

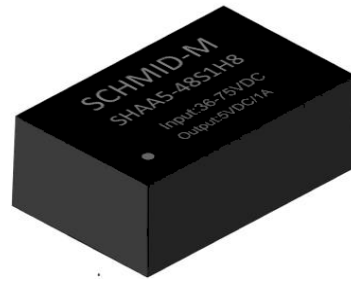
SHAA5H8

5 Watt , Isolated DC-DC Converters



Features

- Wide 2 : 1 Input Voltage Range(9~18V, 18~36V, 36~75V)
- I/O-Isolation Voltage: 4000VACrms
- Isolation Test Voltage 8000VDC
- Extended Operating Temperature Range: -40°C to +85°C
- Output Short Circuit Protection:
Continuous & Auto Recovery
- Over Voltage Protection: Clamp Mode
- Non-Conductive Black Plastic Case
- Lead Free Design, RoHS Compliant
- 24pin DIP Package with Industry-Standard Footprint
- Customer Design Available
- Meet Safety Standard : IEC / EN60950-1



Description

The SHAA5 Series are isolated 5W DC/DC converters. Designed with highly efficiency, allow the operating temperature range of these units to be -40°C to +85°C in a 24 pin DIP package with industry-standard footprint. Further features include wide 2 : 1 input voltage range, short-circuit protection and over voltage protection.

Applications

These converters are well suitable for battery operated equipment, measurement equipment, telecom, wireless network, Industry control system, medical equipment everywhere where isolated, tightly regulated voltages and compact size are required.

Technical Specification

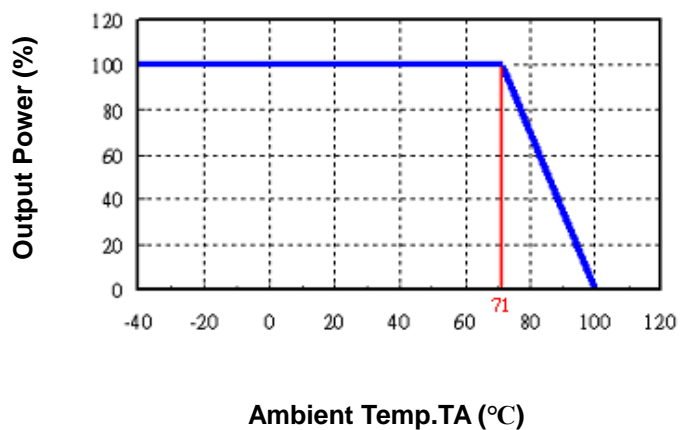
All specifications are typical at nominal input, full load and 25°C unless otherwise stated.

Model Number	Input Voltage Range	Output Voltage (V)	Output Current (mA)		Input Current (mA)		Eff . ⁽¹⁾ (%)	Capacitive Load, max. ⁽²⁾ (uF)
			Min. Load	Full. Load	No Load	Full Load		
SHAA5-12S0H8	9~18V Nominal:12V	3.3	0	1200	18	446	78	3000
SHAA5-12S1H8		5	0	1000	22	541	81	2000
SHAA5-12S2H8		12	0	500	35	630	83	470
SHAA5-12S3H8		15	23	400	32	625	84	350
SHAA5-12D2H8		±12	0	±250	36	630	83	±220
SHAA5-12D3H8		±15	0	±200	37	630	83	±220
SHAA5-24S0H8	18~36V Nominal:24V	3.3	0	1200	10	217	80	3000
SHAA5-24S1H8		5	0	1000	13	265	82	2000
SHAA5-24S2H8		12	23	500	13	309	85	470
SHAA5-24S3H8		15	0	400	14	309	85	350
SHAA5-24D2H8		±12	0	±250	19	313	84	±220
SHAA5-24D3H8		±15	0	±200	21	309	85	±220
SHAA5-48S1H8	36~75V Nominal:48V	5	0	1000	8	135	81	2000
SHAA5-48S2H8		12	0	500	9	158	83	470
SHAA5-48S3H8		15	40	400	10	156	84	350
SHAA5-48D2H8		±12	0	±250	11	158	83	±220
SHAA5-48D3H8		±15	0	±200	12	158	83	±220

