Technical Specification

AES6W2 Series

6W, Universal Input AC/DC Converters

FEATURES

- Wide input range: 85-265VAC/120-370VDC
- 6W isolated outputs
- Efficiency up to 78%
- Single output: 5, 9, 12, 15, 24VDC
- Fixed switching frequency, predicted EMI
- Stable @ no-load operation
- Reinforced isolation: 4KVAC I/O
- Impact size, 2.0"×1.0"×0.6"
- Extensive self-protection, OTP, OCP, OVP and short circuit protection
- Fully encapsulated, high reliability
- Compliance with IEC/EN 62368-1 safety standard

PRODUCT OVERVIEW

The AES6W2 series use advanced power processing, control and packaging technologies to provide the high performance, flexibility, reliability and cost effectiveness of a mature power converter. Wide input range of 85-265VAC/120-370VDC (220VAC nominal) is ideal for automation, power grid, industrial control, data acquisition, signal control, instrumentation, test and measurement, and distribution power system.

A wealth of self-protection features included over temperature shutdown, over current protection with "hiccup" autorestart technique, and indefinite short-circuit protection, along with output OVP.

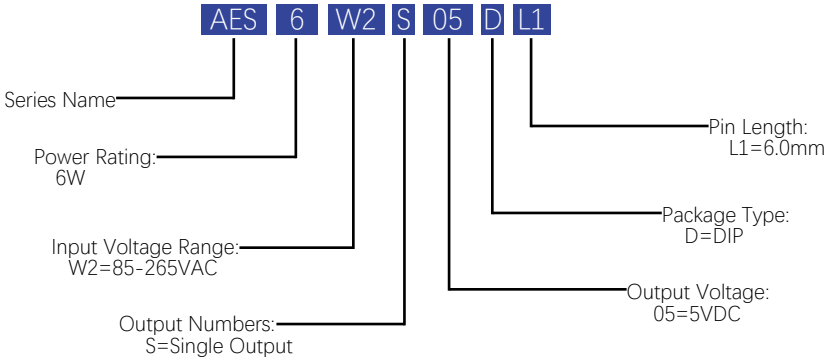
Advanced fully encapsulated package technology provides outstanding thermal performance, no need for extra heat-sink, which is ideal for ruggedized applications involving harsh environments.

The AES6W2 series are designed to safety standards IEC/EN 62368-1.

Models Selections

Basic Models	Input Voltage [VAC]	Input Voltage Range [VAC]/[VDC]	Output Voltage [VDC]	Output Current [A]	Efficiency typ. [%]	Package [inch]
AES6W2S05	220	85-265/120-370	5	1.20	69	2"×1"×0.6" DIP
AES6W2S09	220	85-265/120-370	9	0.66	73	
AES6W2S12	220	85-265/120-370	12	0.50	75	
AES6W2S15	220	85-265/120-370	15	0.40	76	
AES6W2S24	220	85-265/120-370	24	0.25	78	

Model Numbering



Absolute Maximum Ratings					
Parameters	Conditions	Min.	Typ.	Max.	Units
Operating Case Temperature		-40		95	°C
Operating Environment Temperature		-40		70	°C
Storage Temperature Range		-40		85	°C
Soldering Temperature	Wave Soldering < 10s			260	°C

EMC Compliance		
Conducted Emission	EN55032	Class B (with external filter)
Radiated Emission	EN55032	Class B (with external filter)
Conducted Susceptibility	IEC/EN61000-4-6	10Vrms, Criteria A
Radiated Susceptibility	IEC/EN61000-4-3	3V/m, Criteria A
EFT	IEC/EN61000-4-4	±4KV, Criteria A (With external filter)
Surge	IEC/EN61000-4-5	Line to line ±2KV, line to PE ±4KV
ESD	IEC/EN61000-4-2	±4KV Contact ±8KV Air Criteria A
Voltage Fluctuations	IEC/EN61000-3-3	Complies
Voltage Dips, Interruptions	IEC/EN61000-4-11	Class 2, Criteria B

