



### FEATURES

- Efficiency up to 84%
- DIP Package with Industry Standard Pinout
- 2:1 Wide Input Range
- Operating Temperature Range -40°C to +85°C
- Short Circuit Protection
- Overload Protection
- Isolation Voltage 1500VDC /3000VDC(Optional)
- Complies with EN 55022 Class A
- Lead free, RoHS Compliant
- 3 Years Product Warranty



Security



Lab



Medical



Metro



Data Center



Telecom



Industrial



Network

The DH06S/D series are miniature, DIP Package, isolated 6W DC/DC converters with 1,500VDC/3,000 isolation. It offers short circuit protection and allows a wide operating temperature range of -40°C to +85°C (with derating). These isolated DC/DC converters are the latest offering from a world leader in power systems technology and manufacturing — Delta Electronics, Inc. With creative design technology and optimization of component placement, these converters possess outstanding electrical and thermal performance, as well as extremely high reliability under highly stressful operating conditions.

### Model List

| Model Number | Input Voltage (Range) | Output Voltage | Output Current | Input Current |          | Reflected Ripple Current | Max. capacitive Load | Efficiency (typ.) |
|--------------|-----------------------|----------------|----------------|---------------|----------|--------------------------|----------------------|-------------------|
|              |                       |                |                | Max.          |          |                          |                      |                   |
|              | VDC                   | VDC            | mA             | @Max. Load    | @No Load | mA(typ.)                 | uF                   | %                 |
| DH06S1203A   | 12<br>(9 ~ 18)        | 3.3            | 1200           | 440           | 40       | 30                       | 470                  | 75                |
| DH06S1205A   |                       | 5              | 1200           | 641           |          |                          | 470                  | 78                |
| DH06S1212A   |                       | 12             | 500            | 609           |          |                          | 100                  | 82                |
| DH06S1215A   |                       | 15             | 400            | 609           |          |                          | 100                  | 82                |
| DH06S1224A   |                       | 24             | 250            | 595           |          |                          | 47                   | 84                |
| DH06D1205A   |                       | ±5             | ±500           | 534           |          |                          | 100*                 | 78                |
| DH06D1212A   |                       | ±12            | ±250           | 609           |          |                          | 100*                 | 82                |
| DH06D1215A   |                       | ±15            | ±200           | 609           |          |                          | 100*                 | 82                |
| DH06S2403A   | 24<br>(18 ~ 36)       | 3.3            | 1200           | 214           | 20       | 20                       | 470                  | 77                |
| DH06S2405A   |                       | 5              | 1200           | 313           |          |                          | 470                  | 80                |
| DH06S2412A   |                       | 12             | 500            | 298           |          |                          | 100                  | 84                |
| DH06S2415A   |                       | 15             | 400            | 298           |          |                          | 100                  | 84                |
| DH06S2424A   |                       | 24             | 250            | 298           |          |                          | 47                   | 84                |
| DH06D2405A   |                       | ±5             | ±500           | 260           |          |                          | 100*                 | 80                |
| DH06D2412A   |                       | ±12            | ±250           | 298           |          |                          | 100*                 | 84                |
| DH06D2415A   |                       | ±15            | ±200           | 298           |          |                          | 100*                 | 84                |
| DH06S4803A   | 48<br>(36 ~ 75)       | 3.3            | 1200           | 107           | 10       | 15                       | 470                  | 77                |
| DH06S4805A   |                       | 5              | 1200           | 156           |          |                          | 470                  | 80                |
| DH06S4812A   |                       | 12             | 500            | 149           |          |                          | 100                  | 84                |
| DH06S4815A   |                       | 15             | 400            | 149           |          |                          | 100                  | 84                |
| DH06S4824A   |                       | 24             | 250            | 149           |          |                          | 47                   | 84                |
| DH06D4805A   |                       | ±5             | ±500           | 130           |          |                          | 100*                 | 80                |
| DH06D4812A   |                       | ±12            | ±250           | 149           |          |                          | 100*                 | 84                |
| DH06D4815A   |                       | ±15            | ±200           | 149           |          |                          | 100*                 | 84                |

