

## 2W

### DC-DC POWER SUPPLIES

The single output isolated 2W product 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
- 1.5kVDC isolation, 3kVDC option
- Continuous short circuit protection
- Operating temperature  $-40^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$
- Full load to  $+85^{\circ}\text{C}$
- 3 year warranty



#### Applications



Industry 4.0



Instrumentation



Laboratory

#### Dimensions

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

#### Models & Ratings

Model Number <sup>(4,5)</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			
IES0205S3V3	5V (4.5-5.5V)	3.3V	8mA	8mA	357mA	40mA	400mA	2400µF	78%
IES0205S05		5V			500mA	40mA	400mA	2400µF	84%
IES0205S07		6V			500mA	29mA	286mA	1000µF	84%
IES0205S09		9V			494mA	22mA	222mA	1000µF	85%
IES0205S12		12V			494mA	17mA	167mA	560µF	85%
IES0205S15		15V			488mA	13mA	133mA	560µF	86%
IES0205S24		24V			488mA	8mA	83mA	220µF	86%
IES0212S05		12V (10.8 - 13.2V)			5V	8mA	196mA	40mA	400mA
IES0212S09	9V		22mA	222mA	1000µF			83%	
IES0212S12	12V		17mA	167mA	560µF			84%	
IES0212S15	15V		13mA	133mA	560µF			84%	
IES0212S24	24V		8mA	83mA	220µF			85%	
IES0215S05	15V (13.5-16.5V)	5V	8mA	161mA	40mA	400mA	2400µF	83%	
IES0215S15		15V			13mA	133mA	560µF	84%	
IES0224S05		5V			40mA	400mA	2400µF	83%	
IES0224S09	24V (21.6 - 26.4V)	9V	8mA	98mA	22mA	222mA	1000µF	83%	
IES0224S12		12V			17mA	167mA	560µF	84%	
IES0224S15		15V			13mA	133mA	560µF	84%	
IES0224S24		24V			8mA	83mA	220µF	85%	

#### Notes:

1. Typical input currents measured at nominal input voltage.
2. Typical value at full load.
3. Standard tube quantity = 38.

4. For tape & reel option add suffix -TR. Reel quantity = 500.
5. 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	IES0205 for max 1s
			18		IES0212 for max 1s
			21		IES0215 for max 1s
			30		IES0224 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		50/75	150/200	mV pk-pk	Other models/IES0205 20MHz 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
		220			IES0205
Isolation Resistance	10 <sup>9</sup>			Ω	Input to output, tested at 500VDC
Isolation Capacitance		20		pF	Input to output
Power Density			41.6	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.				

### Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-40		+105	°C	Derate from 100% load at +85°C or +70°C model dependent. See derating curve
Storage Temperature	-55		+125	°C	
Case Temperature			+115	°C	
Case Temperature Rise		25/15		°C	Ambient 25°C , 3V3 output/others
Operating Humidity			95	%RH	Non-condensing
Cooling	Natural convection				

### Safety Approvals

Safety Agency	Standard	Notes & Conditions
UL	UL62368-1	Designed to meet
EN	EN62368-1	Designed to meet
CE	Meets all applicable directives	
UKCA	Meets all applicable legislation	

