

## 1W

### DC-DC POWER SUPPLIES

The single output IES01 series is an ideal solution for isolating voltage rails in a distributed power supply architecture such as analog, digital, data and relay circuits. This product family offers a compact design with high efficiency, 1.5kV isolation with 3.0kV optional, short circuit protection and high operating temperature.



### Features

- Unregulated single output
- $\pm 10\%$  input range
- Single outputs 3.3 to 24VDC
- SMD8 DIP package
- Industry standard pinout
- 1.5kVDC isolation, 3kVDC option
- UL62368-1 safety approvals
- Continuous short circuit protection
- Tape & reel option
- Operating temperature  $-40^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$
- Full load to  $100^{\circ}\text{C}$
- 3 year warranty

### Applications



Industrial  
Electronics



Instrumentation



Technology

### Dimensions

0.52" x 0.335" x 0.285" (13.2 x 8.5 x 7.25 mm)

### Models & Ratings

| Model Number <sup>(5,6)</sup> | Input Voltage         | Output Voltage | Input Current <sup>(1)</sup> |           | Output Current |         | Maximum Capacitive Load | Efficiency <sup>(2)</sup> |
|-------------------------------|-----------------------|----------------|------------------------------|-----------|----------------|---------|-------------------------|---------------------------|
|                               |                       |                | No Load                      | Full Load | Minimum        | Maximum |                         |                           |
| IES0105S03                    | 5V<br>(4.5-5.5V)      | 3.3V           | 5mA                          | 270mA     | 30mA           | 303mA   | 2400 $\mu\text{F}$      | 74%                       |
| IES0105S05                    |                       | 5V             | 5mA                          | 270mA     | 20mA           | 200mA   | 2400 $\mu\text{F}$      | 82%                       |
| IES0105S06 <sup>(3)</sup>     |                       | 6V             | 5mA                          | 270mA     | 17mA           | 167mA   | 2400 $\mu\text{F}$      | 82%                       |
| IES0105S09                    |                       | 9V             | 12mA                         | 241mA     | 12mA           | 111mA   | 1000 $\mu\text{F}$      | 83%                       |
| IES0105S12                    |                       | 12V            | 12mA                         | 241mA     | 9mA            | 84mA    | 560 $\mu\text{F}$       | 83%                       |
| IES0105S15                    |                       | 15V            | 18mA                         | 241mA     | 7mA            | 67mA    | 560 $\mu\text{F}$       | 83%                       |
| IES0105S24                    |                       | 24V            | 18mA                         | 241mA     | 4mA            | 42mA    | 220 $\mu\text{F}$       | 85%                       |
| IES0112S05                    | 12V<br>(10.8 - 13.2V) | 5V             | 8mA                          | 107mA     | 20mA           | 200mA   | 2400 $\mu\text{F}$      | 82%                       |
| IES0112S09                    |                       | 9V             | 8mA                          | 106mA     | 12mA           | 111mA   | 1000 $\mu\text{F}$      | 83%                       |
| IES0112S12                    |                       | 12V            | 8mA                          | 106mA     | 9mA            | 84mA    | 560 $\mu\text{F}$       | 83%                       |
| IES0112S15                    |                       | 15V            | 8mA                          | 106mA     | 7mA            | 67mA    | 560 $\mu\text{F}$       | 83%                       |
| IES0112S24                    |                       | 24V            | 8mA                          | 103mA     | 4mA            | 42mA    | 220 $\mu\text{F}$       | 85%                       |
| IES0115S05                    | 15V<br>(13.5-16.5V)   | 5V             | 8mA                          | 86mA      | 20mA           | 200mA   | 2400 $\mu\text{F}$      | 82%                       |
| IES0115S15                    |                       | 15V            | 8mA                          | 85mA      | 7mA            | 67mA    | 560 $\mu\text{F}$       | 83%                       |
| IES0124S05                    | 24V<br>(21.6 - 26.4V) | 5V             | 8mA                          | 55mA      | 20mA           | 200mA   | 2400 $\mu\text{F}$      | 82%                       |
| IES0124S09                    |                       | 9V             | 8mA                          | 55mA      | 12mA           | 111mA   | 1000 $\mu\text{F}$      | 83%                       |
| IES0124S12                    |                       | 12V            | 8mA                          | 55mA      | 9mA            | 84mA    | 560 $\mu\text{F}$       | 83%                       |
| IES0124S15                    |                       | 15V            | 8mA                          | 55mA      | 7mA            | 67mA    | 560 $\mu\text{F}$       | 83%                       |
| IES0124S24                    |                       | 24V            | 8mA                          | 53mA      | 4mA            | 42mA    | 220 $\mu\text{F}$       | 85%                       |

#### Notes:

1. Typical input currents measured at nominal input voltage.
2. Typical value at full load.
3. Designed to meet UL62368-1.
4. Standard tube quantity = 38.
5. For tape & reel option add suffix -TR. Reel quantity = 500.
6. Optional 3kVDC isolation add suffix '-H'.

