

### 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

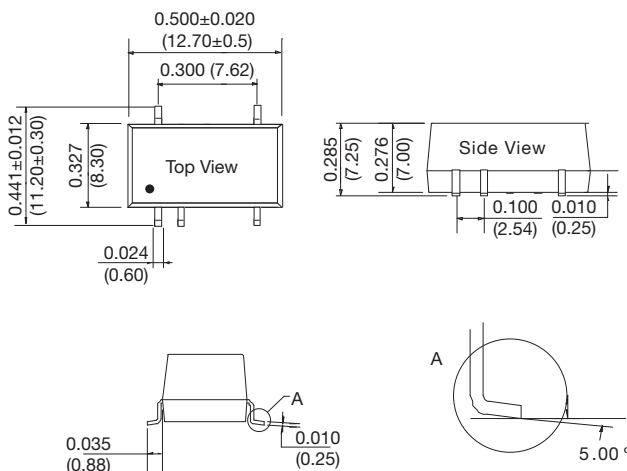
Input Voltage	Output Voltage	Output Current	Input Current <sup>(2)</sup>		Maximum Capacitive Load	Efficiency <sup>(3)</sup>	Model Number <sup>(1,4)</sup>
			No Load	Full Load			
4.5-5.5	3.3V	400 mA	30 mA	506 mA	220 µF	72%	ISH0503A <sup>(1)</sup>
	5V	400 mA	30 mA	506 mA	220 µF	79%	ISH0505A <sup>(1)</sup>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

### Notes

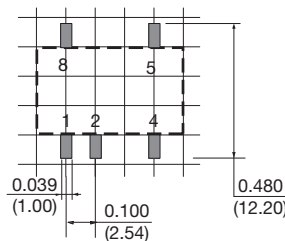
1. For optional 3000 VDC isolation add suffix '-H' to end of part number e.g. ISH1224A-H.
2. Input currents measured at nominal input voltage.

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 $\mu$ H inductor and 47 $\mu$ 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			$\pm 1.2$	%	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 $\mu$ F capacitor
Transient Response			3	% deviation	Recovery to within 1% in 500 $\mu$ 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	$\mu$ 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	$10^9$			$\Omega$	Input to output, tested at 500 VDC
Isolation Capacitance		20		pF	Input to output
Power Density			31.8	Win <sup>3</sup>	
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

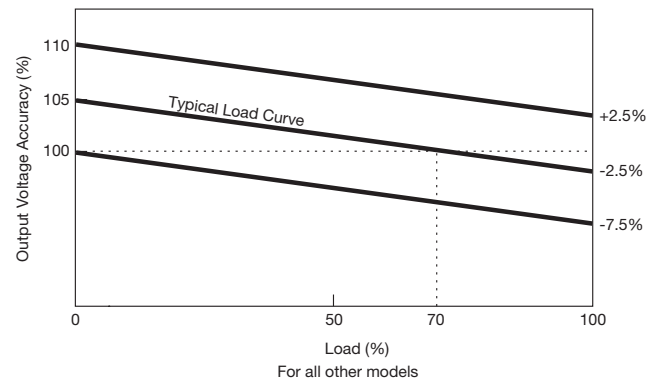
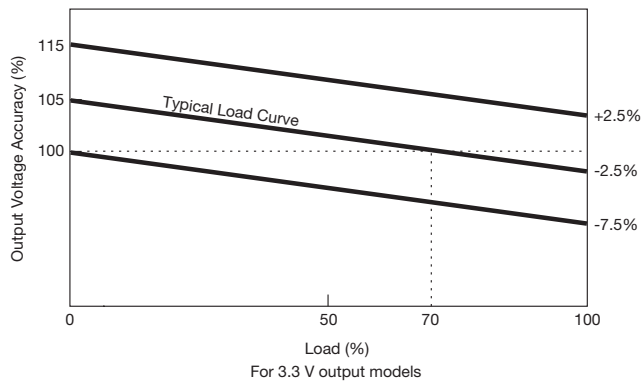
### EMC: Emissions

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

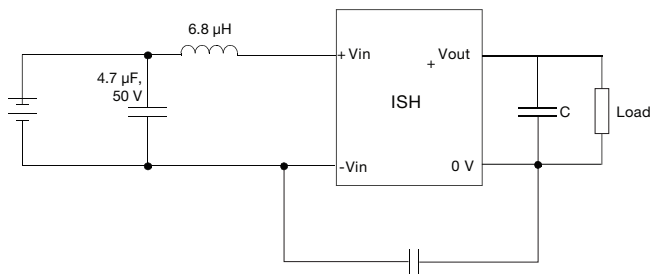
Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
ESD Immunity	EN61000-4-2	3	B	
Radiated Immunity	EN61000-4-3	3 V/m	A	
EFT/Burst	EN61000-4-4	2	B	External input capacitor required, 330 $\mu$ F/100 V
Surge	EN61000-4-5	2	B	External input capacitor required, 330 $\mu$ F/100 V
Conducted Immunity	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

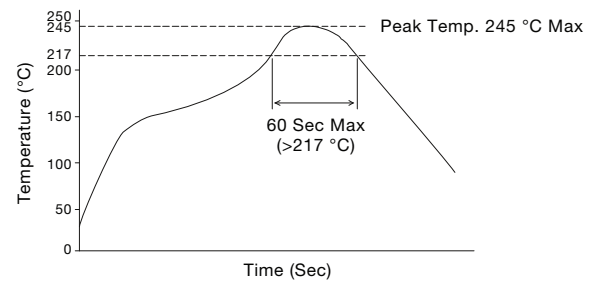


For ISH2424A model only, add Ycap, 470 pF, 3 kv

Output Voltage	C
3.3	10.00 $\mu$ F
5	10.00 $\mu$ F
9	4.70 $\mu$ F
12	2.20 $\mu$ F
15	1.00 $\mu$ F
24	0.47 $\mu$ 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.

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