General Specifications					
Parameters	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage (Test for 1 minute)	Input to output	4000			VAC
Isolation Resistance (Viso=500VDC)	Input to output	100			MΩ
Leakage Current			1		mA
Isolation Safety Rating	Reinforced insulation				
Switching Frequency			300		KHz
Vibration	IEC61373:1999 Category I, Class B, Body mounted				
Shock	IEC61373:1999 Category I, Class B, Body mounted				

Input Specifications					
Parameters	Conditions	Min.	Typ.	Max.	Units
Operating Voltage Range		85	220	265	VAC
		120		370	VDC
Input Frequency		50		60	Hz
Input Current	Vin=115VAC		120		mA
	Vin=230VAC		70		mA
Recommended Input Fuse	Slow-blown		T1A/250VAC		
Inrush Current	Vin=115VAC		16		A
	Vin=230VAC		30		A
Rise Time	Vin=115VAC		50		mS
	Vin=230VAC		20		mS

Performance Data (5 Vout Model)

Output Specifications

Parameters	Conditions	Min.	Typ.	Max.	Units
Output Power				6	W
Output Voltage Setpoint		4.9	5.00	5.1	V
Vout Accuracy		-2		+2	%
Line Regulation		-1		+1	%
Load Regulation		-1		+1	%
Temperature Coefficient		-0.03		+0.03	% of Vout /°C
Total Regulation		-5		+5	%
Over Current Protection	Hiccup	110			% of Iout
Short Circuit Protection	Hiccup, auto recover				
Ripple & Noise Max. ①				100	mV pk-pk
Dynamic Load Peak Deviation ②		-5		+5	%
Dynamic Load Response				500	μS
Hold-up TIme	Vin=115VAC		15		mS
	Vin=230VAC		40		mS
Minimum Load	No minimum load requirement				

Notes
① Ripple & noise is tested with certain filter parameters, please see output ripple & noise in technical notes on page 12 for more details.
② The load is set from 50%-75%-50% of Imax, di/dt=0.1A/μS.

All specifications are tested at 25 ℃ ambient temperature, nominal input voltage, rated output current conditions unless otherwise specified.

Performance Data (9 Vout Model)

Output Specifications

Parameters	Conditions	Min.	Typ.	Max.	Units
Output Power				6	W
Output Voltage Setpoint		8.82	9.00	9.18	V
Vout Accuracy		-2		+2	%
Line Regulation		-1		+1	%
Load Regulation		-1		+1	%
Temperature Coefficient		-0.03		+0.03	% of Vout /°C
Total Regulation		-5		+5	%
Over Current Protection	Hiccup	110			% of Iout
Short Circuit Protection	Hiccup, auto recover				
Ripple & Noise Max. ①				100	mV pk-pk
Dynamic Load Peak Deviation ②		-5		+5	%
Dynamic Load Response				500	µS
Hold-up TIme	Vin=115VAC		15		mS
	Vin=230VAC		40		mS
Minimum Load	No minimum load requirement				

Notes
① Ripple & noise is tested with certain filter parameters, please see output ripple & noise in technical notes on page 12 for more details.
② The load is set from 50%-75%-50% of Imax, di/dt=0.1A/µS.

All specifications are tested at 25 ℃ ambient temperature, nominal input voltage, rated output current conditions unless otherwise specified.

Performance Data (12 Vout Model)

Output Specifications

Parameters	Conditions	Min.	Typ.	Max.	Units
Output Power				6	W
Output Voltage Setpoint		11.76	12.00	12.24	V
Vout Accuracy		-2		+2	%
Line Regulation		-1		+1	%
Load Regulation		-1		+1	%
Temperature Coefficient		-0.03		+0.03	% of Vout /°C
Total Regulation		-5		+5	%
Over Current Protection	Hiccup	110			% of Iout
Short Circuit Protection	Hiccup, auto recover				
Ripple & Noise Max. ①				100	mV pk-pk
Dynamic Load Peak Deviation ②		-5		+5	%
Dynamic Load Response				500	μS
Hold-up TIme	Vin=115VAC		15		mS
	Vin=230VAC		40		mS
Minimum Load	No minimum load requirement				

Notes
① Ripple & noise is tested with certain filter parameters, please see output ripple & noise in technical notes on page 12 for more details.
② The load is set from 50%-75%-50% of Imax, di/dt=0.1A/μS.

