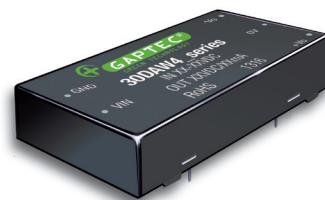


30DAW4_1.5 series

30W isolated DC-DC converter
Ultra-wide input and regulated dual/single output



- ⊕ Ultra-wide 4:1 input voltage range
- ⊕ High efficiency up to 90% with full load
- ⊕ High efficiency up to 82% with 5% load
- ⊕ No-load power consumption as low as 0.14W
- ⊕ I/O isolation test voltage 1.5kVDC
- ⊕ Six-sided metal shielded package
- ⊕ Operating ambient temp. range:-40°C to +80°C
- ⊕ Meets CISPR32/EN55032 CLASS A without extra components
- ⊕ Input reverse polarity protection available with chassis or Din-Rail mounting version
- ⊕ Input under-voltage protection, output short-circuit, over-voltage, over-current protection



DC-DC Converter

30 Watt

The 30DAW4 series of isolated 30W DC-DC converter products with an ultra-wide 4:1 input voltage and feature efficiencies of up to 90%, input to output isolation is tested with 1500VDC and the converters safely operate ambient temperature of -40°C to +80°C, input under-voltage protection, output short-circuit, over-voltage, over-current protection. They meet CLASS A of CISPR32/EN55032 EMI standards without external components, optional packages are offered for chassis or DIN-rail mounting, adding additional input reverse polarity protection and they are widely used in applications such as data transmission device, battery power supply device, telecommunication device, distributed power supply system, hybrid module system, remote control system, industrial robot and railway fields.

Common specifications

Short-circuit Protection:	Hiccup, continuous, self-recovery (See Fig. 1, Fig. 2, Fig. 3 and Fig. 4)		
Operation temp.:	-40°C~+80°C		
Storage temp.:	-55°C~+125°C		
Storage humidity:	5% ~ 95%RH MAX. (Non-condensing)		
Lead temp.:	300°C MAX, 1.5mm from case for 10 sec		
Vibration:	IEC/EN61373 - Category 1, Grade B		
MTBF:	>1,000,000 hours (MIL-HDBK-217F @25°C)		
Case material:	Aluminium alloy		
Cooling:	Free air convection		
Dimensions:	Horizontal (without heatsink)	50.8×25.4×11.8mm	
	Horizontal (with heat sink)	51.4×26.2×16.5mm	
	Chassis mounting(without heat sink)	76.0×31.5×21.2mm	
	Chassis mounting (with heat sink)	76.0×31.5×25.3mm	
	Din-rail mounting (without heat sink)	76.0×31.5×25.8mm	
	Din-rail mounting (with heat sink)	76.0×31.50×29.90mm	
Weight:	Horizontal package/Chassis mounting/Din-rail mounting		
	• Without heat sink	27.8g/52.0g/72.0g Typ.	
	• With heat sink	37.0g/60.0g/80.0g Typ.	

Input specifications

Item	Test condition	Min	Typ	Max	Units
Input current (full load/no load, nominal input series, nominal input voltage)	• 24VDC input				
	- 3.3V output		971/60	994/100	mA
	- 5V output		1453/60	1488/100	mA
	- Others		1420/6	1488/16	mA
	• 48VDC input				
	- 3.3V output		480/20	491/30	mA
Reflected ripple current	Nominal input voltage		40		mA
	• 24VDC input	-0.7		50	VDC
	• 48VDC input	-0.7		100	VDC
Starting voltage	• 24VDC input			9	VDC
	• 48VDC input			18	VDC
Input Under-voltage Protection	• 24VDC input	5.5	6.5		VDC
	• 48VDC input	12	15.5		VDC
Input filter			PI		
Start-up time	Nominal input constant resistance load				10ms Typ.
Hot plug			Unavailable		
Ctrl*	• Models ON	Ctrl pin open or pulled high (3.5-12VDC)			
	• Models OFF	Ctrl pin pulled low to GND (0-1.2VDC)			
	• Input current (OFF)	5mA Typ., 8mA Max.,			

* The CTRL pin voltage is referenced to GND.