\* For each output

## Input Characteristics

| Parameter                         | Model            | Min.                                                     | Typ. | Max. | Unit |
|-----------------------------------|------------------|----------------------------------------------------------|------|------|------|
| Input Surge Voltage (1 sec. max.) | 12V Input Models | -0.7                                                     | ---  | 25   | VDC  |
|                                   | 24V Input Models | -0.7                                                     | ---  | 50   |      |
|                                   | 48V Input Models | -0.7                                                     | ---  | 100  |      |
| Start-Up Voltage                  | 12V Input Models | 7                                                        | 8    | 9    |      |
|                                   | 24V Input Models | 14                                                       | 16   | 18   |      |
|                                   | 48V Input Models | 32                                                       | 34   | 36   |      |
| Under Voltage Shutdown            | 12V Input Models | ---                                                      | ---  | 8.5  |      |
|                                   | 24V Input Models | ---                                                      | ---  | 16   |      |
|                                   | 48V Input Models | ---                                                      | ---  | 35   |      |
| Short Circuit Input Power         | All Models       | ---                                                      | ---  | 3000 | mW   |
| Internal Power Dissipation        |                  | ---                                                      | ---  | 2500 | mW   |
| Conducted EMI                     |                  | Compliance to EN 55022, class A and FCC part 15, class A |      |      |      |

## Output Characteristics

| Parameter                    | Conditions                  | Min.       | Typ.  | Max.  | Unit              |
|------------------------------|-----------------------------|------------|-------|-------|-------------------|
| Output Voltage Accuracy      | Dual Output, Balanced Loads | ---        | ±1.0  | ±2.0  | %                 |
| Output Voltage Balance       |                             | ---        | ±1.0  | ±2.0  | %                 |
| Line Regulation              |                             | ---        | ±0.1  | ±0.5  | %                 |
| Load Regulation              | Io=0% to 100%               | ---        | ±0.6  | ±1.2  | %                 |
| Min.Load                     | No minimum Load Requirement |            |       |       |                   |
| Ripple & Noise (20MHz)       | Over Line, Load % Temp.     | ---        | 50    | 80    | mV <sub>P-P</sub> |
| Ripple & Noise (20MHz)       |                             | ---        | ---   | 100   | mV <sub>P-P</sub> |
| Transient Recovery Time      |                             | ---        | 300   | 600   | μs                |
| Transient Response Deviation | 25% Load Step Change        | ---        | ±3    | ---   | %                 |
| Temperature Coefficient      | Foldback                    | ---        | ±0.01 | ±0.02 | %/°C              |
| Over Load Protection         |                             | 110        | 145   | ---   | %                 |
| Short Circuit Protection     |                             | Continuous |       |       |                   |

## General Characteristics

| Parameter                     | Conditions                        | Min.                                                                   | Typ. | Max. | Unit  |
|-------------------------------|-----------------------------------|------------------------------------------------------------------------|------|------|-------|
| I/O Isolation Voltage (rated) | 60 Seconds                        | Standard                                                               | 1500 | ---  | VDC   |
|                               |                                   | Suffix H(note 5)                                                       | 3000 | ---  | VDC   |
| I/O Isolation Resistance      | 500 VDC                           | 1000                                                                   | ---  | ---  | MΩ    |
| I/O Isolation Capacitance     | 100KHz, 1V                        | ---                                                                    | 1000 | ---  | pF    |
| Switching Frequency           | MIL-HDBK-217F@25°C, Ground Benign | ---                                                                    | 330  | ---  | KHz   |
| MTBF (calculated)             |                                   | 1,000,000                                                              | ---  | ---  | Hours |
| Safety Approvals(pending)     |                                   | UL/cUL 60950-1 recognition(CSA certificate), IEC/EN 60950-1(CB-scheme) |      |      |       |

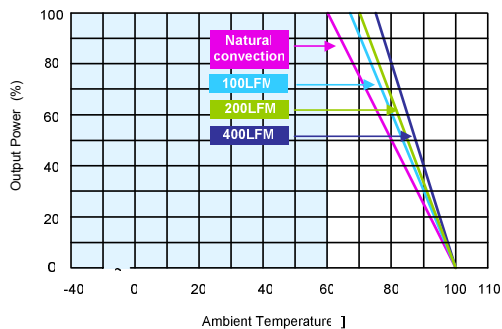
## Recommended Input Fuse

| 12V Input Models      | 24V Input Models     | 48V Input Models     |
|-----------------------|----------------------|----------------------|
| 1500mA Slow-Blow Type | 700mA Slow-Blow Type | 350mA Slow-Blow Type |

