

## Descriptions

0.75W isolated, DC-DC Converter



RoHS



EN62368-1



BS EN62368-1

## Features

- Continuous short-circuit protection
- No-load input current as low as 8mA
- Operating ambient temperature range: -40°C to +85°C
- High efficiency up to 74%
- I/O isolation test voltage 1.5k VDC

## Applications

- Industrial control
- power
- home appliances
- Instrumentation
- Communication
- Civil applications

## Selection Guide

| Certification | Part No.       | Input Voltage (VDC) | Output        |                           | Full Load Efficiency(%)<br>Min./Typ. | Capacitive Load (μF)<br>Max. |
|---------------|----------------|---------------------|---------------|---------------------------|--------------------------------------|------------------------------|
|               |                | Nominal (Range)     | Voltage (VDC) | Current (mA)<br>Max./Min. |                                      |                              |
| EN/BS EN      | DFS0.75-IB0503 | 5<br>(4.75-5.25)    | 3.3           | 200/20                    | 64/68                                | 2400                         |
|               | DFS0.75-IB0505 |                     | 5             | 150/15                    | 68/72                                | 2400                         |
|               | DFS0.75-IB0509 |                     | 9             | 83/9                      | 68/72                                | 1000                         |
|               | DFS0.75-IB0512 |                     | 12            | 62/7                      | 69/73                                | 560                          |
|               | DFS0.75-IB0515 |                     | 15            | 50/5                      | 70/74                                | 560                          |
|               | DFS0.75-IB1203 | 12<br>(11.4-12.6)   | 3.3           | 200/20                    | 64/68                                | 2400                         |
|               | DFS0.75-IB1205 |                     | 5             | 150/15                    | 68/72                                | 2400                         |
|               | DFS0.75-IB1212 |                     | 12            | 62/7                      | 69/73                                | 560                          |
|               | DFS0.75-IB1215 |                     | 15            | 50/5                      | 70/74                                | 560                          |
|               | DFS0.75-IB2403 | 24<br>(22.8-25.2)   | 3.3           | 200/20                    | 62/68                                | 2400                         |
|               | DFS0.75-IB2405 |                     | 5             | 150/15                    | 66/72                                | 2400                         |
|               | DFS0.75-IB2412 |                     | 12            | 62/7                      | 67/73                                | 560                          |
|               | DFS0.75-IB2415 |                     | 15            | 50/5                      | 68/74                                | 560                          |