### EMC: Emissions

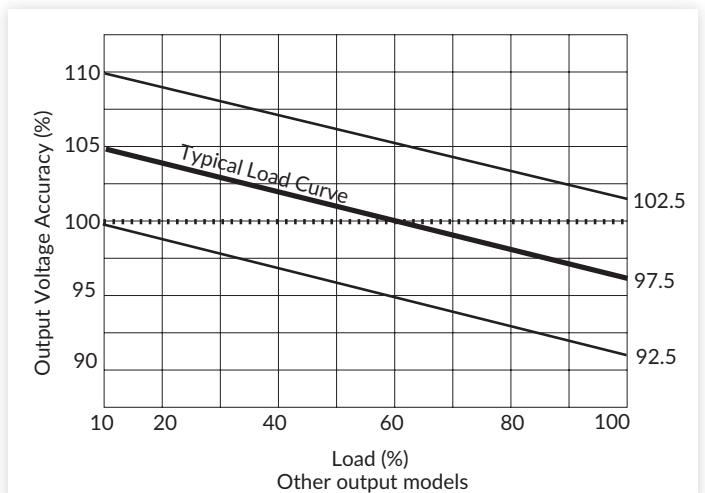
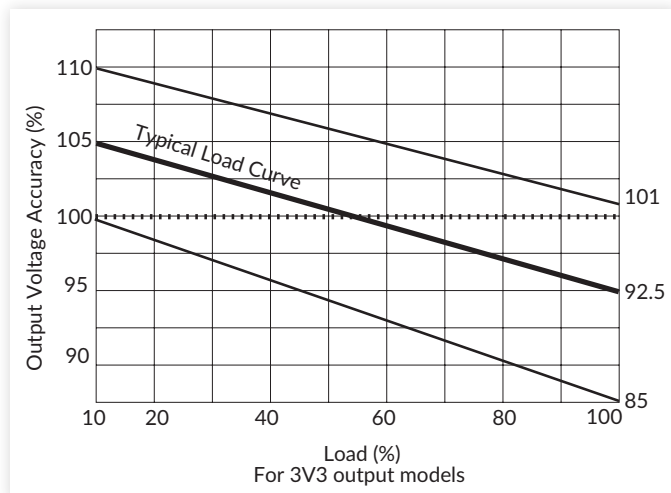
Phenomenon	Standard	Test Level	Notes & Conditions
Conducted	EN55032	Class B	See Application Note for Class B filter
Radiated	EN55032	Class B	

### EMC: Immunity

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

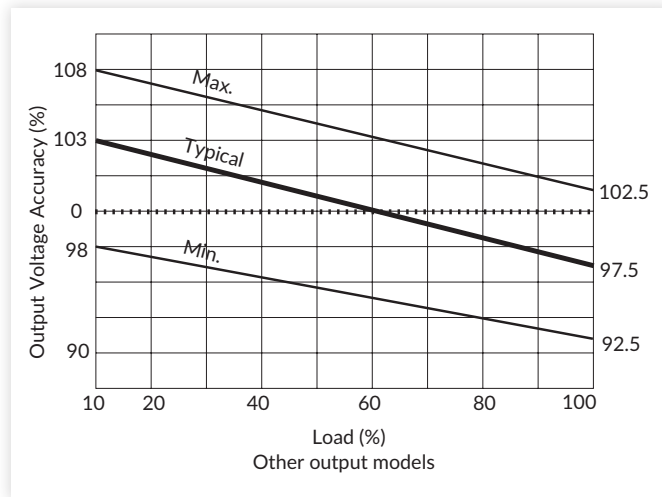
### Load Regulation

#### 5V Input Series

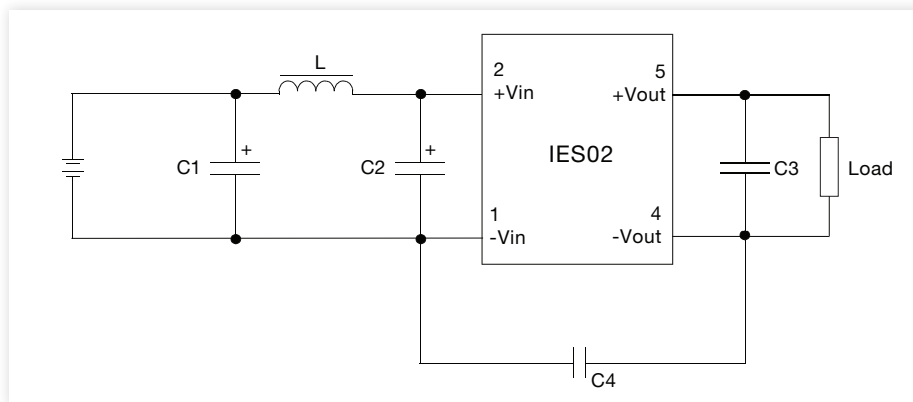


Application Notes

Other Input Series



EMI Filter for Class B Emissions



5V Input:				
Output Voltage	C1, C2	C3	C4	L
3.3V	4.7µF, 16V	10µF, 16V	270pF	6.8µH
5V		4.7µF, 16V		
7V		2.2µF, 25V		
9V		1µF, 25V		
12V		0.47µF, 50V		
15V				
24V				