Output specifications

Item	Test condition	Min	Typ	Max	Units
Voltage accuracy	• 5%-100% load		±1	±3	%
	• 0%-5% load		±1	±5	%
Line regulation	Input voltage variation from low to high at full load				
			±0.2	±0.5	%
			±0.5	±1	%
Load regulation	5% to 100% load		±0.5	±1	%
	• Vo1		±0.5	±1.5	%
	• Vo2				%
Cross regulation	Dual output, Vo1 load at 50%, Vo2 load at range of 10%-100%			±5	%
Transient recovery time	25% load step change, nominal input voltage		300	500	us
Transient response deviation	25% load step change, nominal input voltage				
	• 3.3/5V output		±5	±8	%
	• Others		±3	±5	%
Temperature drift	Full load			±0.03	%/°C
Ripple and noise*	20MHz bandwidth, nominal input voltage, 100% load				
	• Single output		50	100	mV
	• Dual output		50	150	mV
Trim			±10		%Vo
Over voltage protection	Input voltage range		110	160	%Vo
Over current protection	Input voltage range		110	190	%Io
Switching frequency *	PWM mode			300	kHz

Note:

①Load regulation for 0%-100% load is ±5%;

②The "parallel cable" method is used for ripple and noise test, please refer to DC-DC Converter Application Notes for specific information

Example:

30DAW4_2415S1.5

30 = 30Watt; D = DIP; A = series; W4 = Ultra wide input (4:1);

24 = 9-36Vin; 15 = 15Vout; S = Single output; 1.5 = 1500VDC isolation

30DAW4_1.5 series

30W isolated DC-DC converter

Ultra-wide input and regulated dual/single output

Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Input-output Electric Strength test for 1 minute with a leakage current of 1mA max.	1500			VDC
Isolation resistance	Input-output resistance at 500VDC/60sec	1000			MΩ
Isolation capacitance	Input-output capacitance at 100kHz/0.1V		2000		pF

Note:

1. Horizontal Packaging Bag Number: 58200035(without heat sink), 58200051 (with heat sink), chassis mounting/Din-rail mounting Packaging Bag Number: 58220022;
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta = 25°C, humidity <75%RH with nominal input voltage and rated output load;
4. All index testing methods in this datasheet are based on company corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see „Features“ and „EMC“;
7. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.
8. Specifications subject to change without notice.

EMC specifications

EMI	CE	Single output Dual output	CISPR32/EN55032 CISPR32/EN55032	CLASS A (without external components)/CLASS B (see Fig.6-② for recommended circuit) CLASS A (without external components)/CLASS B (see Fig.7-② for recommended circuit)
EMI	RE	Single output Dual output	CISPR32/EN55032 CISPR32/EN55032	CLASS A (without external components)/CLASS B (see Fig.6-② for recommended circuit) CLASS A (without external components)/CLASS B (see Fig.7-② for recommended circuit)
EMS	ESD		IEC/EN61000-4-2 Contact ±4kV	
EMS	RS		IEC/EN61000-4-3 10V/m	
EMS	EFT	Single output Dual output	IEC/EN61000-4-4 ±2kV (see Fig.6-④ for recommended circuit) perf. Criteria B IEC/EN61000-4-4 ±2kV (see Fig.7-④ for recommended circuit) perf. Criteria B	
EMS	Surge	Single output Dual output	IEC/EN61000-4-5 line to line ±2kV (see Fig.6-④ for recommended circuit) perf. Criteria B IEC/EN61000-4-5 line to line ±2kV (see Fig.7-④ for recommended circuit) perf. Criteria B	
EMS	CS	Single output Dual output	IEC/EN61000-4-6 3 Vr.m.s perf. Criteria A IEC/EN61000-4-6 10Vr.m.s perf. Criteria A	