## Specifications

| Product Specifications   | Item                                   | Operating Conditions                                                                            |                    |                           | Min. | Typ.               | Max.   | Unit  |    |
|--------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------|--------------------|---------------------------|------|--------------------|--------|-------|----|
| Input Specifications     | Input Current<br>(full load / no-load) | 5V input                                                                                        | 3.3VDC/5VDC output |                           | --   | 209/8              | 221/-- | mA    |    |
|                          |                                        |                                                                                                 | 9VDC/12VDC output  |                           | --   | 208/12             | 221/-- |       |    |
|                          |                                        |                                                                                                 | 15VDC output       |                           | --   | 202/18             | 215/-- |       |    |
|                          |                                        | 12V input                                                                                       | 3.3VDC output      |                           | --   | 92/8               | 98/--  |       |    |
|                          |                                        |                                                                                                 | 5VDC output        |                           | --   | 87/8               | 92/--  |       |    |
|                          |                                        |                                                                                                 | 12VDC output       |                           | --   | 86/8               | 91/--  |       |    |
|                          |                                        |                                                                                                 | 15VDC output       |                           | --   | 85/8               | 90/--  |       |    |
|                          |                                        | 24V input                                                                                       | 3.3VDC output      |                           | --   | 46/8               | 51/--  |       |    |
|                          |                                        |                                                                                                 | 5VDC output        |                           | --   | 44/8               | 48/--  |       |    |
|                          |                                        |                                                                                                 | 12VDC output       |                           | --   | 43/8               | 47/--  |       |    |
|                          |                                        |                                                                                                 | 15VDC output       |                           | --   | 43/8               | 46/--  |       |    |
|                          |                                        | Reflected Ripple Current                                                                        |                    |                           |      | --                 | 15     |       | -- |
|                          |                                        | Input Filter                                                                                    |                    |                           |      | Capacitance filter |        |       |    |
| Hot Plug                 |                                        |                                                                                                 |                    | Unavailable               |      |                    |        |       |    |
| Output Specifications    | Voltage Accuracy                       |                                                                                                 |                    |                           | --   | --                 | ±3     | %     |    |
|                          | Linear Regulation                      | Input voltage change: ±1%                                                                       |                    |                           | --   | --                 | ±0.25  |       |    |
|                          | Load Regulation                        | 10%-100%load                                                                                    | 3.3VDC output      |                           | --   | --                 | ±3     |       |    |
|                          |                                        |                                                                                                 | Other output       |                           | --   | --                 | ±2     |       |    |
|                          | Ripple & Noise*                        | 20MHz bandwidth                                                                                 | 12/24VDC input     | 5VDC input                | --   | 30                 | 75     | mVp-p |    |
|                          |                                        |                                                                                                 |                    | 3.3/5/12VDC output        | --   | 30                 | 100    |       |    |
|                          |                                        |                                                                                                 |                    | 15VDC output              | --   | 80                 | 150    |       |    |
|                          | Temperature Coefficient                | 100% load                                                                                       |                    |                           | --   | ±0.02              | --     | %/°C  |    |
| Short-circuit Protection |                                        |                                                                                                 |                    | Continuous, self-recovery |      |                    |        |       |    |
| General Specifications   | Isolation                              | Input-output electric strength test for 1 minute with a leakage current of 1mA max.             |                    |                           | 1500 | --                 | --     | VDC   |    |
|                          |                                        | 5VDC input, Input-output electric strength test for 1 second with a leakage current of 1mA max. |                    |                           | 3000 | --                 | --     |       |    |
|                          | Insulation Resistance                  | Input-output resistance at 500VDC                                                               |                    |                           | 1000 | --                 | --     | MΩ    |    |
|                          | Isolation Capacitance                  | Input-output capacitance at 100kHz/0.1V                                                         |                    |                           | --   | 20                 | --     | pF    |    |
|                          | Operating Temperature                  | Derating when operating temperature ≥ 71°C (see Fig. 1)                                         |                    |                           | -40  | --                 | 85     | °C    |    |
|                          | Storage Temperature                    |                                                                                                 |                    |                           | -55  | --                 | 125    |       |    |
|                          | Case Temperature Rise                  | Ta=25°C                                                                                         | 3.3VDC output      |                           | --   | 30                 | --     |       |    |
|                          |                                        |                                                                                                 | Other output       |                           | --   | 25                 | --     |       |    |

|                                                                        |                                      |                                                             |                |      |                                        |     |         |
|------------------------------------------------------------------------|--------------------------------------|-------------------------------------------------------------|----------------|------|----------------------------------------|-----|---------|
|                                                                        | Pin Soldering Resistance Temperature | Soldering spot is 1.5mm away from case for 10 seconds       |                | --   | --                                     | 300 | %RH     |
|                                                                        | Storage Humidity                     | Non-condensing                                              | 5VDC input     | --   | --                                     | 95  |         |
|                                                                        |                                      |                                                             | 12/24VDC input | 5    | --                                     | 95  |         |
|                                                                        | Vibration                            | 5VDC input                                                  |                |      | 10-150Hz, 5G, 30Min. along X, Y and Z  |     |         |
|                                                                        |                                      | 12/24VDC input                                              |                |      | 10-150Hz, 5G, 0.75mm. along X, Y and Z |     |         |
|                                                                        | Switching Frequency                  | 100% load, nominal input voltage                            | 5VDC input     | --   | 270                                    | --  | kHz     |
|                                                                        |                                      |                                                             | 12/24VDC input | --   | 260                                    | --  |         |
| MTBF                                                                   | MIL-HDBK-217F@25°C                   |                                                             |                | 3500 | --                                     | --  | k hours |
| Mechanical Specifications                                              | Case Material                        | Black plastic; flame-retardant and heat-resistant (UL94V-0) |                |      |                                        |     |         |
|                                                                        | Dimensions                           | 11.60 x 6.00 x 10.16 mm                                     |                |      |                                        |     |         |
|                                                                        | Weight                               | 1.3g(Typ.)                                                  |                |      |                                        |     |         |
|                                                                        | Cooling Method                       | Free air convection                                         |                |      |                                        |     |         |
| Note: * The “parallel cable” method is used for ripple and noise test. |                                      |                                                             |                |      |                                        |     |         |

### Electromagnetic Compatibility (EMC)

|                                                    |     |                 |                                         |
|----------------------------------------------------|-----|-----------------|-----------------------------------------|
| Emissions                                          | CE  | CISPR32/EN55032 | CLASS B                                 |
|                                                    | RE  | CISPR32/EN55032 | CLASS B                                 |
| Immunity                                           | ESD | IEC/EN61000-4-2 | Air ±8kV, Contact ±6kV perf. Criteria B |
| Note: Refer to Fig.3 for recommended circuit test. |     |                 |                                         |

