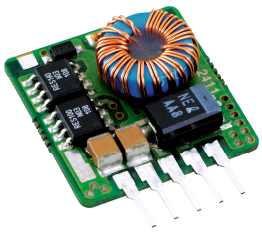
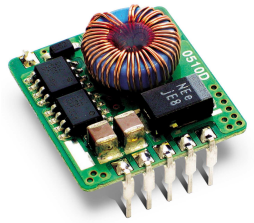
FEATURES

- **Efficiency up To 93%**
- **Output Current up to 2A**
- **MTBF > 1,500,000 Hours**
- **Low Cost**
- **Remote On/Off Control**
- **Low Output Noise**
- **Temperature Performance -25℃ to +85℃**
- **Step-down Switching Regulator**
- **Overload Protection**
- **Standby Current 100μA only**
- **3 Years Product Warranty**





RoHS Compliant

3 year warranty

PRODUCT OVERVIEW

High efficiency, wide input voltage range and low output noise define Minmax's IDS Series of non-isolated, step-down, switching DC/DC converters.
The 3.3V and 5V output devices are respectively up to 93% efficiency. All models are fully line and load regulated and maintain specified accuracy over the impressively wide input voltage ranges of 4.75 to 13.6V for 3.3V output, 6 to 16.5V for 5V output and 16 to 28V for 3.3V and 5V outputs. Output ripple and noise are typically 30mV P-P.
The high efficiency of the IDS Series eliminates the need for thermally conductive potting compound. Devices are specified for full-power operation up to ambient temperatures of +70°C Calculated MTBF (MIL-HDBK-217F) is more than 1.5 million hours.
These simple-to-use power converters have no minimum load requirements. They draw 1mA when unloaded and a mere 100uA in the standby mode (On/Off Control turns off).
3.3V models have an output voltage adjustment range from 1.8 to 3.3V and 5V models are adjustable down to 3.0V.

Model Selection Guide

Model Number	Input Voltage (Range)	Output Voltage	Output Current		Input Current		Efficiency (typ.)
			Max.	Min.	@Max. Load	@No Load	@Max. Load
	VDC	VDC	mA	mA	mA(typ.)	mA(typ.)	%
IDS101	5 (4.75 ~ 13.6)	3.3	2000	200	1434	21	92
IDS112	12 (6 ~ 16.5)	5	2000	200	896	27	93
IDS121	24 (16 ~ 28)	3.3	2000	200	331	45	83
IDS122		5	2000	200	490		85

Input Specifications

Parameter	Model	Min.	Typ.	Max.	Unit
Start-Up Threshold Voltage	5V Input Models	3.5	---	3.9	VDC
	12V Input Models	5.5	---	6	
	24V Input Models	12	---	15	
Input Filter	All Models	Internal Capacitor			
Internal Power Dissipation		---	---	1500	mW

Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		---	±1.0	±2.0	%
Line Regulation	Vin=Min. to Max.	---	±0.2	±0.5	%
Load Regulation	Io=0% to 100%	---	±0.5	±1.5	%
Ripple & Noise	0-20MHz Bandwidth	---	---	50	mV_{P-P}
Transient Recovery Time	50% Load Step Change	---	100	150	μsec
Transient Response Deviation		---	±2	±4	%
Temperature Coefficient		---	±0.01	±0.02	%/°C
Over Load Protection		120	---	---	%
Short Circuit Protection	Continuous				

General Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage (rated)	none				
Switching Frequency		---	300	---	KHz
MTBF (calculated)	MIL-HDBK-217F@25°C, Ground Benign		1,500,000		Hours

Remote On/Off Control

Parameter	Conditions	Min.	Typ.	Max.	Unit
Converter On	3.0 to 5.0V or Open Circuit				
Converter Off	-0.3V ~ 1.2V or Short Circuit				
Control Input Current (on)	Vctrl = 5.0V	---	---	50	μA
Control Input Current (off)	Vctrl = 0V	---	---	-100	μA
Control Common	Referenced to Negative Input				
Standby Input Current	Nominal Vin	---	100	300	μA

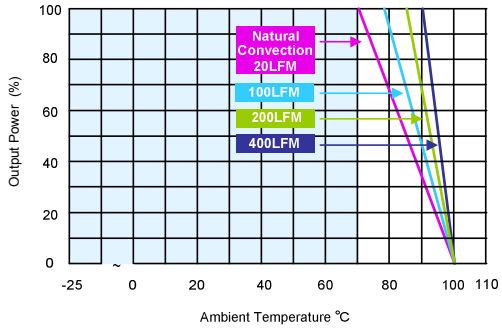
Output Voltage Trim

Parameter	Models	Min.	Typ.	Max.	Unit
Trim Up / Down Range	IDS101, IDS121	1.8	---	3.8	VDC
	IDS112, IDS122	3	---	5	VDC

Environmental Specifications

Parameter	Conditions	Min.	Max.	Unit
Operating Ambient Temperature Range (See Power Derating Curve)	Natural Convection	-25	+85	°C
Storage Temperature Range		-25	+125	°C
Humidity (non condensing)		---	95	% rel. H
Cooling	Free-Air convection			
Lead Temperature (1.5mm from case for 10Sec.)		---	235	°C
Soldering temperature	Max./10sec	---	235	°C