All specifications are tested at 25 ℃ ambient temperature, nominal input voltage, rated output current conditions unless otherwise specified.

Performance Data (15 Vout Model)

Output Specifications

Parameters	Conditions	Min.	Typ.	Max.	Units
Output Power				6	W
Output Voltage Setpoint		14.7	15.00	15.3	V
Vout Accuracy		-2		+2	%
Line Regulation		-1		+1	%
Load Regulation		-1		+1	%
Temperature Coefficient		-0.03		+0.03	% of Vout /°C
Total Regulation		-5		+5	%
Over Current Protection	Hiccup	110			% of Iout
Short Circuit Protection	Hiccup, auto recover				
Ripple & Noise Max. ①				100	mV pk-pk
Dynamic Load Peak Deviation ②		-5		+5	%
Dynamic Load Response				500	µS
Hold-up TIme	Vin=115VAC		15		mS
	Vin=230VAC		40		mS
Minimum Load	No minimum load requirement				

Notes
① Ripple & noise is tested with certain filter parameters, please see output ripple & noise in technical notes on page 12 for more details.
② The load is set from 50%-75%-50% of Imax, di/dt=0.1A/µS.

All specifications are tested at 25 ℃ ambient temperature, nominal input voltage, rated output current conditions unless otherwise specified.

Performance Data (24 Vout Model)

Output Specifications

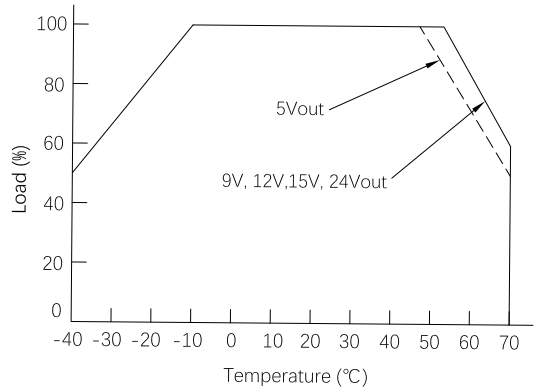
Parameters	Conditions	Min.	Typ.	Max.	Units
Output Power				6	W
Output Voltage Setpoint		23.52	24.00	24.48	V
Vout Accuracy		-2		+2	%
Line Regulation		-1		+1	%
Load Regulation		-1		+1	%
Temperature Coefficient		-0.03		+0.03	% of Vout /°C
Total Regulation		-5		+5	%
Over Current Protection	Hiccup	110			% of Iout
Short Circuit Protection	Hiccup, auto recover				
Ripple & Noise Max. ①				100	mV pk-pk
Dynamic Load Peak Deviation ②		-5		+5	%
Dynamic Load Response				500	µS
Hold-up TIme	Vin=115VAC		15		mS
	Vin=230VAC		40		mS
Minimum Load	No minimum load requirement				

Notes
① Ripple & noise is tested with certain filter parameters, please see output ripple & noise in technical notes on page 12 for more details.
② The load is set from 50%-75%-50% of Imax, di/dt=0.1A/µS.

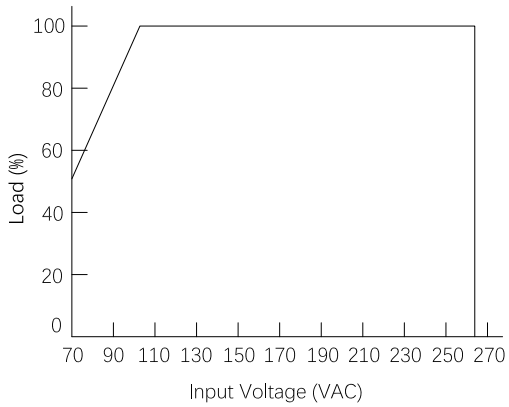
All specifications are tested at 25 ℃ ambient temperature, nominal input voltage, rated output current conditions unless otherwise specified.