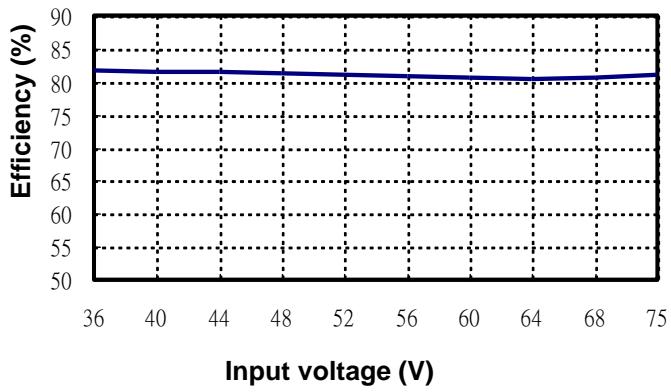
Input Specifications		
Input Voltage	12V nominal input	9~18V
	24V nominal input	18~36V
	48V nominal input	36~75V
Input filter		Pi Type
Input surge voltage (100ms max.)	12V input	25V
	24V input	50V
	48V input	100V
Input reflected ripple current	Nominal Vin and full load	76mA _{p-p} max.
Start up time	Nominal Vin and constant resistive load	580ms max.
Environmental Specifications		
Operating ambient temperature	-40°C to +85°C (with derating)	
Maximum case temperature	+95°C	
Storage temperature range	-50°C to +125°C	
Relative humidity	5% to 95% RH	
Temperature coefficient	±0.02% / °C max.	
Output Specifications		
Output power	6 Watts max.	
Voltage accuracy	Full load and nominal Vin	±1%
Minimum load	See table	
Line regulation	LL to HL at full load	±0.5%
	25% load to full load	Single ±0.5%
Load Regulation	Balanced load	Dual ±0.5%
	Unbalanced load 25% to 100% full load	±3%
Ripple and Noise(20MHz bandwidth)	3.3V, 5V Output Models	110mV _{p-p} typ. 150mV _{p-p} max.
	12V,15V Output Models (single output)	70mV _{p-p} max.
	Other Output Models	200mV _{p-p} typ. 250mV _{p-p} max.
Over voltage protection (Zener Diode Clamp)	3.3V _{out} models	3.9V
	5V _{out} models	6.2V
	12V _{out} models	15V
	15V _{out} models	18V
Capacitive load	See table	
Over load protection	% of full load	120% min..
Short circuit protection	Continuous, automatic recovery	
Transient response settling time	50% load step change	1300μs max.
Transient response over shoot	di/dt=0.8A/μs	≤ ±5% of Vo

General Specifications		
Efficiency	Nominal input	See table
I/O Isolation voltage(rated)	60 Seconds	4000VACrms min.
I/O Isolation Test Voltage	Flash tested for 1 Second	8000VDC min.
Isolation resistance	500VDC	10^9 Ohms min.
Isolation capacitance		12pF typ.
Switching frequency (Fixed)	Pulse width modulation (PWM)	150kHz typ.
Reliability, calculated MTBF		700,000 Hours min.
Physical Specifications		
Case material		Non-Conductive Black Plastic
Potting material		Silicon rubber (UL94V-0)
Dimensions		1.25 × 0.80 × 0.5 Inch (31.7 × 20.3 × 12.65 mm)
Weight		16g (0.56oz) (typical)

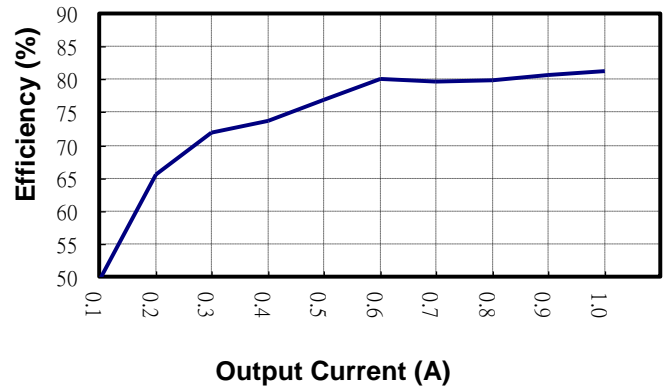
SHAA5Series
Power Derating Curve(3)