### Characteristic Curve

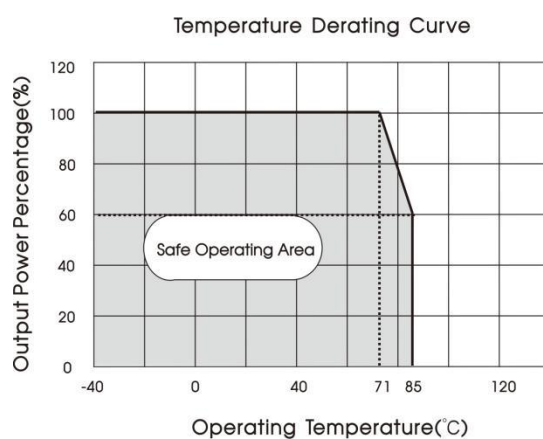
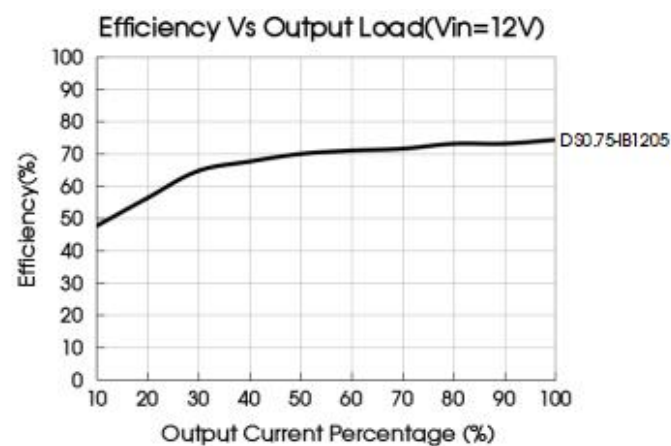
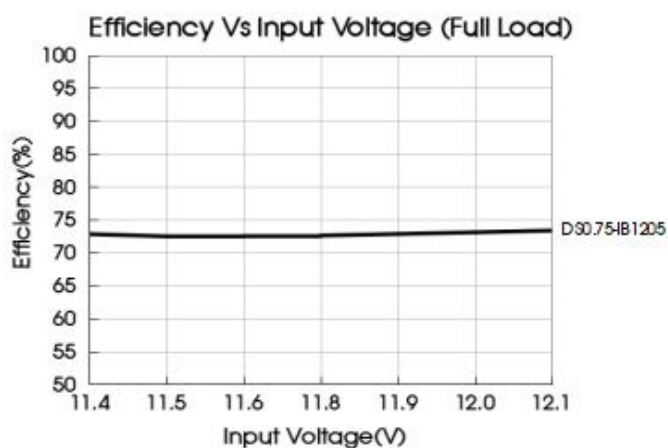
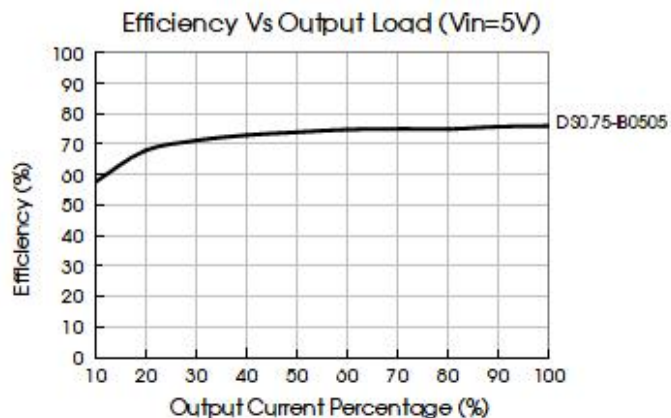
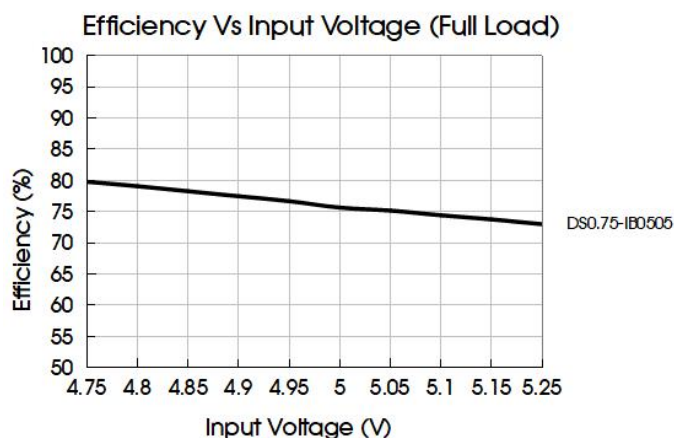


Fig. 1



## Design Reference

### 1. Typical application circuit

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig. 2

Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.