## Input

| Characteristic         | Minimum                      | Typical | Maximum | Units    | Notes & Conditions  |
|------------------------|------------------------------|---------|---------|----------|---|
| Input Voltage          | 4.5                          |         | 26.4    | VDC      | See models and ratings table                                      |
| Input Reflected Ripple |                              | 15/30   | 63      | mA pk-pk | Through 4.7μH inductor and 220μF capacitor, 5V input/other models |
| Input Surge            |                              |         | 9       | VDC      | IES0105 for max 1s  |
|                        |                              |         | 18      |          | IES0112 for max 1s  |
|                        |                              |         | 21      |          | IES0115 for max 1s  |
|                        |                              |         | 30      |          | IES0124 for max 1s  |
| Input Current          | See models and ratings table |         |         |          |   |
| Input Filter           | Capacitor                    |         |         |          |   |

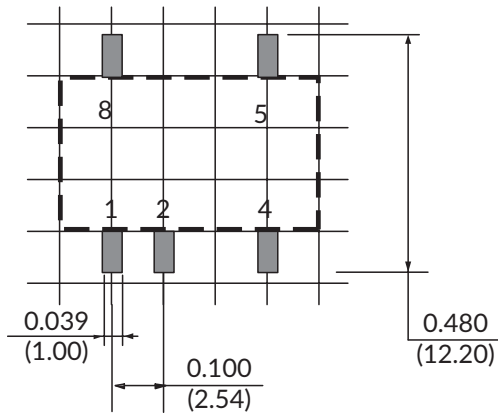
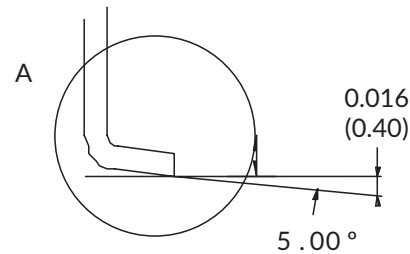
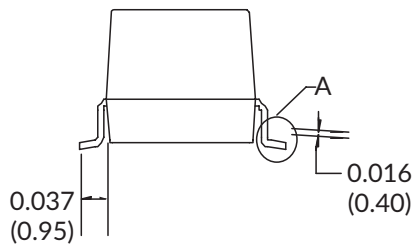
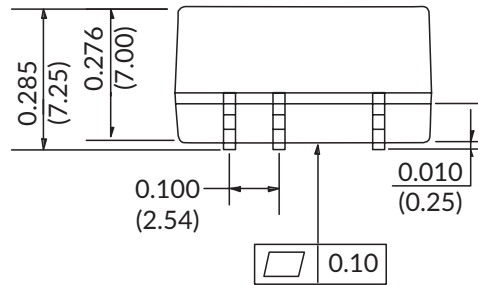
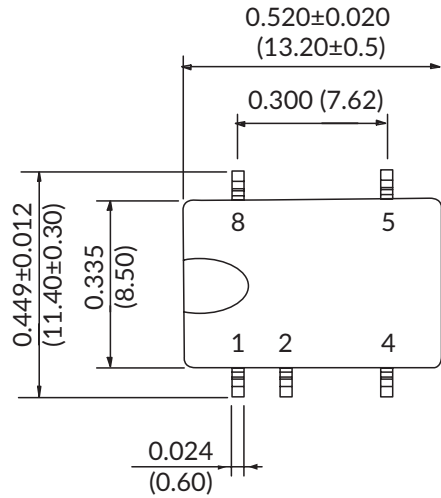
## Output

| Characteristic           | Minimum                        | Typical | Maximum  | Units    | Notes & Conditions   |
|--------------------------|--------------------------------|---------|----------|----------|--|
| Output Voltage           | 3.3                            |         | 24       | VDC      | See models and ratings table   |
| Initial Set Accuracy     | See Load Regulation curves     |         |          |          |  |
| Minimum Load             | 10                             |         |          | %        |  |
| Line Regulation          |                                |         | ±1.2     | %        | Per ±1% change of input voltage  |
| Load Regulation          | See Load Regulation curves     |         |          |          |  |
| Ripple and Noise         |                                | 30 (50) | 75 (100) | mV pk-pk | For models ≤15V/24V output, 20 MHz bandwidth, measured using 0.1μF capacitor |
| Short Circuit Protection | Continuous, with auto recovery |         |          |          |  |
| Maximum Capacitive Load  | See Models and Ratings table   |         |          |          |  |
| Temperature Coefficient  |                                |         | ±0.02    | %/°C     |  |