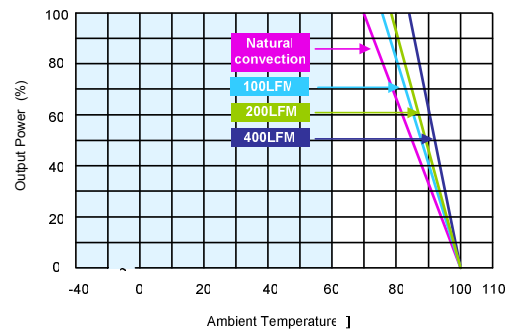
## Environmental Characteristics

| Parameter                                     | Conditions          | Min. | Max. | Unit     |
|-----------------------------------------------|---------------------|------|------|----------|
| Operating Temperature Range (with Derating)   | Ambient             | -40  | +85  | °C       |
| Case Temperature                              | Free-Air convection | ---  | +100 | °C       |
| Storage Temperature Range                     |                     | -50  | +125 | °C       |
| Humidity (non condensing)                     |                     | ---  | 95   | % rel. H |
| Cooling                                       | Free-Air convection |      |      |          |
| Lead Temperature (1.5mm from case for 10Sec.) |                     | ---  | 260  | °C       |

## Power Derating Curve



(3.3 & 5V Output Models)



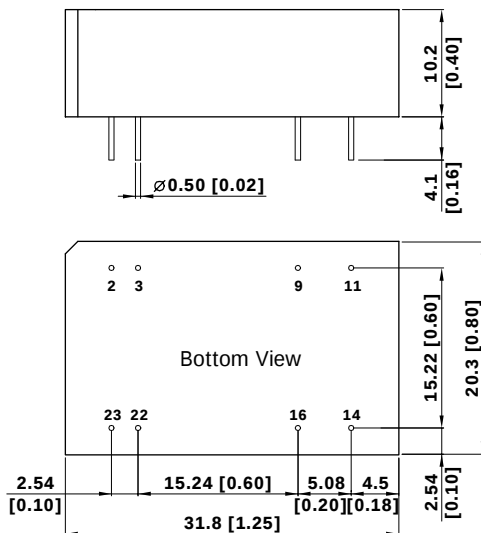
(Other Output Models)

## Notes

- 1 Specifications typical at  $T_a = +25^\circ\text{C}$ , resistive load, nominal input voltage and rated output current unless otherwise noted.
- 2 Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%
- 3 Ripple & Noise measurement bandwidth is 0-20MHz.
- 4 All DC/DC converters should be externally fused at the front end for protection.
- 5 DH06S/D series at 3KVDC isolation is available, order code DH06S with part number option code (last 1 digits).
- 6 Specifications subject to change without notice.

## Mechanical Drawing

### Mechanical Dimensions



### Pin Connections

| Pin | Single Output | Dual Output |
|-----|---------------|-------------|
| 2   | -Vin          | -Vin        |
| 3   | -Vin          | -Vin        |
| 9   | No Pin        | Common      |
| 11  | NC            | -Vout       |
| 14  | +Vout         | +Vout       |
| 16  | -Vout         | Common      |
| 22  | +Vin          | +Vin        |
| 23  | +Vin          | +Vin        |

NC: No Connection

- ▶ All dimensions in mm (inches)
- ▶ Tolerance:  $X.X \pm 0.25$  ( $X.XX \pm 0.01$ )  
 $X.XX \pm 0.13$  ( $X.XXX \pm 0.005$ )
- ▶ Pin diameter  $\varnothing 0.5 \pm 0.05$  ( $0.02 \pm 0.002$ )

## Physical Outline

Case Size : 31.8x20.3x10.2mm (1.25x0.80x0.40 Inches)

Case Material : Non-Conductive Black Plastic (flammability to UL 94V-0 rated)

Weight : 12.7g



## Part Numbering System

| D           | H             | 06    | S                 | 12            | 05             | A                  |
|-------------|---------------|-------|-------------------|---------------|----------------|--------------------|
| Form factor | Family series | Watt  | Number of Outputs | Input Voltage | Output Voltage | Option Code        |
| D-DIP       | A~Z           | 01:1W | S - Single        | 03:3.3V       | 03:3.3V        | A - Std. Functions |
| P-SIP       |               | 02:2W | D- Dual           | 05: 5V        | 05: 5V         | H-3KVDC Isolaton   |
| S-SMD       |               | 03:3W |                   | 12:12V        | 12:12V         |                    |
|             |               | 04:4W |                   | 24: 24V       | 15: 15V        |                    |
|             |               | 06:6W |                   | 48:48V        | 24: 24V        |                    |

## WARRANTY

Delta offers a three(3) years limited warranty. Complete warranty information is listed on our web site or is available upon request from Delta.

Information furnished by Delta is believed to be accurate and reliable. However, no responsibility is assumed by Delta for its use, nor for any infringements of patents or other rights of third parties, which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Delta. Delta reserves the right to revise these specifications at any time, without notice.