# DF04S/D Series

**4W DC/DC CONVERTER, DIP-Package, 4:1 Wide Input Range**

## FEATURES

- Efficiency up to 85%
- DIP Package with Industry Standard Pinout
- Short Circuit Protection
- 4:1 Wide Input Range
- UL60950-1 Safety Approval
- Complies with EN55022 Class A
- Temperature Performance -40℃ to +71℃
- 1500VDC Voltage Isolation
- Internal SMD Construction
- Lead free, RoHs Compliant
- 3 Years Product Warranty

The DF04S/D series are miniature, DIP Package, isolated 4W DC/DC converters. It allows a wide over input voltage ranges of 9-36VDC and 18-75VDC. It alos offers short circuit protection and allows a wide operating temperature range of –40°C to +71°C. 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. | Min. | @Max. Load | @No Load | | | @Max. Load |
| | VDC | VDC | mA | mA | mA(typ.) | mA(typ.) | mA(typ.) | uF | % |
| DF04S2403A | 24 (9 ~ 36) | 3.3 | 900 | 90 | 161 | 20 | 5 | 3000 | 77 |
| DF04S2405A | | 5 | 660 | 66 | 170 | | | | 81 |
| DF04S2412A | | 12 | 333 | 33 | 201 | | | | 83 |
| DF04S2415A | | 15 | 267 | 27 | 201 | | | | 83 |
| DF04D2405A | | ±5 | ±300 | ±30 | 156 | | | 680* | 80 |
| DF04D2412A | | ±12 | ±167 | ±17 | 201 | | | | 83 |
| DF04D2415A | | ±15 | ±133 | ±13 | 201 | | | | 83 |
| DF04S4803A | 48 (18 ~ 75) | 3.3 | 900 | 90 | 79 | 10 | 5 | 3000 | 78 |
| DF04S4805A | | 5 | 660 | 66 | 84 | | | | 82 |
| DF04S4812A | | 12 | 333 | 33 | 98 | | | | 85 |
| DF04S4815A | | 15 | 267 | 27 | 98 | | | | 85 |
| DF04D4805A | | ±5 | ±300 | ±30 | 76 | | | 680* | 82 |
| DF04D4812A | | ±12 | ±167 | ±17 | 98 | | | | 85 |
| DF04D4815A | | ±15 | ±133 | ±13 | 98 | | | | 85 |

* For each output



E-mail: DCDC@delta.com.tw
http://www.delta.com.tw/dcdc

## Input Characteristics

| Parameter | Model | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Input Surge Voltage (1 sec. max.) | 24V Input Models | -0.7 | --- | 50 | VDC |
| | 48V Input Models | -0.7 | --- | 100 | |
| Start-Up Voltage | 24V Input Models | 4.5 | 6 | 8.5 | |
| | 48V Input Models | 8.5 | 12 | 17 | |
| Under Voltage Shutdown | 24V Input Models | --- | --- | 8 | |
| | 48V Input Models | --- | --- | 16 | |
| Reverse Polarity Input Current | All Models | --- | --- | 1 | A |
| Short Circuit Input Power | | --- | 1000 | 2000 | 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 | | --- | ±0.5 | ±1.0 | % |
| Output Voltage Balance | Dual Output, Balanced Loads | --- | ±0.5 | ±2.0 | % |
| Line Regulation | Vin=Min. to Max. | --- | ±0.2 | ±0.5 | % |
| Load Regulation | Io=10% to 100% | --- | ±0.3 | ±1.0 | % |
| Ripple & Noise (20MHz) | | --- | 50 | 75 | $mV_{P-P}$ |
| Ripple & Noise (20MHz) | Over Line, Load & Temp. | --- | --- | 100 | $mV_{P-P}$ |
| Ripple & Noise (20MHz) | | --- | --- | 15 | mV rms |
| Transient Recovery Time | 25% Load Step Change | --- | 150 | 500 | uS |
| Transient Response Deviation | | --- | ±2 | --- | % |
| Temperature Coefficient | | --- | ±0.01 | ±0.02 | %/℃ |
| Over Load Protection | Foldback | 120 | TBD | --- | % |
| Short Circuit Protection | Continuous | | | | |

