

2 Watts

- Single Output
- SMD Package
- Industry Standard Pinout
- Operating Temperature -40 °C to +105 °C
- 1500 VDC Isolation, 3000 VDC Option
- 3 Year Warranty



Dimensions:

ISH:
0.500 x 0.44 x 0.285" (12.7 x 11.2 x 7.25 mm)

Models & Ratings

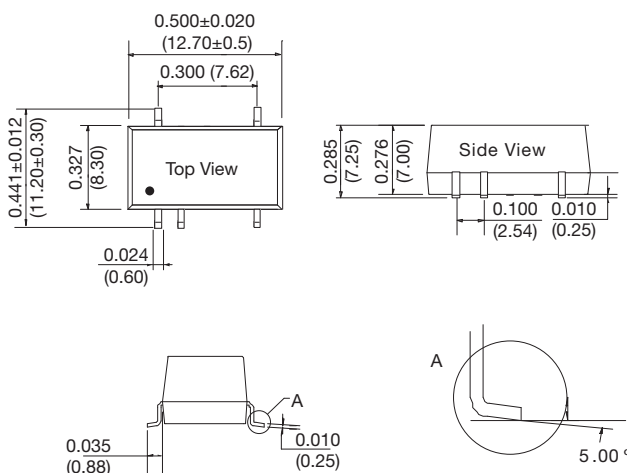
| Input Voltage | Output Voltage | Output Current | Input Current ⁽²⁾ | | Maximum Capacitive Load | Efficiency ⁽³⁾ | Model Number ^(1,4) |
|---------------|----------------|----------------|------------------------------|-----------|-------------------------|---------------------------|-------------------------------|
| | | | No Load | Full Load | | | |
| 4.5-5.5 | 3.3V | 400 mA | 30 mA | 506 mA | 220 µF | 72% | ISH0503A ⁽¹⁾ |
| | 5V | 400 mA | 30 mA | 506 mA | 220 µF | 79% | ISH0505A ⁽¹⁾ |
| | 9V | 222 mA | 30 mA | 506 mA | 220 µF | 82% | ISH0509A ⁽¹⁾ |
| | 12V | 167 mA | 30 mA | 506 mA | 220 µF | 82% | ISH0512A ⁽¹⁾ |
| | 15V | 133 mA | 30 mA | 506 mA | 220 µF | 83% | ISH0515A ⁽¹⁾ |
| 10.8-13.2 | 5V | 400 mA | 25 mA | 212 mA | 220 µF | 79% | ISH1205A ⁽¹⁾ |
| | 9V | 222 mA | 25 mA | 212 mA | 220 µF | 82% | ISH1209A |
| | 12V | 167 mA | 25 mA | 212 mA | 220 µF | 82% | ISH1212A ⁽¹⁾ |
| | 15V | 133 mA | 25 mA | 212 mA | 220 µF | 83% | ISH1215A ⁽¹⁾ |
| 13.5-16.5 | 24V | 83 mA | 25 mA | 212 mA | 220 µF | 84% | ISH1224A ⁽¹⁾ |
| | 15V | 133 mA | 18 mA | 169 mA | 220 µF | 83% | ISH1515A ⁽¹⁾ |
| 21.6-26.4 | 5V | 400 mA | 15 mA | 105 mA | 220 µF | 79% | ISH2405A ⁽¹⁾ |
| | 12V | 167 mA | 15 mA | 105 mA | 220 µF | 82% | ISH2412A ⁽¹⁾ |
| | 15V | 133 mA | 15 mA | 105 mA | 220 µF | 83% | ISH2415A ⁽¹⁾ |
| | 24V | 83 mA | 15 mA | 105 mA | 220 µF | 86% | ISH2424A ⁽¹⁾ |

Notes

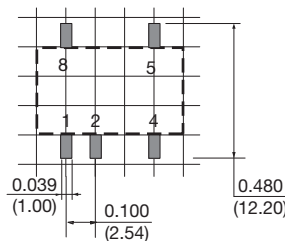
1. For optional 3000 VDC isolation add suffix '-H' to end of part number e.g. ISH1224A-H.
2. Input currents measured at nominal input voltage.