## General

| Characteristic             | Minimum   | Typical     | Maximum | Units             | Notes & Conditions  |
|----------------------------|---|-------------|---------|-------------------|---|
| Efficiency                 | See Models and Ratings table  |             |         |                   |   |
| Isolation: Input to Output | 1500/3000   |             |         | VDC               | IES/IES-H functional  |
| Switching Frequency        | 260   | 270         | 278     | kHz               | Low input voltage 10% load to high input voltage at full load |
| Isolation Resistance       | 10 <sup>9</sup>   |             |         | Ω                 | Input to output, tested at 500VDC                             |
| Isolation Capacitance      |   | 20          |         | pF                | Input to output   |
| Power Density              |   |             | 20.8    | W/in <sup>3</sup> |   |
| Mean Time Between Failure  | 3500  |             |         | khrs              | MIL-HDBK-217F, 25°C GB.                                       |
| Weight                     |   | 0.003 (1.4) |         | lb(g)             |   |
| Recommended Solder Profile | IPC/JEDEC J-STD-020D.1, peak temp ≤245°C, max duration, ≤60s at 217°C |             |         |                   |   |
| MSL                        | Level 1   |             |         |                   |   |
| Case Material              | Black plastic, flame retardant UL94V-0                                |             |         |                   |   |
| Pin Material               | Phosphor bronze, solder coated  |             |         |                   |   |
| Water Wash                 | Non-soaking water wash with de-ionised water. Dry thoroughly.         |             |         |                   |   |

Mechanical Details



| Pin Connections |                              |
|-----------------|------------------------------|
| Pin             | Function                     |
| 1               | -Vin                         |
| 2               | +Vin                         |
| 4               | -Vout                        |
| 5               | +Vout                        |
| 8               | No Connection <sup>(5)</sup> |

Recommended Footprint  
 Top View grid: 0.1 x 0.1 in (2.54 x 2.54 mm)

Notes:

1. All dimensions are in inches (mm).
2. Weight: 0.003lbs (1.4g) typical.
3. Pin pitch and length tolerance:  $\pm 0.004$  ( $\pm 0.10$ ).
4. Case tolerance:  $\pm 0.02$  ( $\pm 0.5$ ).
5. Pin 8 leave floating.

## Environmental

| Characteristic        | Minimum            | Typical | Maximum | Units | Notes & Conditions                                   |
|-----------------------|--------------------|---------|---------|-------|--|
| Operating Temperature | -40                |         | +105    | °C    | Derate from 100% load at +100°C to 80% load at 105°C |
| Storage Temperature   | -55                |         | +125    | °C    |  |
| Case Temperature      |                    |         | +105    | °C    |  |
| Case Temperature Rise |                    | 25/15   |         | %RH   | Ambient 25°C , 3V3 output/others                     |
| Operating Humidity    |                    |         | 95      | m     | Non-condensing                                       |
| Cooling               | Natural convection |         |         |       |  |

## Safety Approvals

| Safety Agency | Standard                         | Notes & Conditions |
|---------------|----------------------------------|--------------------|
| UL            | UL62368-1                        |                    |
| CE            | Meets all applicable directives  |                    |
| UKCA          | Meets all applicable legislation |                    |