Performance Data

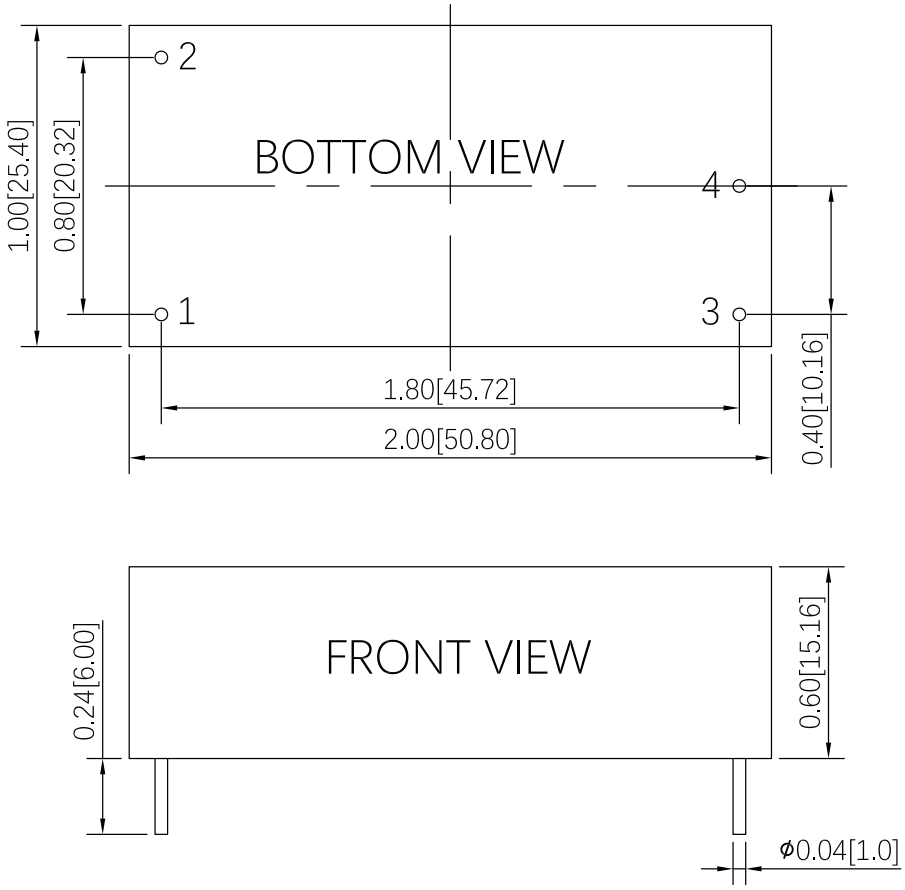
THERMAL DERATING



INPUT VOLTAGE VS LOAD



Mechanical Specifications



PIN:
PIN1~PIN4: Φ0.04inch
Material: Copper Alloy
Finish: Matte Tin Over Nickel Plate

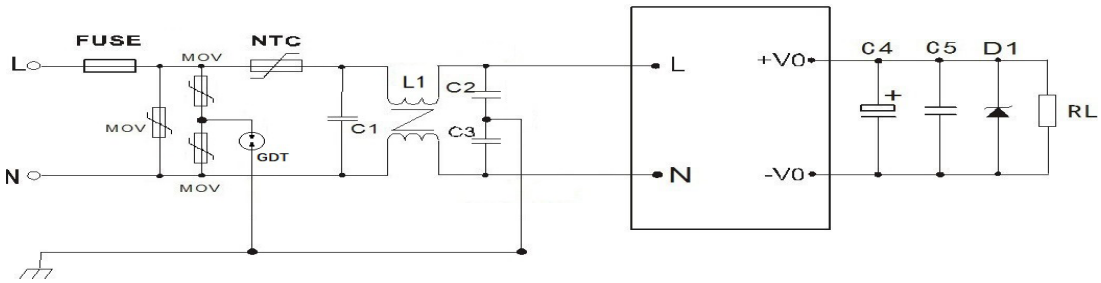
TOLERANCE:
X.XX=±0.02[0.5]
X.XXX= ±0.010[0.25]

Dimensions are in inches [mm]
Weight: ~40g.

