

## FEATURES

1. Ultra-wide 4:1 input voltage range
2. High efficiency up to 85%
3. Reinforced I/O isolation test voltage 2.25k VDC
4. Operating ambient temperature range -40°C to +85°C
5. Input under-voltage protection, output short circuit, over-current, over-voltage protection
6. Low output ripple & noise
7. EN50121-3-2 & CISPR32/EN55032 CLASS A EMI compliant without external components
8. Designed to meet UL62368/IEC62368 standard
9. Input Reverse Polarity Protection available with Chassis (A2S) or DIN-Rail mounting (A4S) version
10. Industry standard pin-out



3 years  
Warranty

## Selection Guide

Part No. ①	Input Voltage (VDC)		Output		Full Load Efficiency ③(%) Min./Typ.	Max. Capacitive Load(μF)
	Nominal (Range)	Max. ②	Voltage (VDC)	Current (mA) Max./Min.		
ATB1D03LMD-10WR3	110 (40-160)	170	3.3	2400/0	76	5400
ATB1D05LMD-10WR3			5	2000/0	80	5400
ATB1D12LMD-10WR3			12	833/0	84	470
ATB1D15LMD-10WR3			15	667/0	84	330
ATB1D24LMD-10WR3			24	417/0	85	100

Note:  
 ① Use "H" suffix for heat sink mounting, "A2S" suffix for chassis mounting and "A4S" suffix for DIN-Rail mounting. We recommend to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements;  
 ② Absolute maximum stress rating without damage (not recommended);  
 ③ Efficiency is measured at nominal input voltage and rated output load; efficiencies for A2S and A4S Model's is decreased by 2% due to the input reverse polarity protection circuit.

## Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	Nominal input voltage	3.3V output	–	95/3	98/8	mA
		Others	–	110/3	117/8	
Reflected Ripple Current	Nominal input voltage		–	25	–	VDC
Surge Voltage (1sec. max.)			-0.7	–	180	
Start-up Voltage	100% load		–	–	40	
Shut-down Voltage			28	33	–	ms
Start-up Time	Nominal input voltage & constant resistance load		–	10	–	
Input Filter			Pi filter			
Hot Plug			Unavailable			

## Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy	0%-100% load		—	±1	±3	%
Linear Regulation	Input voltage variation from low to high at full load		—	±0.2	±0.5	
Load Regulation	0%-100% load		—	±0.5	±1	%
Transient Recovery Time	25% load step change, nominal input voltage		—	300	500	μs
Transient Response Deviation		3.3V/5V output	—	±3	±8	%
		Others	—	±3	±5	
Temperature Coefficient	Full load		—	±0.02	±0.03	%/°C
Ripple & Noise <sup>①</sup>	20MHz bandwidth, 5%-100% load		—	50	100	mV p-p
Over-voltage Protection	Input voltage range		110	—	160	%Vo
Over-current Protection			120	—	210	%Io
Short-circuit Protection			Continuous, self-recovery			
Note: ①Ripple & Noise at < 5% load is 5%Vo max. The “parallel cable” method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.						

## General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max.	2250	–	–	VDC
	Input/output-case Electric Strength Test for 1 minute with a leakage current of 1mA max.	1600	–	–	
Insulation Resistance	Input-output resistance at 500VDC	1000	–	–	MΩ
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V	–	2200	–	pF
Operating Temperature	See Fig.1	-40	–	+85	°C
Storage Temperature		-55	–	+125	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	–	–	300	
Storage Humidity	Non-condensing	5	–	95	%RH
Vibration		IEC61373 - Category 1, Grade B			
Switching Frequency <sup>①</sup>	PWM Mode	–	300	–	KHz
MTBF	MIL-HDBK-217F@25°C	1000	–	–	K hours