EMC specifications

EMI	CE	Single output Dual output	EN50121-3-2 150kHz-500kHz 99dBμV (see Fig.6-② for recommended circuit) EN55016-2-1 500kHz-30MHz 93dBμV (see Fig.6-② for recommended circuit) EN50121-3-2 150kHz-500kHz 99dBμV (see Fig.7-② for recommended circuit) EN55016-2-1 500kHz-30MHz 93dBμV (see Fig.7-② for recommended circuit)	
EMI	RE	Single output Dual output	EN50121-3-2 30MHz-230MHz 40dBμV/m at 10m (see Fig.6-② for recommended circuit) EN55016-2-1 230MHz-1GHz 47dBμV/m at 10m (see Fig.6-② for recommended circuit) EN50121-3-2 30MHz-230MHz 40dBμV/m at 10m (see Fig.7-② for recommended circuit) EN55016-2-1 230MHz-1GHz 47dBμV/m at 10m (see Fig.7-② for recommended circuit)	
EMS	ESD		EN50121-3-2 Contact ±6kV/Air ±8kV perf. Criteria A	
EMS	RS		EN50121-3-2 20V/m perf. Criteria A	
EMS	EFT	Single output Dual output	EN50121-3-2 ±2kV 5/50ns 5kHz (see Fig.6-④ for recommended circuit) perf. Criteria A EN50121-3-2 ±2kV 5/50ns 5kHz (see Fig.7-④ for recommended circuit) perf. Criteria A	
EMS	Surge	Single output Dual output	EN50121-3-2 line to line ±1kV (42Ω, 0.5μF) (see Fig.6-④ for recommended circuit) perf. Criteria A EN50121-3-2 line to line ±1kV (42Ω, 0.5μF) (see Fig.7-④ for recommended circuit) perf. Criteria A	
EMS	CS	Single output Dual output	EN50121-3-2 0.15MHz-80MHz 10V r.m.s perf. Criteria A EN50121-3-2 0.15MHz-80MHz 10V r.m.s perf. Criteria A	

Product Selection Guide

Certification	Part Number	Input Voltage [VDC]			Output Voltage [VDC]	Output Current [mA, Max/Min]	Efficiency ⁽²⁾ [% , Typ.]	Capacitor load [μF, Max]
		Nominal	Range	Max ⁽¹⁾				
UL	30DAW4_2403S1.5	24	9-36	40	3.3	6000/0	83/85	10000
UL	30DAW4_2405S1.5	24	9-36	40	5	6000/0	84/86	10000
UL	30DAW4_2409S1.5	24	9-36	40	9	3333/0	86/88	4700
UL	30DAW4_2412S1.5	24	9-36	40	12	2500/0	88/90	2700
UL	30DAW4_2415S1.5	24	9-36	40	15	2000/0	88/90	1680
UL	30DAW4_2424S1.5	24	9-36	40	24	1250/0	88/90	680
UL	30DAW4_4803S1.5	48	18-75	80	3.3	6000/0	84/86	10000
UL	30DAW4_4805S1.5	48	18-75	80	5	6000/0	85/87	10000
UL	30DAW4_4812S1.5	48	18-75	80	12	2500/0	86/88	2700
UL	30DAW4_4815S1.5	48	18-75	80	15	2000/0	87/89	1680
UL	30DAW4_4824S1.5	48	18-75	80	24	1250/0	85/87	680

30DAW4_1.5 series

30W isolated DC-DC converter

Ultra-wide input and regulated dual/single output

Product Selection Guide

Certification	Part Number	Input Voltage [VDC]			Output Voltage [VDC]	Output Current [mA, Max/Min]	Efficiency ⁽²⁾ [%, Typ.]	Capacitor load [μF, Max]
		Nominal	Range	Max ⁽¹⁾				
---	30DAW4_2405D1.5	24	9-36	40	±5	±3000/0	84/86	2000
---	30DAW4_2412D1.5	24	9-36	40	±12	±1250/0	87/89	1250
---	30DAW4_2415D1.5	24	9-36	40	±15	±1000/0	87/89	680
---	30DAW4_2424D1.5	24	9-36	40	±24	±625/0	87/89	470
---	30DAW4_4805D1.5	48	18-75	80	±5	±3000/0	84/86	2000
---	30DAW4_4812D1.5	48	18-75	80	±12	±1250/0	86/88	1250
---	30DAW4_4815D1.5	48	18-75	80	±15	±1000/0	86/88	680

①Use "/H" suffix for heatsink mounting, "/CM" suffix for chassis mounting and "/DR" suffix for DIN-Rail mounting (i.e. 30DAW4_4815D1.5/DR). We recommend to choose modules with a heatsink for enhanced heat dissipation and applications with extreme temperature requirements;

②The minimum input voltage and starting voltage of chassis mounting and DIN-Rail mounting Model are 1VDC higher than those of DIP package due to input reverse polarity protection function; ③Exceeding the maximum input voltage may cause permanent damage;

④Efficiency is measured at nominal input voltage and rated output load; efficiencies for Chassis mounting and DIN-Rail mounting Model's is decreased by 2% due to the input reverse polarity protection circuit; ⑤The specified maximum capacitive load for positive and negative output is identical.