SHAA5-48S1H8
Input voltage vs. Efficiency



SHAA5-48S1H8
Output Current vs. Efficiency

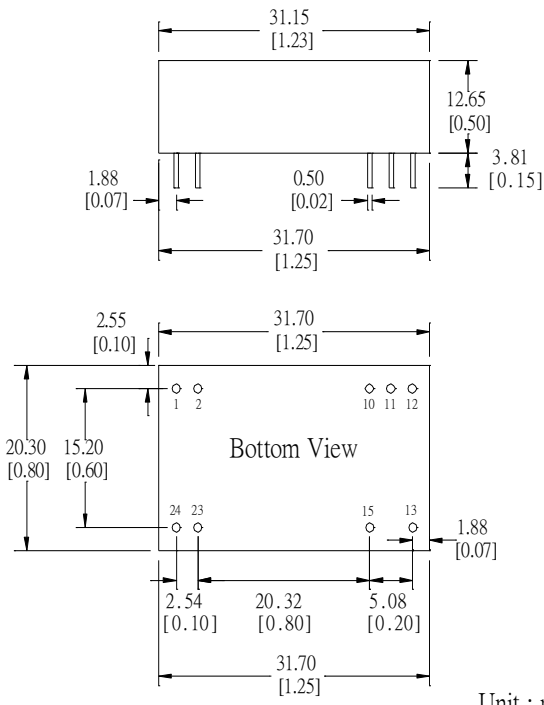


Note

1. Typical value, tested at nominal input and full load.
2. For each output.
3. Based on SHAA5-48S1H8.
4. Specifications subject to change without notice.

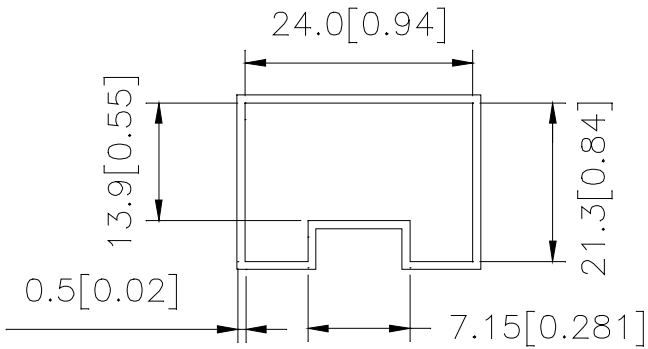
Mechanical Dimensions

Pin Assignment		
Pin	Single	Dual
1	+Vin	+Vin
2	+Vin	+Vin
10	NC	Common
11	NC	Common
12	-Vout	NC
13	+Vout	-Vout
15	NC	+Vout
23	-Vin	-Vin
24	-Vin	-Vin



Unit : mm[inch]
 Tolerance : XX.X ±0.5[±0.02]
 XX.XX ±0.25[±0.01]

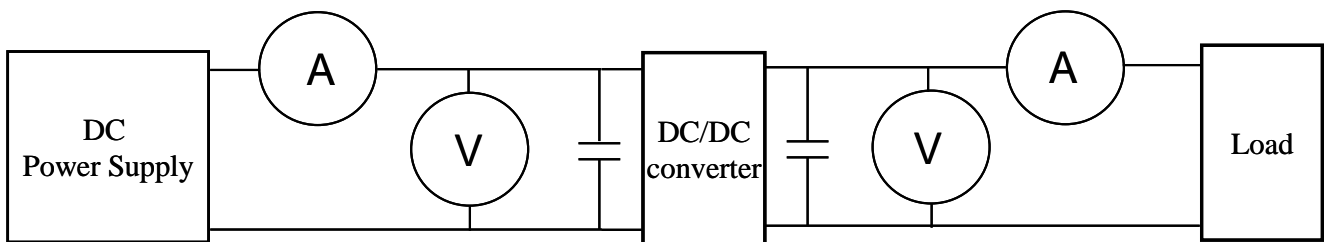
Package Information



PS:
 Unit: mm [inch]
 L= 355 mm[13.98 inch] ; ONE TUBE = 10 PCS

Test Configurations

All specifications are typical at nominal input, full load and 25°C unless otherwise stated.



©DC Power Supply: It offers a wide voltage and current range precisely.

◎Current meter (A): Accuracy → 200μA ~ 200mA 4 ranges $\pm(0.2\% \text{ rdg} + 2 \text{ digits})$
 2000mA ~ 20A 2 ranges $\pm(0.3\% \text{ rdg} + 2 \text{ digits})$.

◎Voltage meter (V): Accuracy → $\pm(0.03\% \text{ rdg} + 4 \text{ digits})$.

◎Load: At full load.

◎Wires: The resistance of the wires must be small.