Note: ① Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

## Mechanical Specifications

Case Material	Aluminum alloy		
Dimensions	Horizontal package (without heat sink)		50.80 ×25.40 ×12.00 mm
	Horizontal package (with heat sink)		51.40 ×26.20 ×16.50 mm
	A2S chassis mounting (without heat sink)		76.00 ×31.50 ×21.20 mm
	A2S chassis mounting (with heat sink)		76.00 ×31.50 ×25.30 mm
	A4S Din-rail mounting (without heat sink)		76.00 ×31.50 ×25.80 mm
	A4S Din-rail mounting (with heat sink)		76.00 ×31.50 ×29.90 mm
	Weight	without heat sink	Horizontal package/A2S chassis mounting/A4S Din-rail mounting
with heat sink		Horizontal package/A2S chassis mounting/A4S Din-rail mounting	47.0g/56.0g/76.0g(Typ.)
Cooling Methods	Free air convection		

### EMCSpecifications

Emissions	CE	CISPR32/EN55032	CLASS A (without external components)/ CLASS B (see Fig.3 or Fig.4 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A (without external components)/ CLASS B (see Fig.3 or Fig.4 for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact $\pm 6\text{KV}$ /Air $\pm 8\text{KV}$	perf. Criteria B
	RS	IEC/EN61000-4-3	20V/m	perf. Criteria A
	EFT	EN50121-3-2	$\pm 2\text{kV}$ 5/50ns 5kHz	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line $\pm 2\text{KV}$ ( $2\Omega$ 18uF see Fig.3 for recommended circuit) line to ground $\pm 4\text{KV}$ ( $12\Omega$ 9uF see Fig.3 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	10 Vr.m.s	perf. Criteria A

### Typical Characteristic Curves

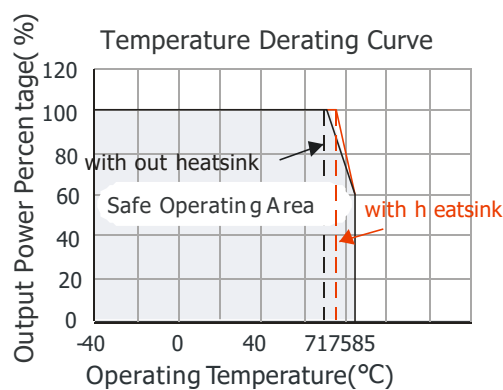
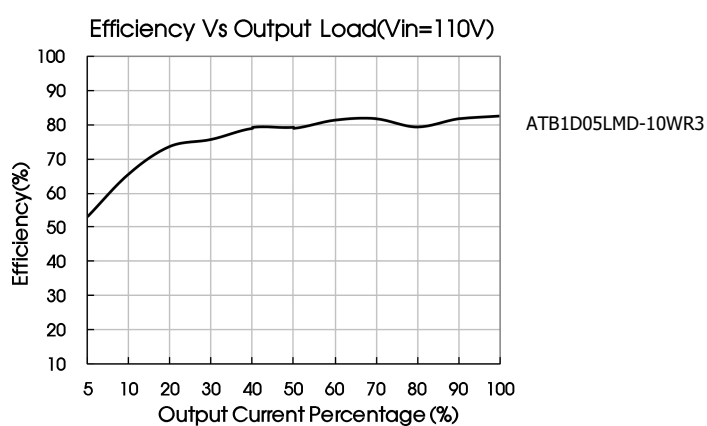
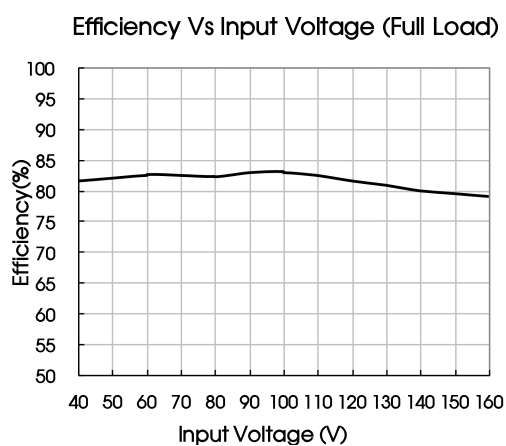
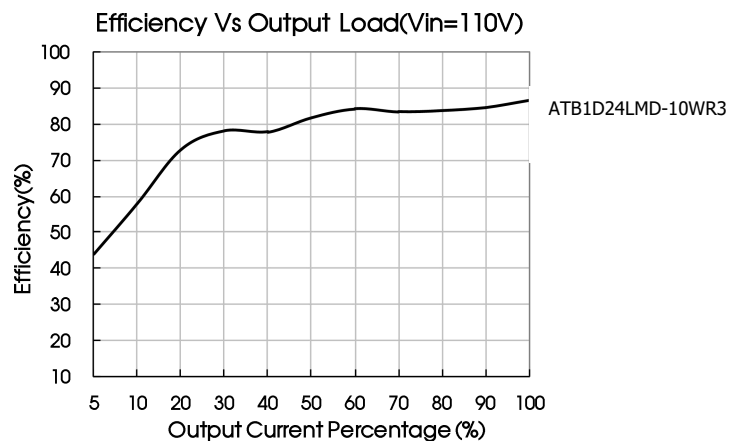
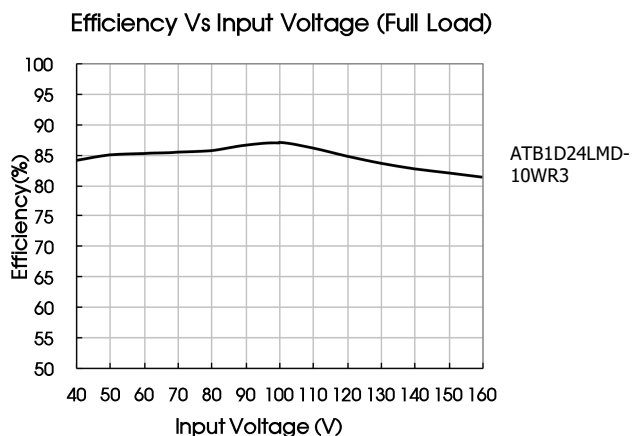