Typical characteristics

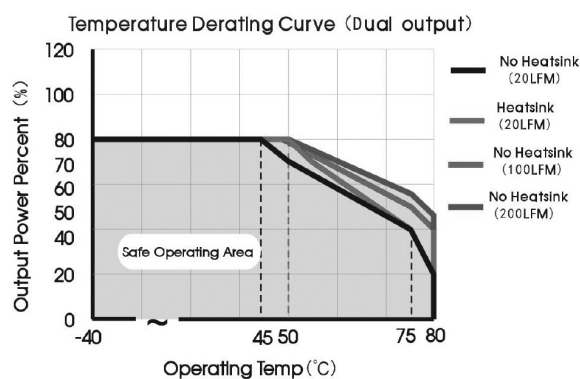


Fig. 1

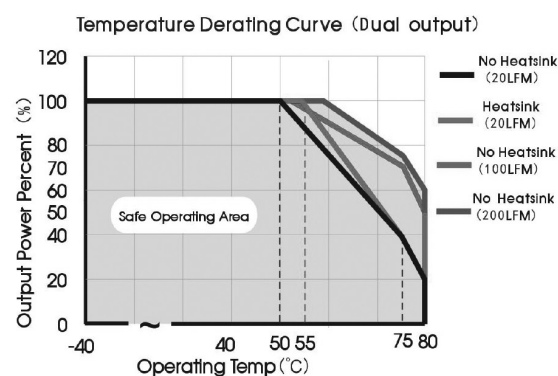


Fig. 2

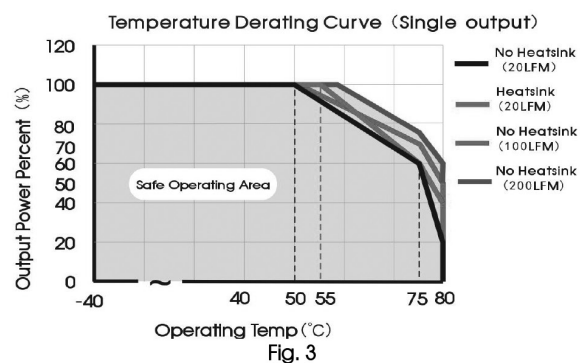


Fig. 3

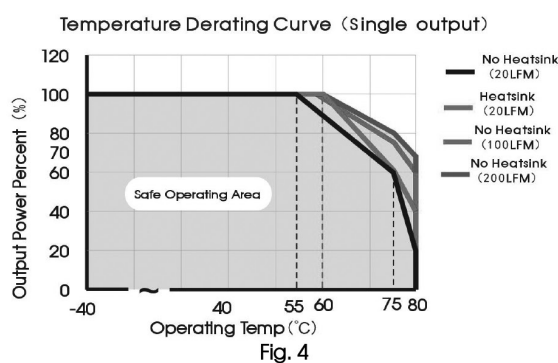


Fig. 4

Note:

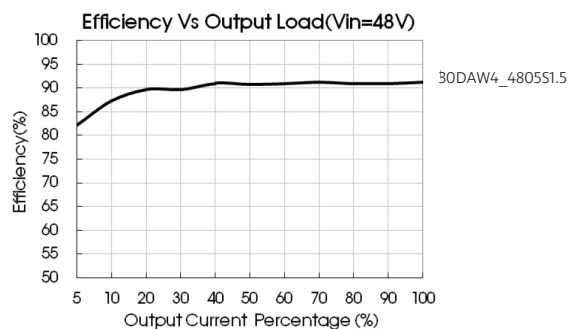
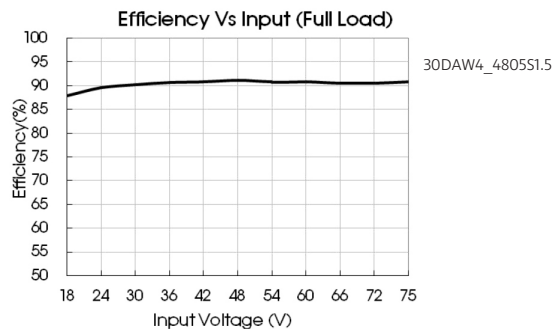
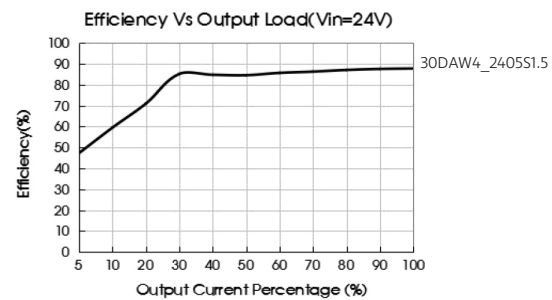
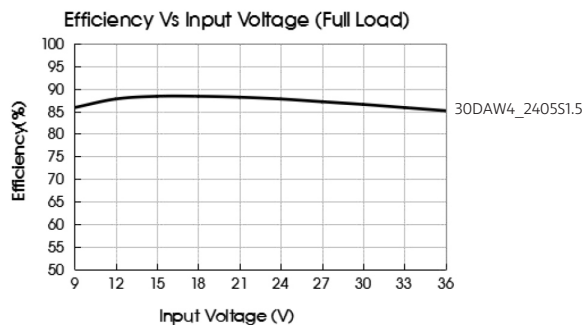
- Fig-1 Applicable models: 30DAW4_2405D(H)1.5 (9-18V input voltage), 30DAW4_2424D(H)1.5 (9-18V input voltage), 30DAW4_4805D(H)1.5 (18-36V input voltage)
- Fig-2 Applicable models: 30DAW4_2405D(H)1.5 (18-36V input voltage), 30DAW4_2424D(H)1.5 (18-36V input voltage), 30DAW4_4805D(H)1.5 (36-75V input voltage), 30DAW4_2412D(H)1.5, 30DAW4_2415D(H)1.5, 30DAW4_4812D(H)1.5, 30DAW4_4815D(H)1.5
- Fig-3 Applicable models: 30DAW4_2403S(H)1.5, 30DAW4_2405S(H)1.5, 30DAW4_4803S(H)1.5, 30DAW4_4805S(H)1.5
- Fig-4 Applicable models: 30DAW4_2409S(H)1.5, 30DAW4_2412S(H)1.5 (18-36V input voltage), 30DAW4_2415S(H)1.5, 30DAW4_2424S(H)1.5, 30DAW4_4812S(H)1.5, 30DAW4_4815S(H)1.5, 30DAW4_4824D(H)1.5

30DAW4_1.5 series

30W isolated DC-DC converter

Ultra-wide input and regulated dual/single output

Efficiency



Typical application

All the DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 5.

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 specified max. capacitive load value of the product.

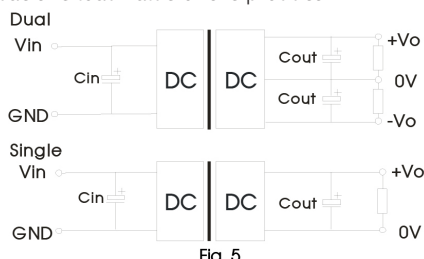


Fig. 5

Single output voltage (VDC)	C_{out} (μF)	C_{in} (μF)	Dual output voltage (VDC)	C_{out} (μF)	C_{in} (μF)
3.3/5/9	220	100	$\pm 5/\pm 12/\pm 15$	220	100
12/15/24	100	100	± 24	100	100

EMC recommended circuit

Single output:

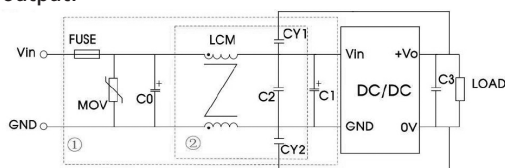


Fig. 6

Notes: We use Part ① in Fig. 6 for immunity and part ② for emissions test.