## EMC: Emissions

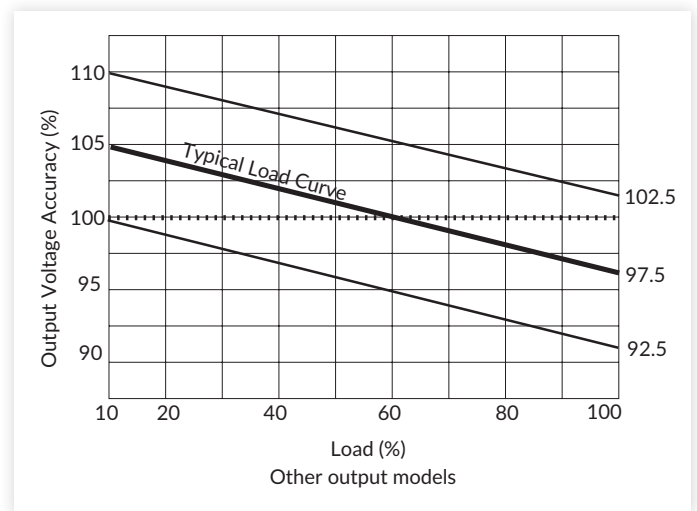
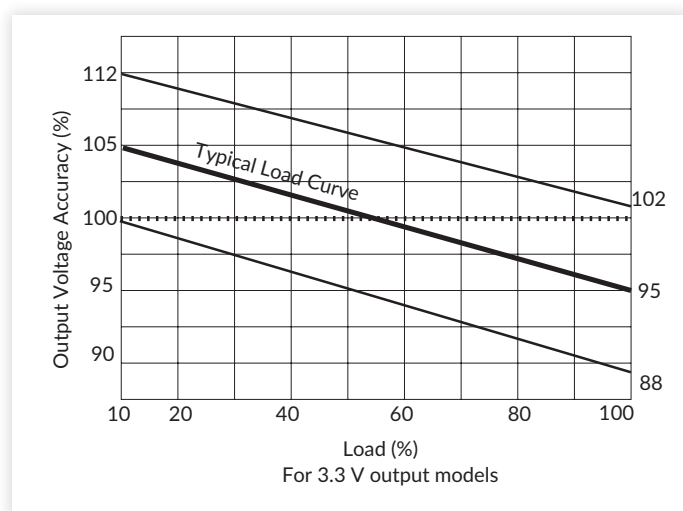
| Phenomenon | Standard | Test Level | Notes & Conditions                      |
|------------|----------|------------|---|
| Conducted  | EN55032  | Class B    | See Application Note for Class B filter |
| Radiated   | EN55032  | Class B    |   |

## EMC: Immunity

| Phenomenon   | Standard    | Test Level                           | Criteria | Notes & Conditions |
|--------------|-------------|--------------------------------------|----------|--------------------|
| ESD Immunity | EN61000-4-2 | ±4kV contact /<br>±8kV air discharge | B        |                    |