1. Input voltage range: Narrow input voltage range ($\pm 10\%$)、wide input voltage range (2:1 and 4:1)。

EX: Narrow input voltage range ($\pm 10\%$)

5V nominal input → 4.5~5.5V
 12V nominal input → 10.8~13.2V
 24V nominal input → 21.6~26.4V

Wide input voltage range 2:1

5V nominal input → 4.5~9V
 12V nominal input → 9~18V
 24V nominal input → 18~36V
 48V nominal input → 36~75V

Wide input voltage range 4:1 (W)

24V nominal input → 9~36V
 48V nominal input → 18~75V

2. Input power :

$$P_{in} = V_{in} \times I_{in}$$

V_{in} : Input voltage

I_{in} : Input current

3. Output power :

$$P_{out} = V_{out} \times I_{out}$$

V_{out} : Output voltage

I_{out} : Output current

4. Efficiency :

$$\text{Efficiency} = \frac{P_{out}}{P_{in}} \times 100\%$$

P_{out} : Output power

P_{in} : Input power

5. Voltage accuracy:

$$\frac{|V_{out} - V_{out(nominal)}|}{V_{out}} \times 100\%$$

V_{out} : Output voltage

$V_{out(nominal)}$: Nominal output voltage

6. Line regulation: Wide input voltage range and regulated output voltage series.

$$\frac{|V_{out(LL)} - V_{out(HL)}|}{V_{out(LL)}} \times 100\%$$

LL: Low Line input voltage

HL: High Line input voltage

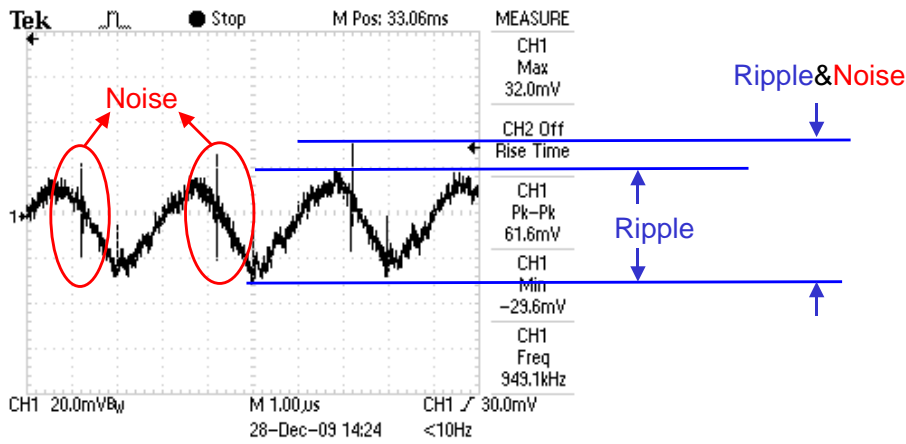
7. Load regulation :

$$\frac{|V_{out(FL)} - V_{out(NL)}|}{V_{out(FL)}} \times 100\%$$

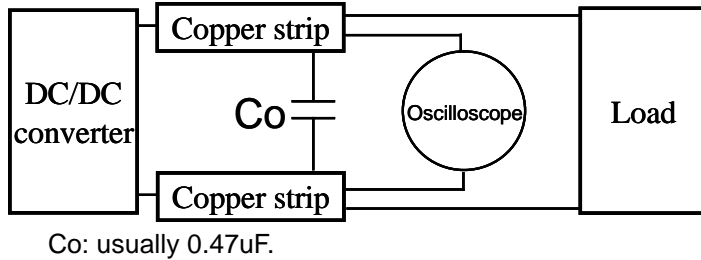
$V_{out(FL)}$: Output voltage at full load

$V_{out(NL)}$: Output voltage at 25% full load or 10% full load

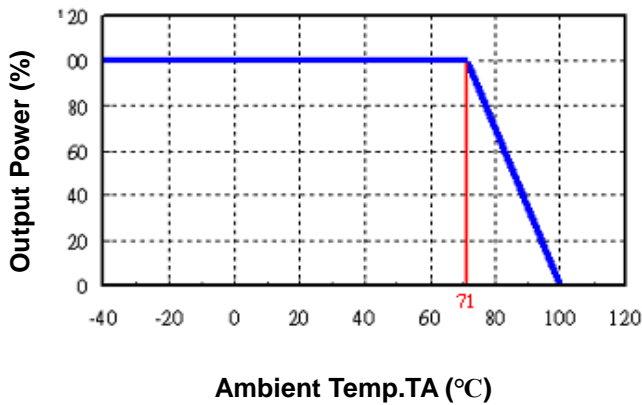
8. **Ripple and Noise**: as shown below. The bandwidth is 0-20MHz.



Output Ripple&Noise measurement test circuit: as shown below.



9. **Temperature derating curve**: The DC-DC converter will operate over a wider temperature range if less power is drawn from the output and the device is already running. The temperature derating curve shows the operating power-temperature range. As shown below.



10. **Switching frequency**: The nominal operating frequency of the DC-DC converters.

11. **Input to output isolation**: The dielectric breakdown strength test between input and output circuits. This is the isolation voltage the device is capable of withstanding for a specified time, usually 1 second or 1 minute.