Dual output:

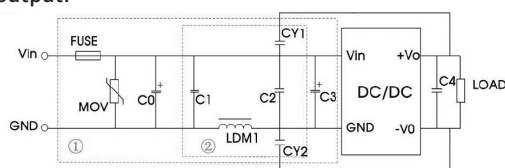


Fig. 7

Notes: We use Part ① in Fig. 7 for immunity and part ② for emissions test.

Recommended external circuit parameters	Vin: 24V	Vin: 48V
FUSE	Choose according to actual input current	
MOV	S20K30	S14K60
C0	680 μF /50V	330 μF /100V
C1	330 μF /50V	330 μF /100V
C2	4.7 μF /50V	2.2 μF /100V
C3	Refer to the C_{out} in Fig.5	
LCM	1mH	
CY1, CY2	1nF/2KV	

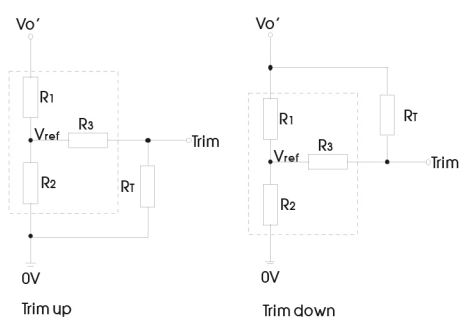
Recommended external circuit parameters	Vin: 24V	Vin: 48V
FUSE	Choose according to actual input current	
MOV	S20K30	S14K60
C0	680 μF /50V	330 μF /100V
C1 / C2	2.2 μF /50	2.2 μF /100V
C3	Refer to the C_{out} in Fig.5	
LCM	3.3 μH	
CY1, CY2	2.2nF/400VAC Safety Y Capacitor	

30DAW4_1.5 series

30W isolated DC-DC converter

Ultra-wide input and regulated dual/single output

Trim Function for Output Voltage Adjustment (open if unused)



Calculating Trim resistor values:

$$\begin{aligned} \text{up: } R_T &= \frac{\alpha R_2}{R_2 - \alpha} - R_3 & \alpha &= \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1 \\ \text{down: } R_T &= \frac{\alpha R_1}{R_1 - \alpha} - R_3 & \alpha &= \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2 \end{aligned}$$