3. Typical value at full load.
4. For optional tape & reel option add suffix '-TR' to the end of the p/n. Reel quantity = 500

Mechanical Details



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



| PIN CONNECTIONS | |
|-----------------|---------------|
| Pin | Function |
| 1 | GND |
| 2 | +Vin |
| 4 | 0V |
| 5 | +Vout |
| 8 | No Connection |

Notes

1. All dimensions are in inches (mm)
2. Weight: 0.003 lbs (1.5 g) typical.
3. Pin diameter: 0.02 ±0.002 (0.5 ±0.005)
4. Pin pitch and length tolerance: ±0.014 (±0.35)
5. Case tolerance: ±0.02 (±0.5)

Input

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|------------------------|-----------|---------|---------|-------------|--|
| Input Voltage Range | 4.50 | | 5.50 | VDC | 5 V nominal |
| | 10.80 | | 13.20 | VDC | 12 V nominal |
| | 13.50 | | 16.50 | VDC | 15 V nominal |
| | 21.60 | | 26.40 | VDC | 24 V nominal |
| Input Current | | | | | See Models and Ratings table |
| Input Reflected Ripple | | 15 | | mA pk-pk | Through 12 μ H inductor and 47 μ F capacitor |
| Input Surge | | | 9 | VDC for 1 s | 5 V models |
| | | | 18 | VDC for 1 s | 12 V models |
| | | | 21 | VDC for 1 s | 15 V models |
| | | | 30 | VDC for 1 s | 24 V models |
| 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 | | | -7.5, +2.5 | % | At 70% load |
| Minimum Load | 10 | | | % | |
| Line Regulation | | | ± 1.2 | % | Per 1% change of input voltage ($\pm 1.5\%$ for 3V3 output) |
| Load Regulation | | | | % | See graph |
| Start Up Delay | | 2 | | ms | |
| Ripple and Noise | | 100 | | mV pk-pk | 20 MHz bandwidth, measured using 0.1 μ F capacitor |
| Transient Response | | | 3 | % deviation | Recovery to within 1% in 500 μ s for a 25% load change (5% max. deviation for 3.3 & 5 V models) |
| Short Circuit Protection | | | | | Continuous, with auto recovery, except 1 s max for 24 input V models |
| Maximum Capacitive Load | | | 220 | μ F | |
| Temperature Coefficient | | | 0.03 | %/°C | |

General

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|----------------------------|------------------------|-------------|---------|------------------|--|
| Efficiency | | | | | See Models and Ratings table |
| Isolation: Input to Output | 1500 | | | VDC | For optional high isolation versions, 3000 VDC input to output add suffix -H to model number |
| Switching Frequency | 100 | 115 | 135 | kHz | |
| Isolation Resistance | 10^9 | | | Ω | Input to output, tested at 500 VDC |
| Isolation Capacitance | | 20 | | pF | Input to output |
| Power Density | | | 31.8 | Win ³ | |
| Mean Time Between Failure | 3500 | | | kHrs | MIL-HDBK-217F, +25 °C GB |
| Weight | | 0.003 (1.5) | | lb (g) | |
| Recommended Solder Profile | IPC/JEDEC J-STD-020D.1 | | | | |

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 | | | +115 | °C | |
| Operating Humidity | | | 95 | % RH | Non-condensing |
| Cooling | | | | | Natural convection |

