



Features

- Wide 2 : 1 Input Voltage Range(9~18V, 18~36V, 36~75V)
- I/O-Isolation Voltage: 4000VACrms
- Isolation Test Voltage 6000Vpk
- 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



Description

The HAA5 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 (Vdc) | Output Current (mA) | | Input Current (mA) | | Eff. ⁽¹⁾ (%) | Capacitive Load, max. ⁽²⁾ (uF) |
|--------------|-------------------------|----------------------|---------------------|------------|--------------------|-----------|-------------------------|---|
| | | | Min. Load | Full. Load | No Load | Full Load | | |
| HAA5-12S1H6 | 9~18V Nominal:12VDC | 5 | 0 | 1000 | 22 | 541 | 81 | 2000 |
| HAA5-12S2H6 | | 12 | 0 | 500 | 35 | 630 | 83 | 470 |
| HAA5-12D2H6 | | ±12 | 0 | ±250 | 36 | 630 | 83 | ±220 |
| HAA5-12D3H6 | | ±15 | 0 | ±200 | 37 | 630 | 83 | ±220 |
| HAA5-24S1H6 | 18~36V Nominal:24VDC | 5 | 0 | 1000 | 13 | 265 | 82 | 2000 |
| HAA5-24S2H6 | | 12 | 0 | 500 | 13 | 309 | 85 | 470 |
| HAA5-24D2H6 | | ±12 | 0 | ±250 | 19 | 313 | 84 | ±220 |
| HAA5-24D3H6 | | ±15 | 0 | ±200 | 21 | 309 | 85 | ±220 |
| HAA5-48S1H6 | 36~75V Nominal:48VDC | 5 | 0 | 1000 | 8 | 135 | 81 | 2000 |
| HAA5-48S2H6 | | 12 | 0 | 500 | 9 | 158 | 83 | 470 |
| HAA5-48D2H6 | | ±12 | 0 | ±250 | 11 | 158 | 83 | ±220 |
| HAA5-48D3H6 | | ±15 | 0 | ±200 | 12 | 158 | 83 | ±220 |

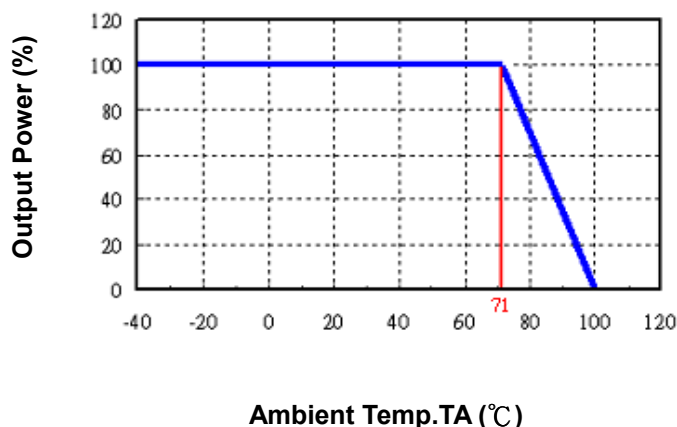


| Input Specifications | | | |
|--|---|--------|---|
| Input Voltage | 12V nominal input | | 9~18Vdc |
| | 24V nominal input | | 18~36Vdc |
| | 48V nominal input | | 36~75Vdc |
| Input filter | | | Pi Type |
| Input surge voltage (100ms max.) | 12V input | | 25Vdc |
| | 24V input | | 50Vdc |
| | 48V input | | 100Vdc |
| Input reflected ripple current | Nominal Vin and full load | | 76mA _{p-p} max. |
| Start up time | Nominal Vin and constant resistive load | | 510ms 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. | | |
| EMC Characteristics | | | |
| EMI | EN55022 (radiation) | | Meet class A |
| 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) | 5V Output Models | | 110mV _{p-p} typ. 150mV _{p-p} max. |
| | 12V Output Models (single output) | | 70mV _{p-p} max. |
| | Other Output Models | | 150mV _{p-p} typ. 200mV _{p-p} max. |
| Over voltage protection (Zener Diode Clamp) | 5Vout models | | 6.2V |
| | 12Vout models | | 15V |
| | 15Vout 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 | | 780μs max. |
| Transient response over shoot | di/dt=0.8A/μs | | ≤ ±5% of Vo |

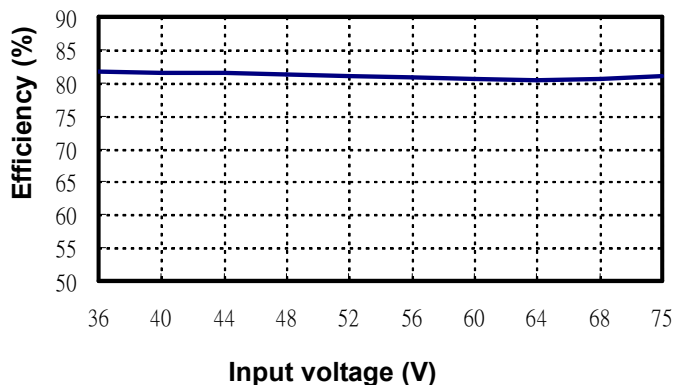


| General Specifications | | |
|------------------------------|---------------------------|--|
| Efficiency | Nominal input | See table |
| I/O Isolation voltage(rated) | 60 Seconds | 4000VACrms min. |
| I/O Isolation Test Voltage | Flash tested for 1 Second | 6000Vpk min. |
| Isolation resistance | 500Vdc | 10 ⁹ Ohms min. |
| Isolation capacitance | | 12pF typ. |
| Switching frequency | | 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) |