R_T = Trim Resistor value

α = self-defined parameter

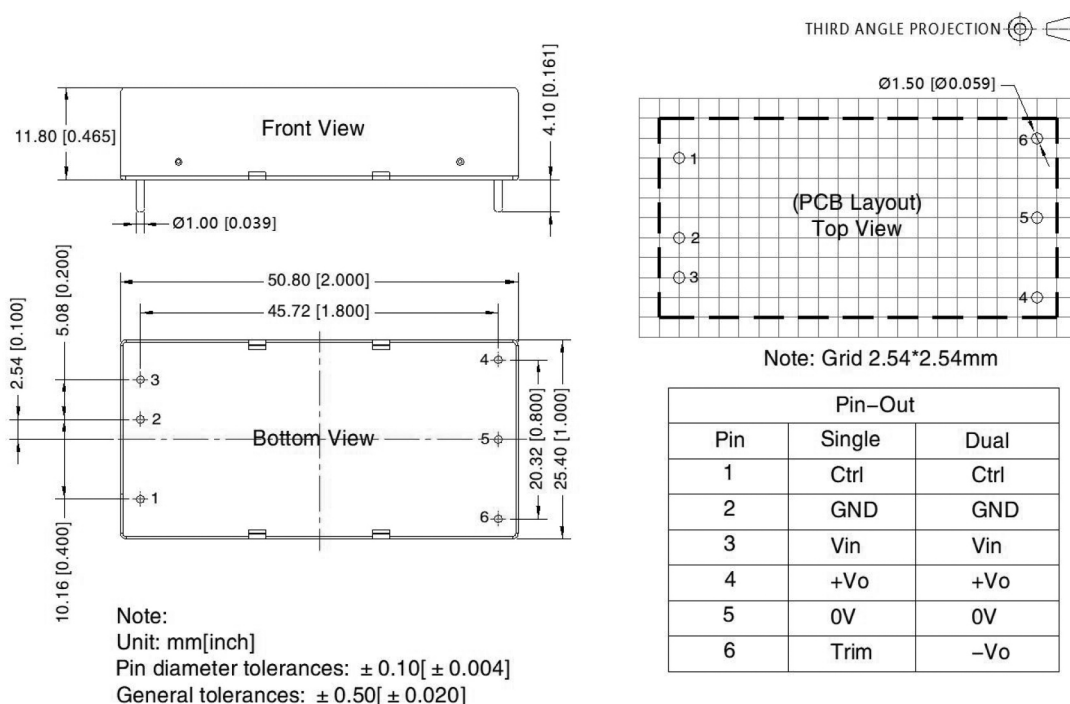
V_o' = desired output voltage

TRIM resistor connection (dashed line shows internal resistor network)

Vout (V)	R1 (KΩ)	R2 (KΩ)	R3 (KΩ)	Vref (V)
3.3	4.801	2.87	12.4	1.24
5	2.883	2.87	10	2.5
9	7.500	2.87	15	2.5
12	11.000	2.87	15	2.5
15	14.494	2.87	15	2.5
24	24.872	2.87	17.8	2.5

The product does not support output in parallel with power per liter.