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

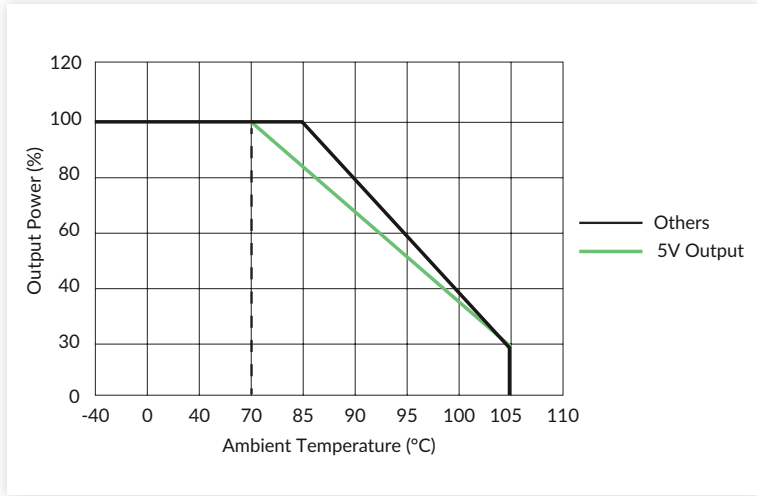
Other Input Series:				
Output Voltage	C1, C2	C3	C4	L
5V	4.7µF, 50V	10µF, 10V	270pF	6.8µH
9V		2.2µF, 25V		
12V		2.2µF, 25V		
15V		1µF, 25V		
24V		0.47µF, 50V		