Power Derating Curve

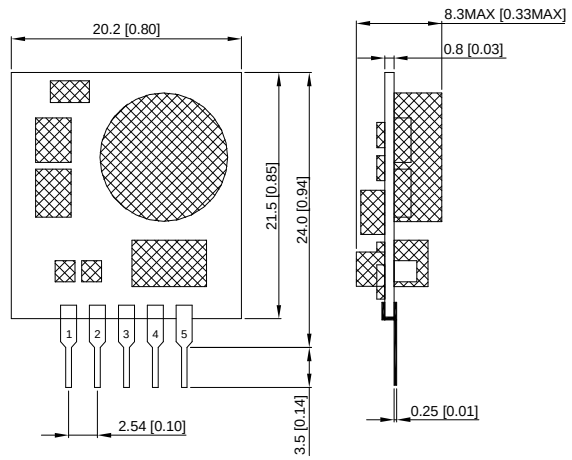


Notes

1. Specifications typical at Ta=+25°C, resistive load, nominal input voltage and rated output current unless otherwise noted.
2. Transient recovery time is measured to within 1% error band for a step change in output load of 50% to 100%.
3. These power converters require a minimum output loading to maintain specified regulation, operation under no-load conditions will not damage these modules; however they may not meet all specifications listed.
4. We recommend to protect the converter by a slow blow fuse in the input supply line.
5. Other input and output voltage may be available, please contact factory.
6. To order the converter with DIP Package, please add **suffix D** (e.g. IDS101D) to order code.
7. That "natural convection" is about 20LFM but is not equal to still air (0 LFM).
8. Specifications are subject to change without notice.

Package Specifications

Mechanical Dimensions (SIP Package)



Pin Connections

Pin	Function
1	Remote On/Off
2	+Vin
3	-Vin
4	+Vout
5	Trim

- All dimensions in mm (inches)
- Tolerance: X.X±0.25 (X.XX±0.01)
  X.XX±0.13 (X.XXX±0.005)
- Pins ±0.05 (±0.002)

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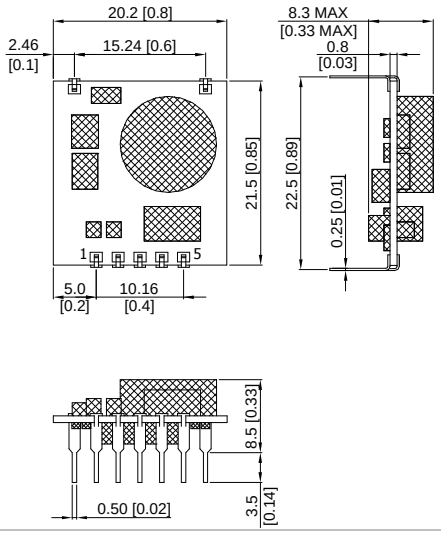
Mechanical Dimensions (DIP Package)



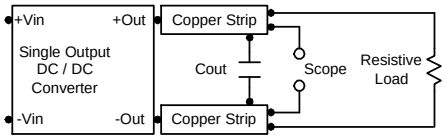
Physical Characteristics

Vibration	:	5 to 10Hz amplitude 10mm pk-pk 10 to 55Hz acceleration 2G
Shock	:	Acceleration 20G max. time 11 ms
Weight	:	8.6 g

Test Setup

Peak-to-Peak Output Noise Measurement Test

Use a Cout 0.47μF ceramic capacitor. Scope measurement should be made by using a BNC socket, measurement bandwidth is 0-20 MHz. Position the load between 50 mm and 75 mm from the DC/DC Converter.



Technical Notes

Remote On/Off

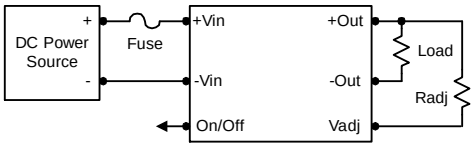
Positive logic remote on/off turns the module on during a logic high voltage on the remote on/off pin, and off during a logic low. Negative logic remote on/off turns the module off during a logic low and on during a logic high. To turn the power module on and off, the user must supply a switch to control the voltage between the on/off terminal and the -Vin terminal. The switch can be an open collector or equivalent. A logic low is -0.3V to 1.2V. A logic high is 3.0V to 5.0V.
The maximum sink current at on/off terminal during a logic low is -100μA. The maximum allowable leakage current of the switch at on/off terminal (3.0 to 5.0V) is 50uA.

Output Voltage Trim

Connecting the external resistor (Radj) between the Vadj and +Vout pins decreases the output voltage to set the point as defined in the following equation:

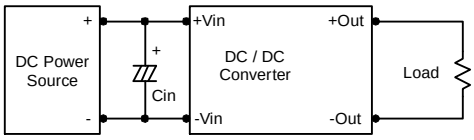
$$VR1 = \frac{(Rx \cdot 1200) \cdot (Vo1 - 1.195)}{(Rx \cdot 1.195) - [1200 \cdot (Vo - 1.195)]}$$

IDS101 and IDS121 == > Rx=2130Ω Output Voltage range is 1.8-3.3VDC
IDS112 and IDS122 == > Rx=3840Ω Output Voltage range is 3.0-5.0VDC



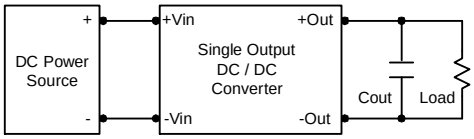
Input Source Impedance

The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module.
In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.
Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100 KHz) capacitor of a 100μF for the 5V input devices and a 33μF for the 12V and 24V devices.



Output Ripple Reduction

A good quality low ESR capacitor placed as close as practicable across the load will give the best ripple and noise performance. To reduce output ripple, it is recommended to use 22μF capacitors at the output.



Thermal Considerations

Many conditions affect the thermal performance of the power module, such as orientation, airflow over the module and board spacing. To avoid exceeding the maximum temperature rating of the components inside the power module, the ambient temperature must be kept below 70°C.
The derating curves are determined from measurements obtained in an experimental apparatus.