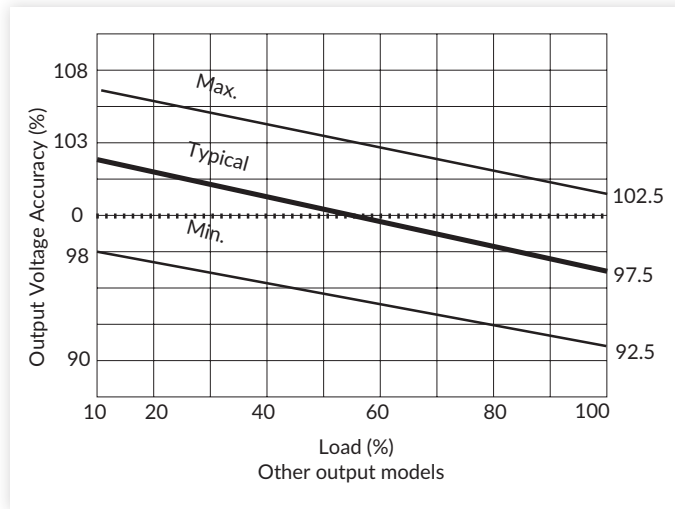
## Load Regulation

5V input series

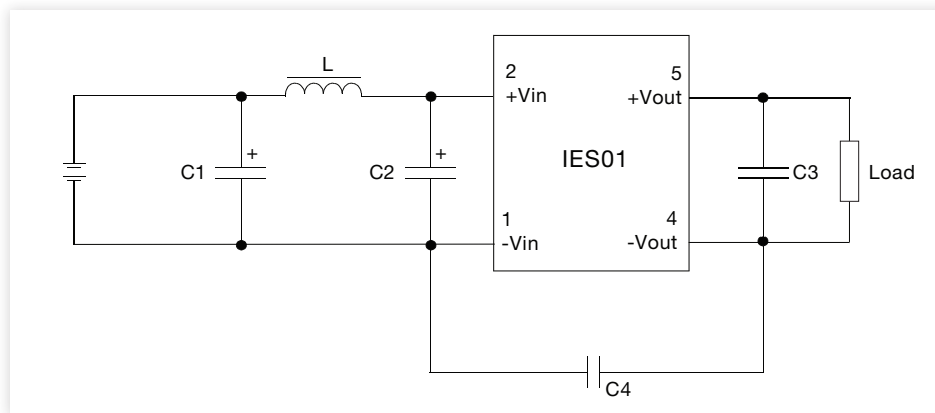


## Application Notes

### Other Input Series



### EMI Filter for Class B Emissions



| 5V Input:      |            |             |            |       |
|----------------|------------|-------------|------------|-------|
| Output Voltage | C1, C2     | C3          | C4         | L     |
| 3.3V           | 4.7μF, 25V | 10μF, 16V   | Not fitted | 6.8μH |
| 5V             |            | 10μF, 16V   |            |       |
| 9V             |            | 2.2μF, 25V  |            |       |
| 12V            |            | 2.2μF, 25V  | 1nF        |       |
| 15V            |            | 1μF, 25V    |            |       |
| 24V            |            | 0.47μF, 50V |            |       |

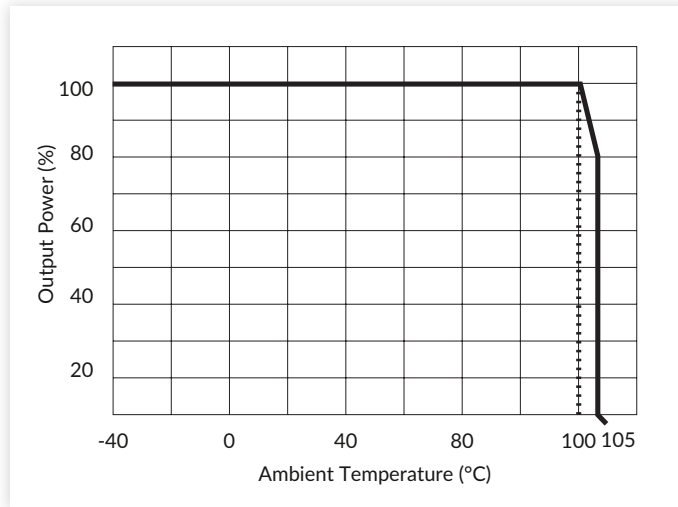
C4: 2kV, ceramic. Upgrade C4 to 4kV for 3kV isolation option -H.

| Other Input Series: |            |            |       |       |
|---------------------|------------|------------|-------|-------|
| Output Voltage      | C1, C2     | C3         | C4    | L     |
| 5V                  | 4.7μF, 50V | 10μF, 16V  | 270pF | 6.8μH |
| 9V                  |            | 2.2μF, 16V |       |       |
| 12V                 |            | 2.2μF, 25V |       |       |
| 15V                 |            | 1μF, 25V   |       |       |
| 24V                 |            | 1μF, 50V   |       |       |

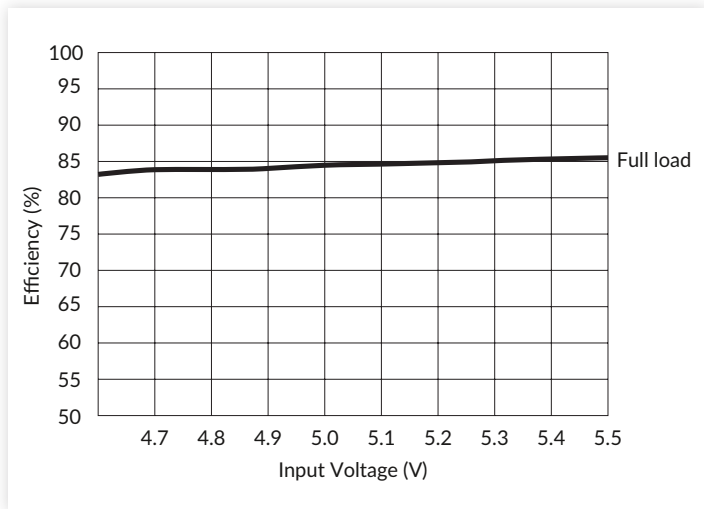
C4: 2kV, ceramic. Upgrade C4 to 4kV for 3kV isolation option -H.

## Application Notes

Temperature Derating Curve



Efficiency vs Input Voltage (IES0105S05)



Efficiency vs Output Load (IES0105S05)