## General Characteristics

| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| I/O Isolation Voltage (rated) | 60 Seconds | 1500 | --- | --- | VDC |
| I/O Isolation Resistance | 500 VDC | 1000 | --- | --- | MΩ |
| I/O Isolation Capacitance | 100KHz, 1V | --- | 380 | 500 | pF |
| Switching Frequency | | --- | 350 | --- | KHz |
| MTBF (calculated) | MIL-HDBK-217F@25℃, Ground Benign | 1,000,000 | --- | --- | Hours |
| Safety Approvals | UL/cUL 60950-1 recognition(UL certificate), IEC/EN 60950-1 | | | | |

## Recommended Input Fuse

| 24V Input Models | 48V Input Models |
|---|---|
| 1000mA Slow-Blow Type | 500mA Slow-Blow Type |

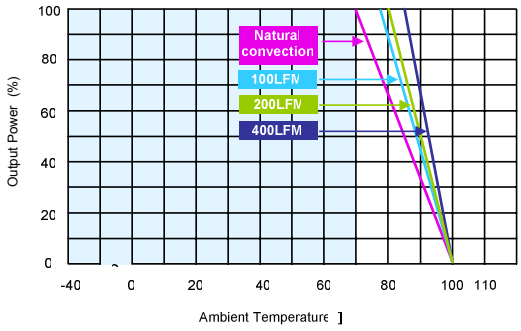
## Environmental Characteristics

| Parameter | Conditions | Min. | Max. | Unit |
|---|---|---|---|---|
| Operating Temperature Range (with Derating) | Ambient | -40 | +85 | ℃ |
| Case Temperature | | --- | +90 | ℃ |
| Storage Temperature Range | | -50 | +125 | ℃ |
| Humidity (non condensing) | | --- | 95 | % rel. H |
| Cooling | Free-Air convection | | | |
| Lead Temperature (1.5mm from case for 10Sec.) | | --- | 260 | ℃ |



E-mail: DCDC@delta.com.tw
http://www.delta.com.tw/dcdc

## Power Derating Curve

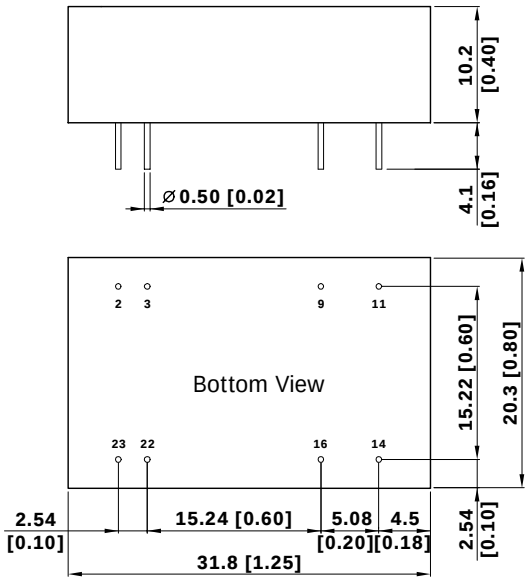



## Notes

1 Specifications typical at Ta=+25℃, 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 50% to 100%
3 Ripple & Noise measurement bandwidth is 0-20MHz.
4 These power converters require a minimum output loading to maintain specified regulation, operation under no-load conditions will not damage these modules; however they may not meet all specifications listed.
5 All DC/DC converters should be externally fused at the front end for protection.
6 Specifications subject to change without notice.

## Mechancial 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±0.25 (X.XX±0.01)
  X.XX±0.13 ( X.XXX±0.005)
- ▶Pin diameter ⇔ 0.5 ±0.05 (0.02±0.002)

## Physical Outline

| | | |
|---|---|---|
| Case Size | : | 31.8x20.3x10.2mm (1.25x0.80x0.40 Inches) |
| Case Material | : | Metal With Non-Conductive Baseplate |
| Weight | : | 16.2g |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## Part Numbering System

| D | F | 04 | S | 24 | 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 | |
| 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.

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Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

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Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

**Офис по работе с юридическими лицами:**

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:
moschip.ru
moschip.ru_4
moschip.ru_6
moschip.ru_9