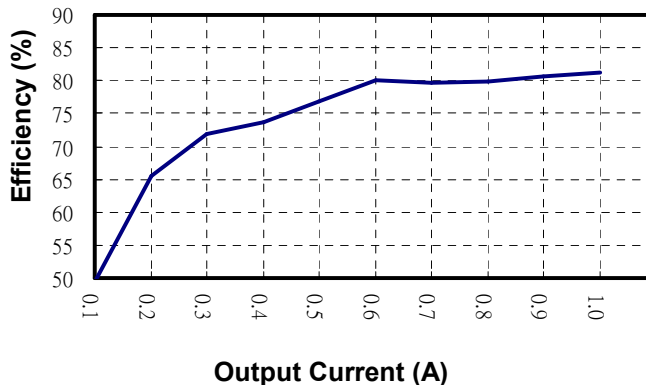
**HAA5Series
Power Derating Curve(3)**



**HAA5-48S1H6
Input voltage vs. Efficiency**



**HAA5-48S1H6
Output Current vs. Efficiency**



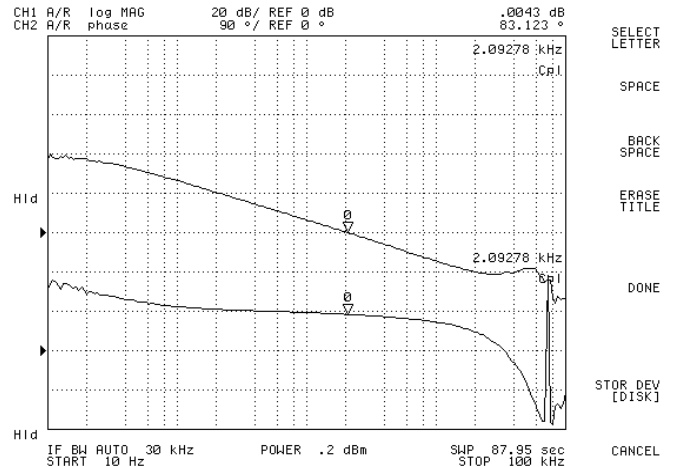
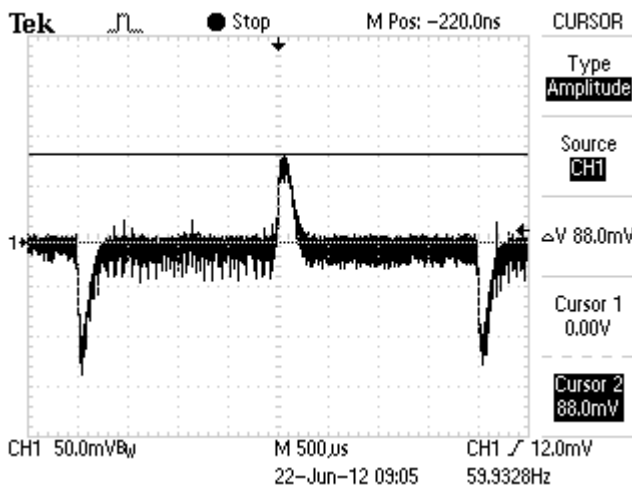


HAA5-48S1H6

HAA5-48S1H6

Transient Response at 50%~100% Max Load

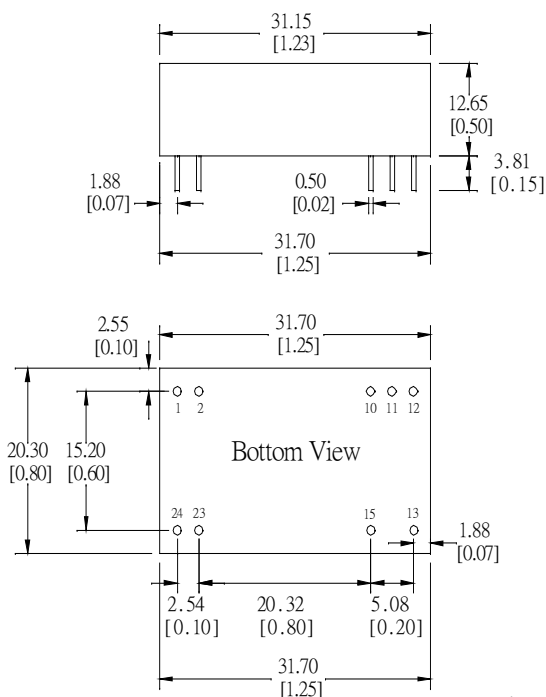
Loop Gain & Phase at Vi=48V, Full Load



Note

1. Typical value, tested at nominal input and full load.
2. For each output.
3. Based on HAA5-48S1H6.

Mechanical Dimensions



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

| 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 |

Specifications subject to change without notice.