Fig. 1



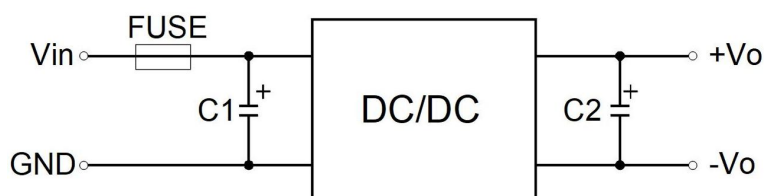


## Design Reference

### 1. Typical application

All the DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2.

Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values  $C_{in}$  and  $C_{out}$  and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the max. capacitive load value of the product.



Vout(VDC)	Fuse	Cin	Cout
3.3/5	2A, slow blow	10μF - 47μF	470μF
12/15			220μF
24/48			100μF

### 2. EMC compliance circuit

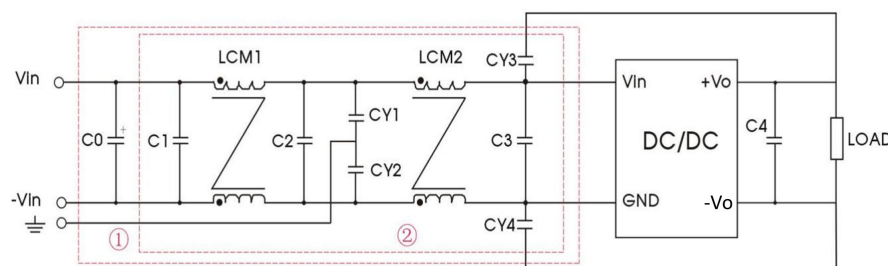


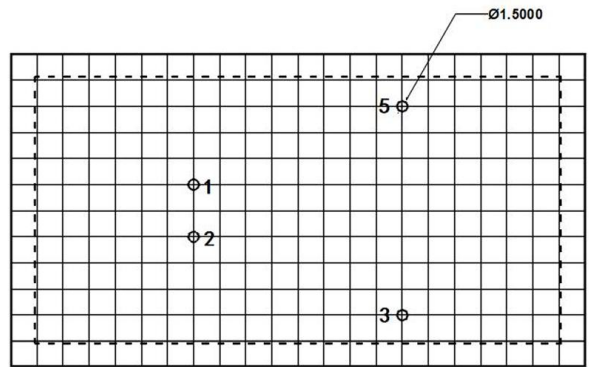
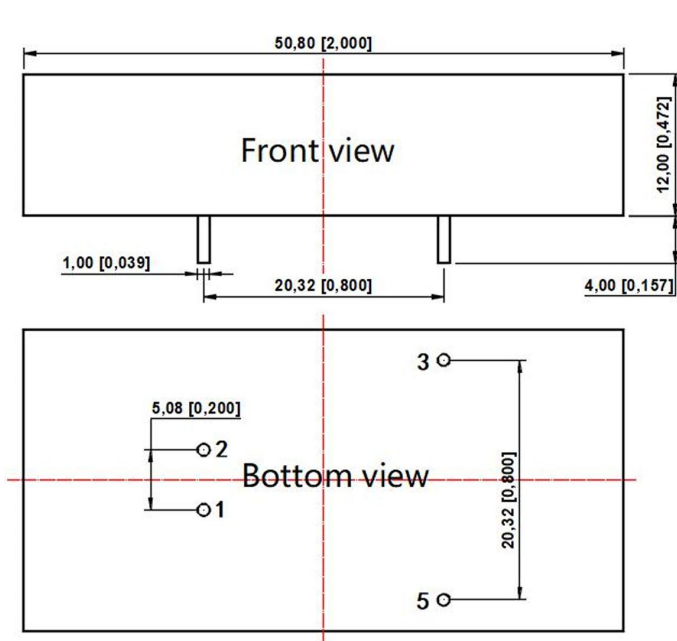
Fig. 3

Fig. 3 List of components:

EMI Recommended component parameters	
C0	100μF/200V
C1、C2	0.22μF/250V
C3	Refer to the Cin in Fig.2
LCM1	2.2mH
LCM2	1.1mH
CY1、CY2、CY3、CY4	1000pF/400VAC
C4	Refer to the Cout in Fig.2

### 3. The products do not support parallel connection of their output

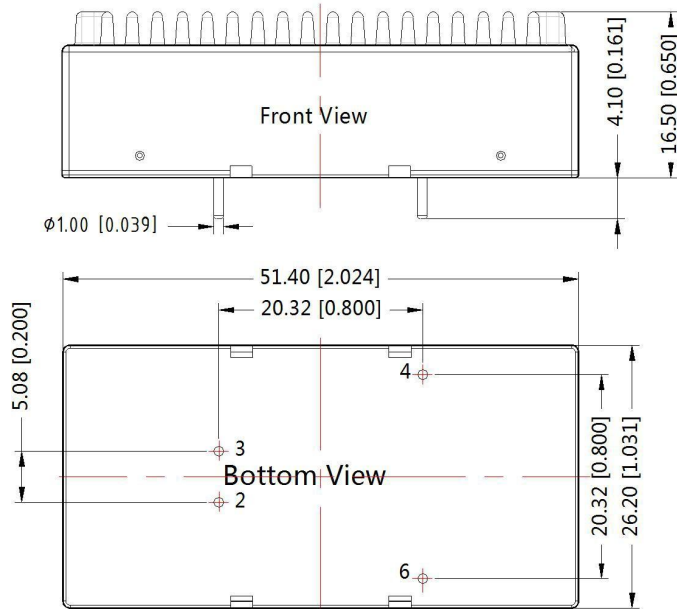
### Horizontal Package (without heat sink) Dimensions and Recommended Layout