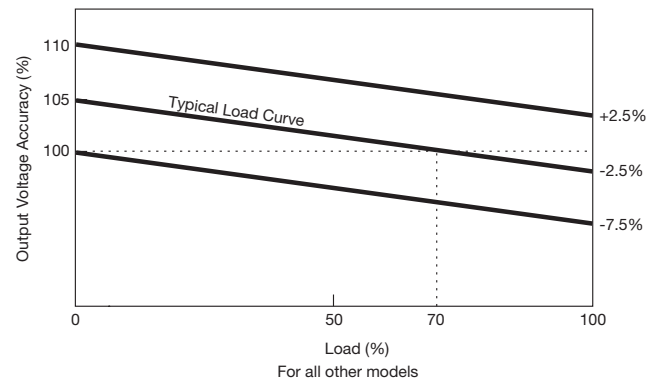
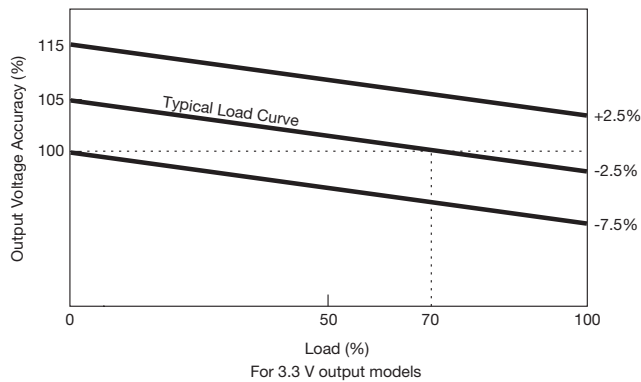
EMC: Emissions

| Phenomenon | Standard | Test Level | Notes & Conditions |
|------------|----------|------------|---|
| Conducted | EN55022 | Class B | See Application Note for Class B filter |
| Radiated | EN55022 | Class B | See Application Note for Class B filter |

EMC: Immunity

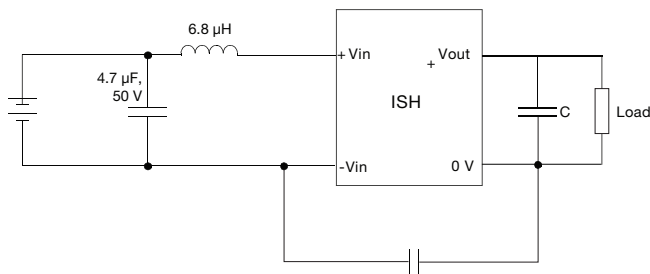
| Phenomenon | Standard | Test Level | Criteria | Notes & Conditions |
|--------------------|-------------|------------|----------|--|
| ESD Immunity | EN61000-4-2 | 3 | B | |
| Radiated Immunity | EN61000-4-3 | 3 V/m | A | |
| EFT/Burst | EN61000-4-4 | 2 | B | External input capacitor required, 330 μ F/100 V |
| Surge | EN61000-4-5 | 2 | B | External input capacitor required, 330 μ F/100 V |
| Conducted Immunity | EN61000-4-6 | 3 V rms | A | |
| Magnetic Fields | EN61000-4-8 | 1 A/m | A | |

Load Regulation



Application Note

EMI Filter for Class B Emissions

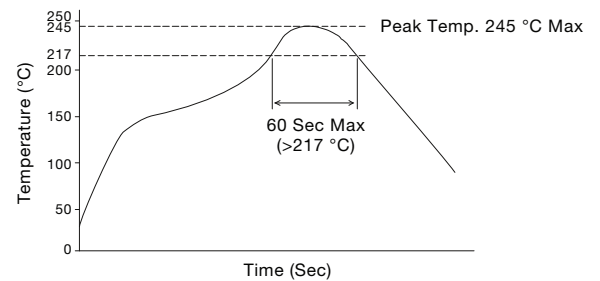


For ISH2424A model only, add Ycap, 470 pF, 3 kv

| Output Voltage | C |
|----------------|---------------|
| 3.3 | 10.00 μ F |
| 5 | 10.00 μ F |
| 9 | 4.70 μ F |
| 12 | 2.20 μ F |
| 15 | 1.00 μ F |
| 24 | 0.47 μ F |

Solder Profile

It is recommended to refer to IPC/JEDEC J-STD-020D standard for reflow soldering curve. The recommended reflow soldering temperature graph for our products is as follows:



Note:

The curve is only suitable for hot air convection reflow soldering.