage need to be adjusted through Trim pin (Pin 19) of hardware, 0xEC command should be changed to 0x55.

The main output voltage can be adjusted by changing value of 0.1% resistor (Rtrim) connected from pin Trim to signal GND as shown in Figure 16.

$$Vo(Rtrim) = \frac{75324.076}{Rtrim + 4518.182} + 39.929$$

Vo is in V

Rtrim is in ohm

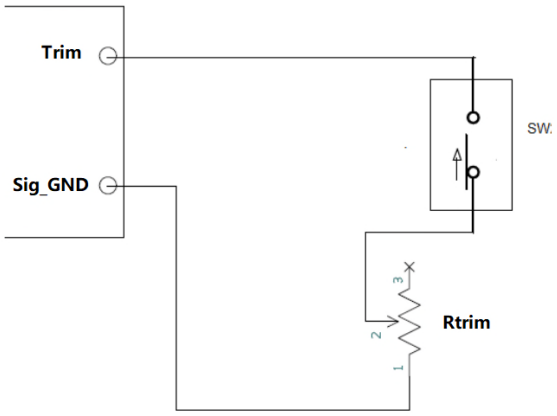


Figure 16 Output Voltage Adjustment Circuit Diagram

Vo=Vonom when Rtrim is OPEN.

To get the tight output voltage tolerance, it's highly recommended that the Rtrim is 0.1% tolerance resistor with good temperature coefficient.

5.9 ACNOK - (Pin 13)

ACNOK is input pin. Reserve function, this pin is left N/C.

5.10 BNOK - (Pin 14)

BNOK is input pin, connected with isolated PFC LD Enable / BOK (Bulk Voltage OK) signal. The output is enabled when the BNOK pin is open or driven to a logic high. If not using the BNOK feature, The pin may be left N/C.

SECTION 6 APPLICATION NOTES

6.1 Typical Application

Below Figure 17 is the typical application of the ADH1100380S50B series power supply.

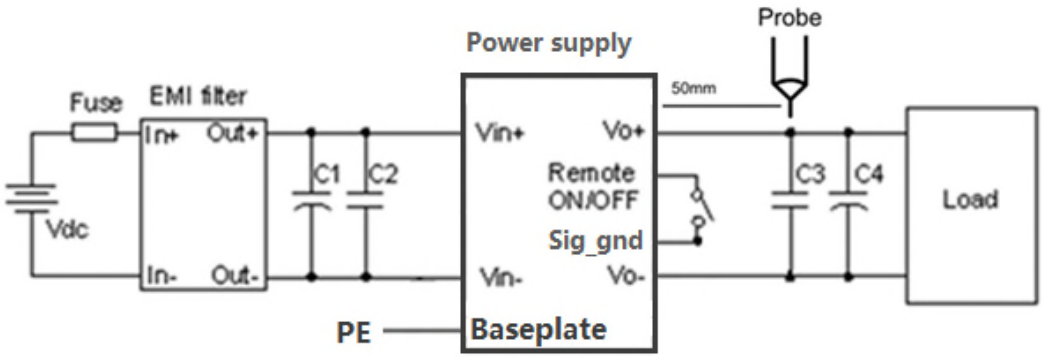


Figure 17 Typical application

C1: 330μF/500V electrolytic capacitor

C2: 470nF/630V ceramic +220nF/630V ceramic +100nF/630V ceramic + 33nF/630V Ceramic capacitor

C3: 5*10μF/100V Ceramic capacitor

C4: 56μF/80V Poly capacitor + 8*100μF/80V Poly capacitor

Fuse: 0505010.MXP

Ensure three mounting holes of baseplate maintain reliable connection with earth.

EMI Filter: Refer Figure 18.

6.2 Output Ripple & Noise Test Configuration

Output Ripple & Noise Test circuit also see Figure 17

Note: Using a coaxial cable with a 50ohm termination resistor and 0.68μF ceramic capacitor in series to test output ripple & noise is recommended.