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

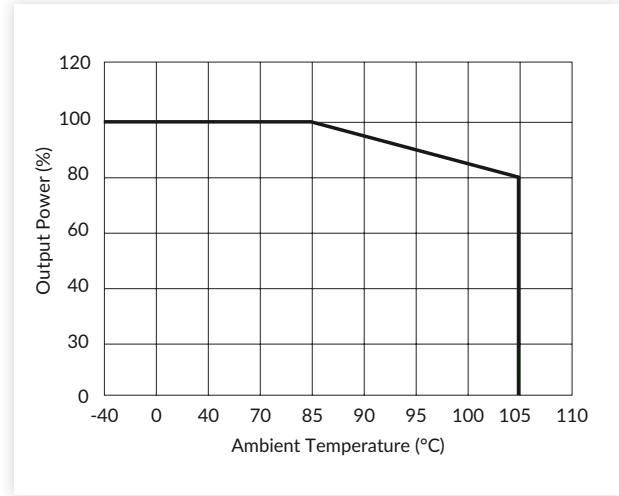
**Application Notes**

**Temperature Derating Curve**

IES0212, 15 & 24

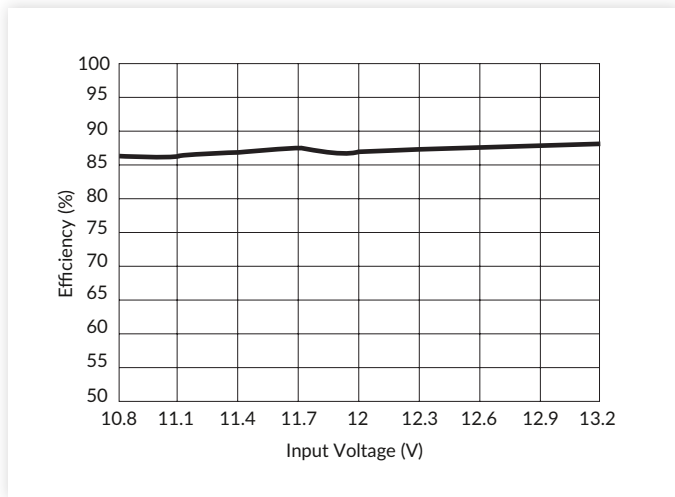


IES0205S05

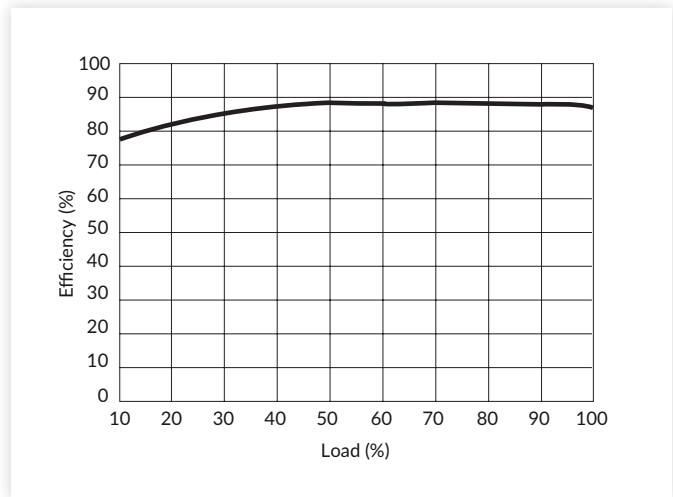


**Efficiency Curves**

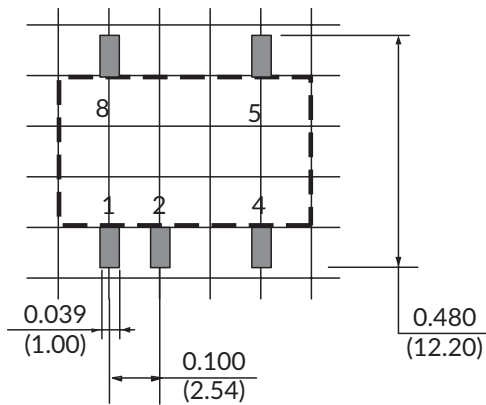
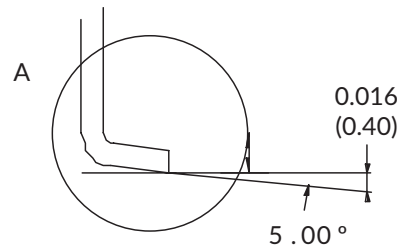
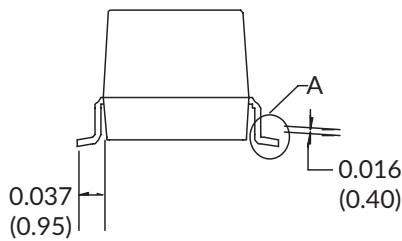
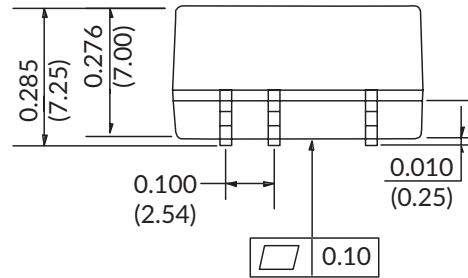
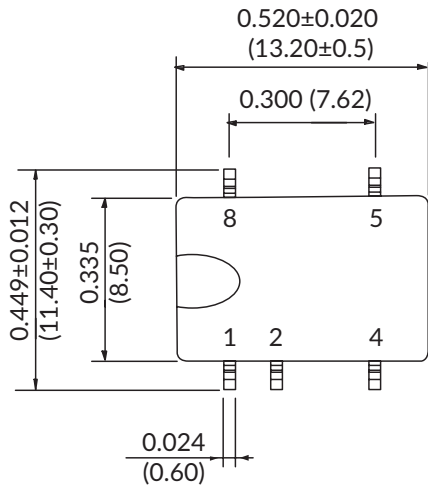
Efficiency vs Input Voltage (IES0205S05)



Efficiency vs Output Load (IES0205S05)



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: ±0.004 (±0.10).
4. Case tolerance: ±0.02 (±0.5).
5. Pin 8 leave floating.

09 November 2022