Pin	Function
1	GND
2	Vin
3	-Vo
5	+Vo

### Horizontal Package (with heat sink) Dimensions

THIRD ANGLE PROJECTION

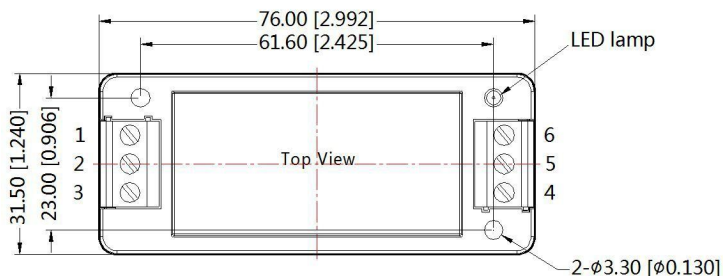


Pin-Out	
Pin	Function
2	GND
3	Vin
4	+Vo
6	0V

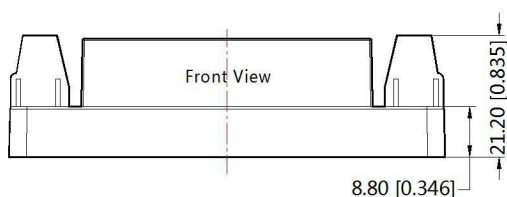
Note:  
Unit :mm[inch]  
General tolerances:±0.50[±0.020]

### ATB\_LMD-10WR3A2S (without heat sink) Dimensions

THIRD ANGLE PROJECTION



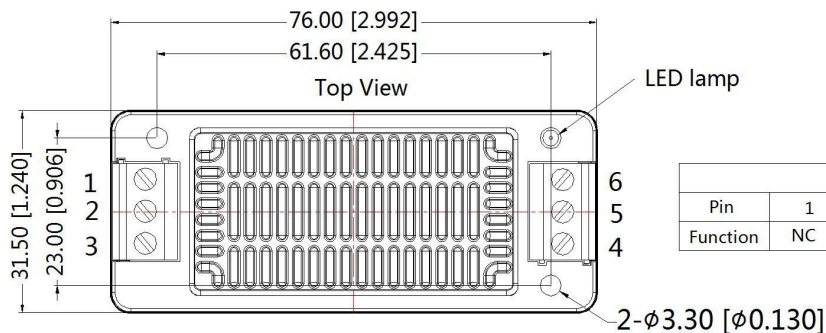
Pin-Out						
Pin	1	2	3	4	5	6
Function	NC	GND	Vin	+Vo	NC	0V



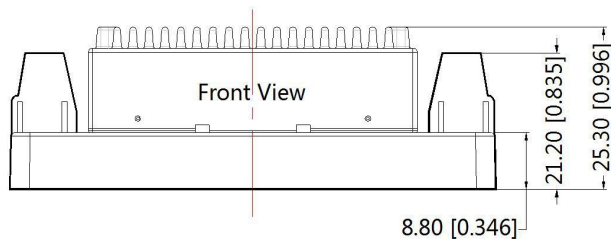
Note:  
Unit: mm[inch]  
Wire range: 24-12 AWG  
Tightening torque: Max 0.4 N·m  
General tolerances:  $\pm 0.50$  [ $\pm 0.020$ ]