SECTION 6 APPLICATION NOTES

6.3 EMI Filter Schematic

Below Figure 18 is the EMI Filter Schematic of the ADH1100380S50B series power supply.

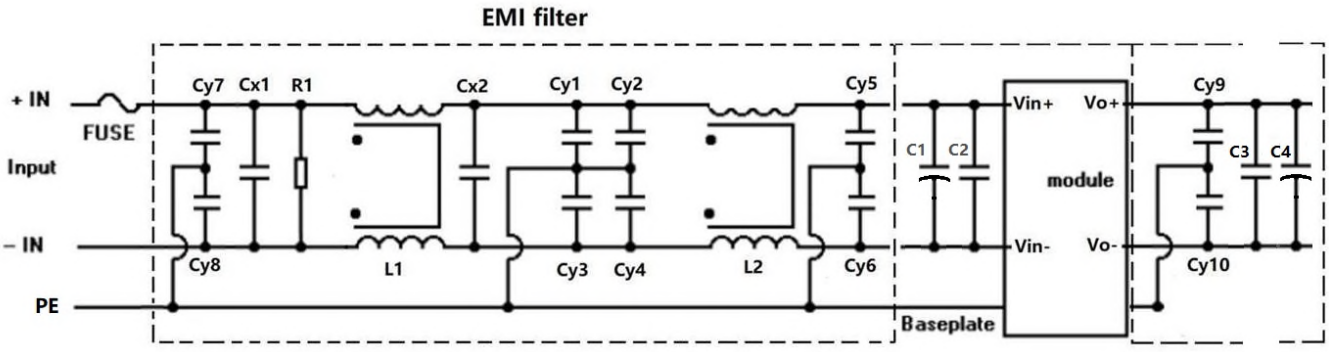


Figure 18 EMI Filter Schematic

Cx1:2.2uF/630V SAF+100nF/630V ceramic

Cx2:2.2uF/630V SAF

Cy1,Cy3: 2.2nF/999V Ceramic

Cy2,Cy4: 3.3nF/999V Ceramic

Cy5:3.3nF/999V Ceramic

Cy6:3.3nF*2/999V Ceramic

L1,L2: 3.3mH

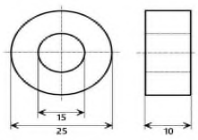
R1: 660Kohm (Discharge function)

Cy9,Cy10: NA

C1 to C4: See Figure 17

Ensure three mounting holes of baseplate maintain reliable connection with earth.

Reference EMC components:

Component	L1, L2
Turn ratio	22:22
Wire gauge	D=1.2mm Magnet Wire
Core Dimension	A072 25mm 
Inductance	3.3mH
DC Resistance	16 mohm MAX

SECTION 6 APPLICATION NOTES

Reference EMC components (Con't):

Component	Component	Manufacture	Manufacture P/N
Cx1	2.2uF/630V SAF capacitor	XIAMEN FARATRONIC CO LTD	C42Q2225K9SC000
	100nF/630V ceramic capacitor	WALSIN TECHNOLOGY	1210B104K631CT
Cx2	2.2uF/630V SAF capacitor	XIAMEN FARATRONIC CO LTD	C42Q2225K9SC000
Cy1,Cy3	2.2nF/999V Ceramic capacitor	MURATA COMPANY LIMITED	DE1E3RA222MN4AP01F
Cy2,Cy4,Cy5,Cy6	3.3nF/999V Ceramic capacitor	WALSIN TECHNOLOGY	YU1AC332M100DAFD7B
C1	330μF/500V electrolytic capacitor	NIPPON CHEMI-CON	EKHS501VSN331MR50S
C2	470nF/630V ceramic capacitor	MURATA COMPANY LIMITED	RDER72J474MUE1H03A
	220nF/630V ceramic capacitor	WALSIN TECHNOLOGY	SH55B224K631CT
	100nF/630V ceramic capacitor	WALSIN TECHNOLOGY	1210B104K631CT
	33nF/630V Ceramic capacitor	WALSIN TECHNOLOGY	1210B333K631CT
C3	5*10μF/100V Ceramic capacitor	TAIYO YUDEN	MBASH32MAC7106KPCA01
C4	56μF/80V Poly capacitor	LELON ELECTRONICS	HBT560M1KSA-1012
	8*100μF/80V Poly capacitor	LELON ELECTRONICS	HBR101M1KSA-1016