PIN CONNECTIONS	
Single Output	
Pin	Function
1	AC(N)
2	AC(L)
3	+Vout
4	-Vout

Emissions Performance

Density Power measures its products for conducted emissions and radiated emission against the EN55032 standards. The AC/DC converter passed EN55032 conducted emission and radiated emission Class B with add the recommended EMI filter shows as below:



Conducted Emissions and Radiated Emission Test Circuit

Recommended Filter Parameters

REFERENCE	DESCRIPTION	REFERENCE	DESCRIPTION
FUSE	T1A/250VAC, Slow-blown	C1	0.1μF/275V
NTC	10D-9	C2, C3	1000pF/400V
L1	3-10mH/0.2-0.5A	GDT	EM470XS
MOV	7D471K	C5	0.1μF/50V
C4	5 Vout: 470μF/16V 9 Vout: 150μF/16V 12 Vout: 120μF/16V 15 Vout: 120μF/25V 24 Vout: 100μF/35V	D1	5 Vout: P6KE6.8A 9 Vout: P6KE16A 12 Vout: P6KE16A 15 Vout: P6KE20A 24 Vout: P6KE33A
NOTE	In case that custormer requires special EMC performance for particular applications, please optimize the EMI filter or contact our FAE for support.		

Technical Notes

INPUT FUSING

Certain applications may require fuse at the inputs of power conversion components. The AES6W2 modules are not internally fused. We strongly recommend a slow-blown fuse to be used.
For safety agency approvals, the installer must install the converter in compliance with the end user safety standard.

TYPICAL APPLICATION CONNECTION

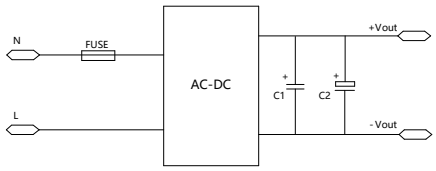


Figure 1·Typical Application Connection

Figure 1 shows the typical use of the module connection.

OUTPUT RIPPLE & NOISE

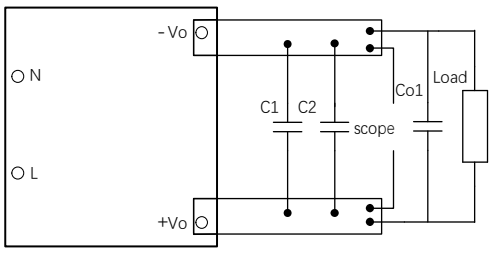


Figure 2· Output Ripple

These AES6W2 modules' output ripple and noise is measured at the rated input voltage and output current, along with 10uF and 0.1uF MLCC used in parallel with appropriate voltage ratings and placed as C1 & C2 shown in the figure 2. The scope's bandwidth is set to 20MHz.
External output capacitors are required to further reduce the ripple & noise. The output capacitors should be low ESR and appropriate frequency response with appropriate voltage ratings, and must be located as close to the converters as possible, also PCB layout must be taken into consideration.

CURRENT LIMITING

The output voltage remains constant as the output current increases. However, once the output current is over the specified Output DC Current Limit, the converter turns off.
The converter then enters a “hiccup mode” where it repeatedly turns on and off until the short circuit condition is removed. This prevents excessive heating of the converter or the load board.

SHORT CIRCUIT CONDITION

When the converter's output is short, the converter will be shut down. If the short-circuit condition persists, another shutdown cycle will be initiated. This on/off cycling is referred to as "hiccup" mode. The hiccup cycling reduces the average output current, thereby preventing internal temperatures from rising to excessive levels. The module is capable of enduring an indefinite short circuit output condition.

This product is subject to the following operating requirements and the Life and Safety Critical Application Sales Policy:
Refer to: http://www.densitypower.com