### ATB\_LMD-10WHR3A2S (with heat sink) Dimensions

THIRD ANGLE PROJECTION



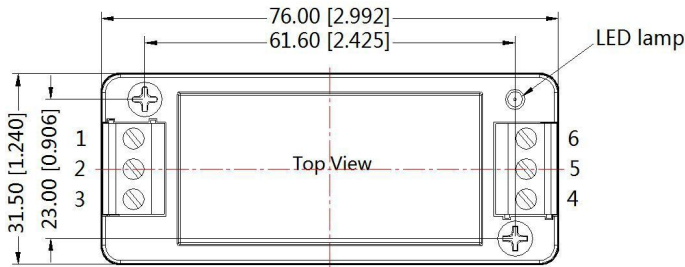
Pin-Out						
Pin	1	2	3	4	5	6
Function	NC	GND	Vin	+Vo	NC	0V



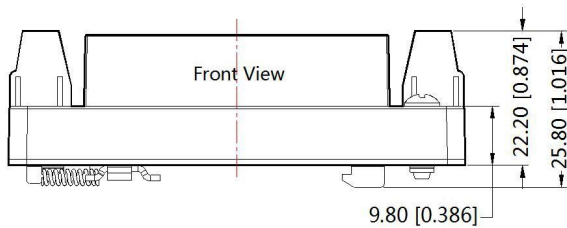
Note:  
Unit: mm[inch]  
Wire range: 24-12 AWG  
Tightening torque: Max 0.4 N·m  
General tolerances:  $\pm 0.50$  [ $\pm 0.020$ ]

### ATB\_LMD-10WR3A4S (without heat sink) Dimensions

THIRD ANGLE PROJECTION



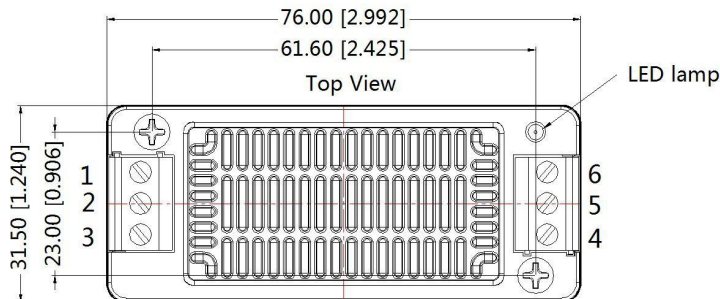
Pin-Out						
Pin	1	2	3	4	5	6
Function	NC	GND	Vin	+Vo	NC	0V



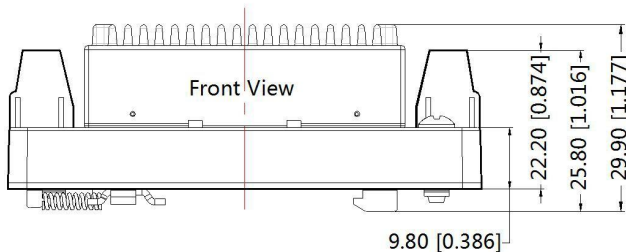
Note:  
 Unit: mm[inch]  
 Mounting rail: TS35  
 Wire range: 24-12 AWG  
 Tightening torque: Max 0.4 N·m  
 General tolerances:  $\pm 1.00[\pm 0.039]$

### ATB\_LMD-10WHR3A4S(with heat sink) Dimensions

THIRD ANGLE PROJECTION



Pin-Out						
Pin	1	2	3	4	5	6
Function	NC	GND	Vin	+Vo	NC	0V



Note:  
 Unit: mm[inch]  
 Mounting rail: TS35  
 Wire range: 24-12 AWG  
 Tightening torque: Max 0.4 N·m  
 General tolerances:  $\pm 1.00[\pm 0.039]$

#### Note:

1. If the product works under the minimum required load, it cannot guarantee that the performance of the product complies with all the performance indicators in this manual;
2. The maximum capacitive load is tested under the input voltage range and full load condition;
3. Unless otherwise stated, all indexes in this manual are measured at  $T_a=25^{\circ}\text{C}$ , humidity  $<75\%\text{RH}$ , nominal input voltage and rated output load;
4. All index testing methods in this manual are based on the enterprise standards of the company;
5. Our company can provide product customization, specific needs can directly contact our technical staff;

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