6.4 Isolation Zones of Primary And Secondary

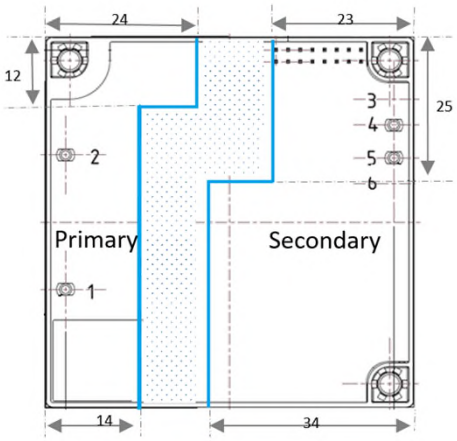


Figure 19 Isolation Zones of Primary And Secondary

SECTION 7 SOLDERING INFORMATION

7.1 Soldering

Generally, as the most common mass soldering method for the solder attachment, wave soldering is used for through-hole power modules and reflow soldering is used for surface-mount ones.

Reflow soldering is not a suggested method for through-hole power modules due to process challenges that can result in reduced module reliability. If you have this kind of application requirement, please contact sales or FAE for further information and recommendations.

7.2 Wave Soldering

When wave soldering is used, the temperature on pins is specified to maximum 255^{O}C for maximum 7s.

When soldering by hand, the iron temperature should be maintained at 300^{O}C to 380^{O}C and applied to the converter pins for less than 10s. Longer exposure can cause internal damage to the converter.

Cleaning of solder joint can be performed with cleaning solvent IPA or simulative.

SECTION 8 PMBus™ SPECIFICATIONS

8.1 PMBus™ General Instructions

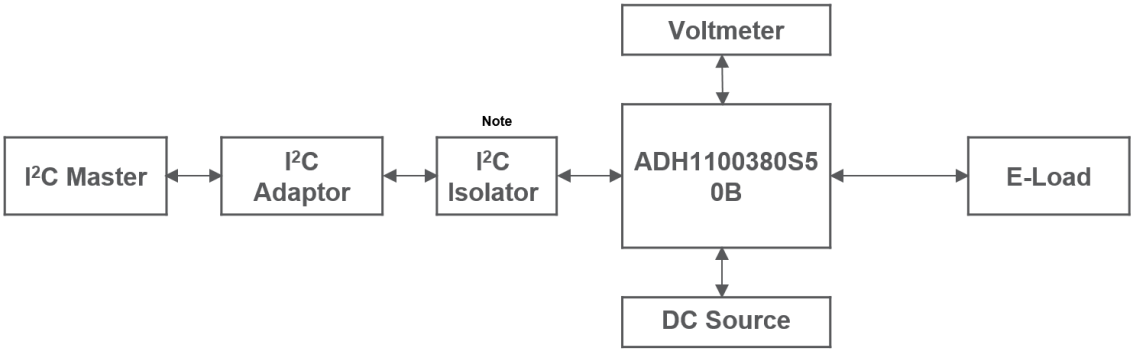
The ADH1100380S50B is equipped with digital PMBus™ interface that allows the module to be configured and to communicate with a system controller. Detailed timing and electrical characteristics of the PMBus™ can be found in the Power Management Protocol Specification, Part 1, Revision 1.2, available at http://PMBUS.org.