Fig. 2

Table 1: Recommended input and output capacitor values

| Vin   | Cin        | Output      | Cout      |
|-------|------------|-------------|-----------|
| 5VDC  | 4.7μF/16V  | 3.3VDC/5VDC | 10 μF/16V |
| 12VDC | 2.2 μF/25V | 9/12VDC     | 2.2μF/25V |
| 24VDC | 1μF/50V    | 15VDC       | 1μF/25V   |

## 2. EMC (CLASS B) compliance circuit

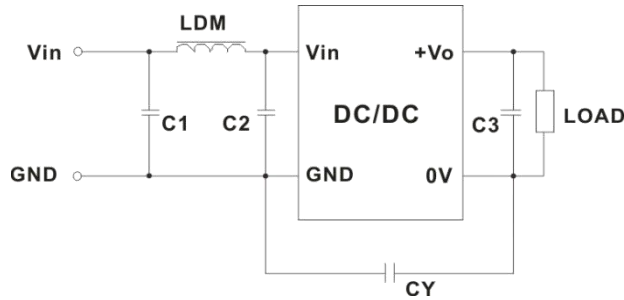
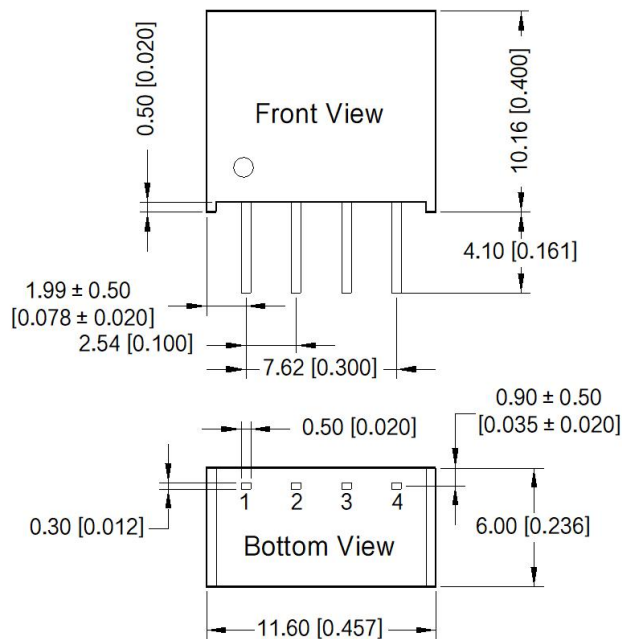


Fig. 3

Table 2: Recommended EMC filter values

| Input voltage  |       | 5DVC                         |                 | 12/24VDC         |
|----------------|-------|------------------------------|-----------------|------------------|
| Output voltage |       | 3.3/5/9VDC                   | 12/15VDC        | --               |
| EMI            | C1/C2 | 4.7 $\mu$ F/25V              | 4.7 $\mu$ F/25V | 4.7 $\mu$ F /50V |
|                | CY    | --                           | 1nF /4kVDC      | 270pF /2kV       |
|                | C3    | Refer to the Cout in table 1 |                 |                  |
|                | LDM   | 6.8 $\mu$ H                  |                 |                  |

## Dimensions and Recommended



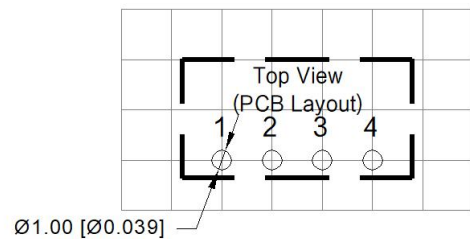
Note:

Unit: mm[inch]

Pin section tolerances:  $\pm 0.10[\pm 0.004]$

General tolerances:  $\pm 0.25[\pm 0.010]$

THIRD ANGLE PROJECTION



Note: Grid 2.54\*2.54mm

| Pin-Out |      |
|---------|------|
| Pin     | Mark |
| 1       | GND  |
| 2       | Vin  |
| 3       | 0V   |
| 4       | +Vo  |

### Notes:

1. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25°C, humidity<75%RH with nominal input voltage and rated output load;
4. All index testing methods in this datasheet are based on our company corporate standards;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.