The module supports 100kHz bus timing requirements. The module shall stretch the clock, as long as it does not exceed the maximum clock LO period of 35mS. It is recommended to always use PEC (Packet Error Check) when communicating via PMBus.

The module supports a subset of the commands in the PMBus 1.2 specification. Most all of the controller parameters can be programmed using the PMBus™ and stored as defaults for later use. All commands that require data input or output use the linear format. The exponent of the data words is fixed at a reasonable value for the command and altering the exponent is not supported. Direct format data input or output is not supported by the module. The supported commands are described in greater detail below. The module contains non-volatile memory that is used to store configuration settings and scale factors. The settings programmed into the device are not automatically saved into this non-volatile memory though. The STORE_USER_ALL command must be used to commit the current settings to non-volatile memory as device defaults. The settings that are capable of being stored in non-volatile memory are noted in their detailed descriptions.

Equipment Setup

The following is a typical I²C communication setup:



Note: I²C Isolator circuit are recommended between adaptor and ADH1100 as shown in Figure 20, I²C Isolator circuit is near at module's SDA,SCL pins.

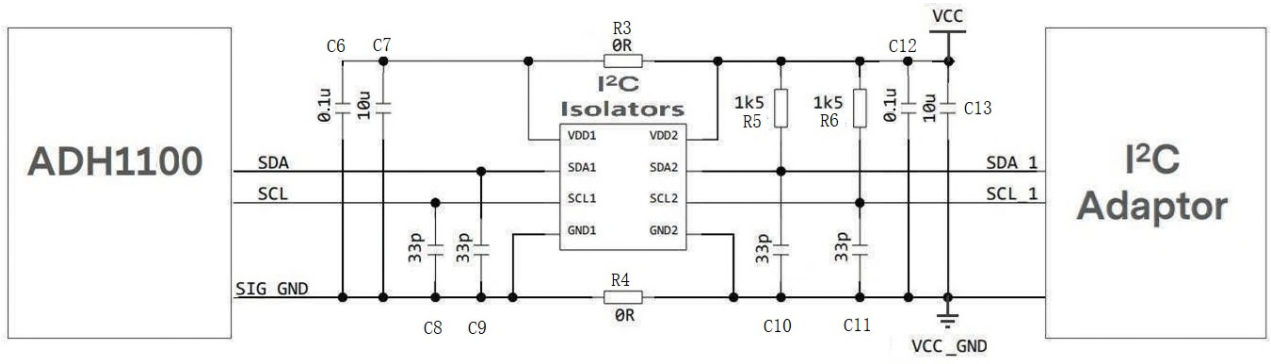
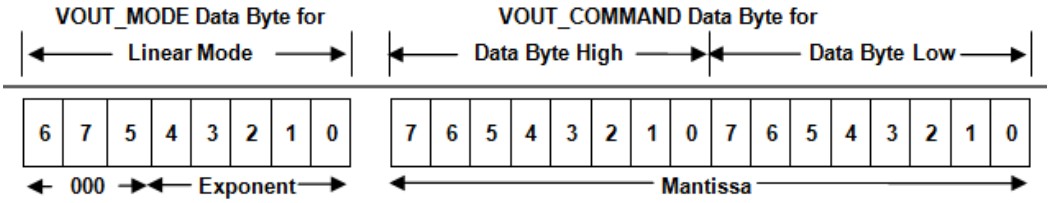


Figure 20 I²C Isolator circuit

SECTION 8 PMBus™ SPECIFICATIONS

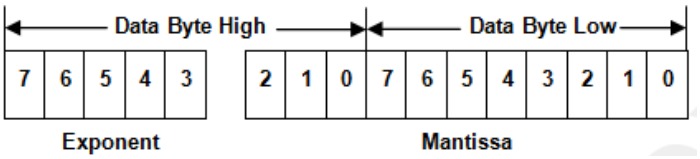
PMBus™ Data Format

For commands that set or report any voltage thresholds related to output voltage (including VOUT_COMMAND, the module supports the linear data format consisting of a two byte value with a 16-bit, unsigned mantissa, and a fixed exponent . The format of the two data bytes is shown below:



The value of the number is then given by Value = Mantissa x $2^{Exponent}$

For commands that set all other thresholds, voltages or report such quantities, the module supports the linear data format consisting of a two byte value with an 11-bit, two's complement mantissa and a 5-bit, two's complement exponent. The format of the two data bytes is shown below:

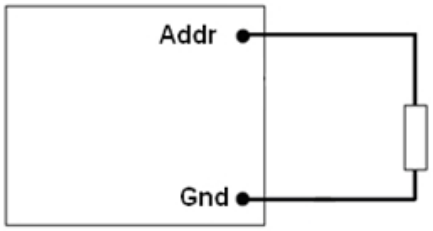


The value is of the number is then given by Value = Mantissa x $2^{Exponent}$

SECTION 8 PMBus™ SPECIFICATIONS

8.2 PMBus™ Addressing

The module I²C ADDRESS pin supports PMBus address selection with multiple modules.



Address (HEX)	R_address (Ohm), 1%
70	0
71	1240
72	2870
73	4990
74	8060
75	12400
76	20000
77	34800
78	80600
79	Open

8.3 Reading the Status of the Module using the PMBus

The module supports a number of status information commands implemented in PMBUS.

STATUS_WORD: Returns two bytes of information with a summary of the module's fault/warning conditions.

High Byte

Bit Position	Flag	Default Value
15	VOUT fault	0
14	IOUT fault or warning	0
13	Input Voltage fault	0
12	Reserved	0
11	POWER_GOOD#(is positive)	0
10	Reserved	0
9	Reserved	0
8	A fault type not given in bits [15:1] of the STATUS_WORD has been detected	0

SECTION 8 PMBus™ SPECIFICATIONS

Low Byte

Bit Position	Flag	Default Value
7	Reserved	0
6	OFF	0
5	VOUT Over voltage	0
4	IOUT Over current	0
3	VIN Under voltage	0
2	Temperature	0
1	CML(Command)	0
0	A fault or warning not listed in bits [7:1] of this byte has occurred	0

STATUS_VOUT: Returns one byte of information relating to the status of the module's output voltage related faults.

Bit Position	Flag	Default Value
7	VOUT OV Fault	0
6:0	Reserved	0

STATUS_IOUT: Returns one byte of information relating to the status of the module's output current related faults.

Bit Position	Flag	Default Value
7	IOUT OC Fault	0
6	Reserved	0
5	IOUT OC Warning	0
4:0	Reserved	0

STATUS_INPUT: Returns one byte of information relating to the status of the module's input voltage related faults.

Bit Position	Flag	Default Value
7	VIN OV Fault	0
6	Input over voltage warning	0
5	Input under voltage warning	0
4	VIN UV Fault	0
3:0	Reserved	0

SECTION 8 PMBus™ SPECIFICATIONS

STATUS_TEMPERATURE: Returns one byte of information relating to the status of the module's temperature related faults.

Bit Position	Flag	Default Value
7	OT Fault	0
6	OT Warning	0
5:0	Reserved	0

All of the warning or fault bits set in the status registers remain set, even if the fault or warning condition is removed or corrected, until one of the following occur:

1) The bit is individually cleared;

2) The device receives a CLEAR_FAULTS command;

3) Bias power is removed from the module.

SECTION 8 PMBus™ SPECIFICATIONS

8.3 ADH1100380S50B Supported PMBus™ Command list

Command Code	Command Name	Default Value	Access Type	Data Bytes	Data Format	Description
01h	OPERATION	80h	R/W	1	Bit field	Used to turn the unit ON/OFF
03h	CLEAR_FAULTS	-	Send	1	N/A	Clear any fault bits that have been set
12h	RESTORE_DEFAULT_ALL	-	Send	0	N/A	Restores operating parameters
15h	STORE_USER_ALL	-	Send	0	N/A	Stores operating parameters
20h	VOUT_MODE	-	R	1	Mode+exp	To read VOUT data format
21h	VOUT_COMMAND	-	R/W	2	Vout Linear	Set the output voltage
35h	VIN_ON	-	R	2	Linear	Returns turn on voltage threshold of vin (report AC input when work with AIH03)
36h	VIN_OFF	-	R	2	Linear	Returns turn off voltage threshold of vin (report AC input when work with AIH03)
40h	VOUT_OV_FAULT_LIMIT	-	R	2	Vout Linear	Returns output overvoltage fault threshold
42h	VOUT_OV_WARN_LIMIT	-	R	2	Vout Linear	Returns output overvoltage warn threshold
46h	IOUT_OC_FAULT_LIMIT	-	R	2	Linear	Returns output overcurrent fault threshold
4Ah	IOUT_OC_WARN_LIMIT	-	R/W	2	Linear	Set the output overcurrent warn threshold
51h	OT_WARN_LIMIT	-	R/W	2	Linear	Set the over temperature warn threshold
55h	VIN_OV_FAULT_LIMIT	-	R	2	Linear	Returns input overvoltage fault threshold (report AC input when work with AIH03)
79h	STATUS_WORD	-	R	2	Bit field	Returns the information with a summary of the module's fault/warning
7Ah	STATUS_VOUT	-	R	1	Bit field	Returns the information of the module's output voltage related fault/warning
7Bh	STATUS_IOUT	-	R	1	Bit field	Returns the information of the module's output current related fault/warning
7Ch	STATUS_INPUT	-	R	1	Bit field	Returns the information of the module's input over voltage and under voltage fault
7Dh	STATUS_TEMPERATURE	-	R	1	Bit field	Returns the information of the module's temperature related fault/warning
7Eh	STATUS_CML	-	R	1	Bit field	Returns the information of the module's communication related faults
88h	READ_VIN	-	R	2	Linear	Returns the input voltage of the module (report AC input when work with AIH03)
8Bh	READ_VOUT	-	R	2	Vout Linear	Returns the output voltage of the module
8Ch	READ_IOUT	-	R	2	Linear	Returns the output current of the module
8Dh	READ_TEMP1	-	R	2	Linear	Returns module's temp. sensor temp.
98h	PMBUS_REVISION	-	R	1	Bit field	Read the version of the PMBus
99h	MFR_ID	-	Block R	3	Char	Returns the AEI
9Ah	MFR_MODEL	-	Block R	15	Char	Returns the name of the module
9Ch	MFR_MOD_DATE_LOC_SN	-	Block R	2	Char	Returns the production's place of the module
9Dh	MFR_DATE		Block R	6	Char	Returns date YYMMDD
9Eh	PMBus_CMD_MFR_SERIAL	-	Block R	11	Char	Returns the serial number of the module
89h	READ_IIN	-	R	2	Linear	Only work with AIH03， report AIH03 IIN, ADH no IIN
8Eh	READ_TEMP2	-	R	2	Linear	AIH03 temperature
96H	POUT	-	R	2	Linear	Returns the output power of the module
97H	PIN	-	R	2	Linear	Only work with AIH03， report AIH03 input power, ADH no input power.
EC	SELECT TRIM OR SW	-	R/W	1	Char	Choose trim or cmd 21h to adjust Vout 0xAA:Software by cmd 21h 0x55:Trim by hardware Default value:0xAA

SECTION 9 RECORD OF REVISION AND CHANGES

Issue	Date	Description	Originators
1.0	4.23.2026	First issue	E. Wang
1.1	9.16.2026	Update logo and co-brand	E. Wang

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