Horizontal Package (without heat sink) Dimensions and Layout

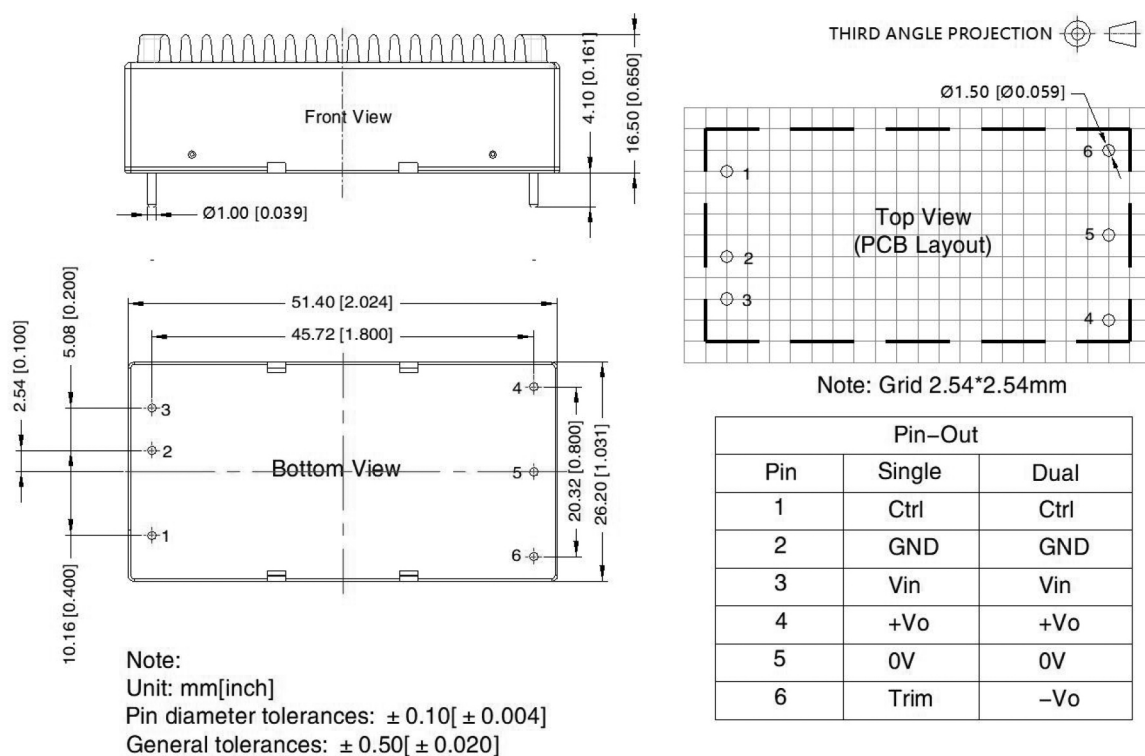


30DAW4_1.5 series

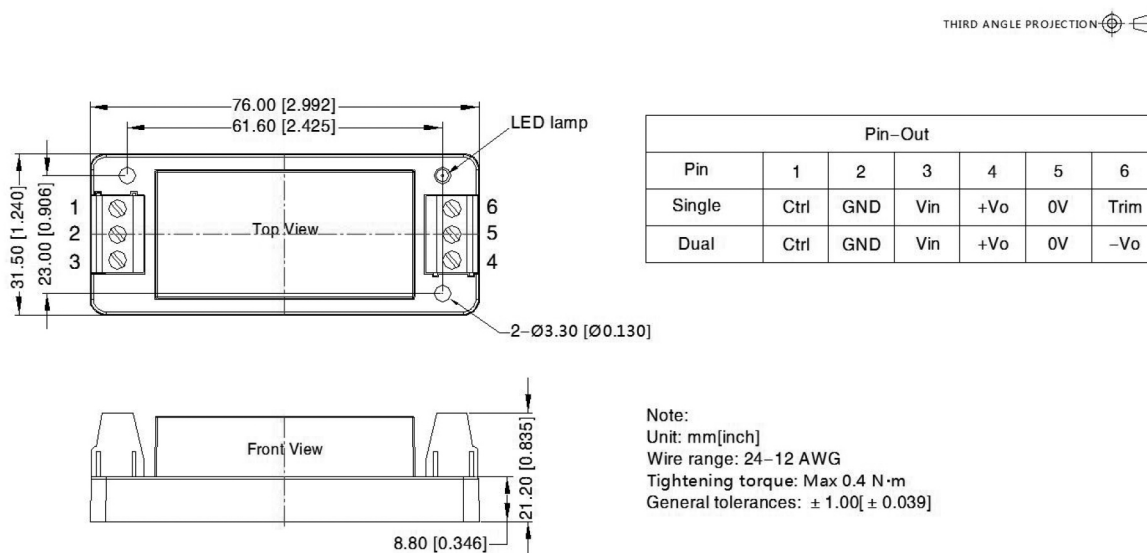
30W isolated DC-DC converter

Ultra-wide input and regulated dual/single output

Horizontal Package (with heat sink) Dimensions and Layout



Chassis mounting (without heat sink) Dimensions and Layout



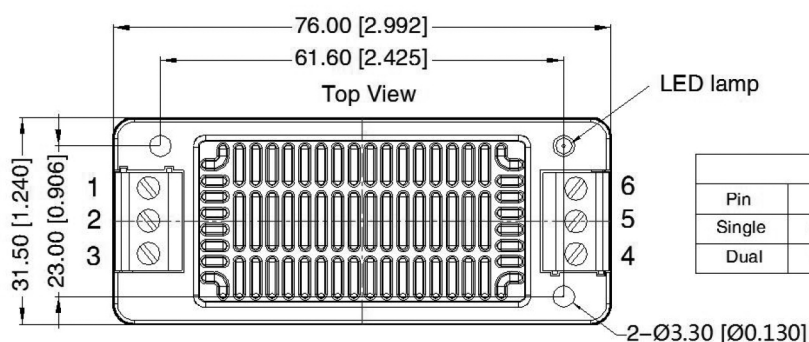
30DAW4_1.5 series

30W isolated DC-DC converter

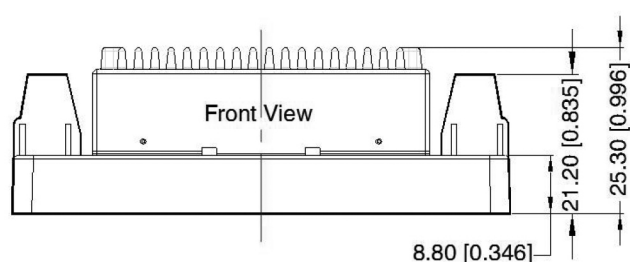
Ultra-wide input and regulated dual/single output

Chassis mounting (with heat sink) Dimensions and Layout

THIRD ANGLE PROJECTION 



Pin-Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	Vin	+Vo	0V	Trim
Dual	Ctrl	GND	Vin	+Vo	0V	-Vo



Note:

Unit: mm[inch]

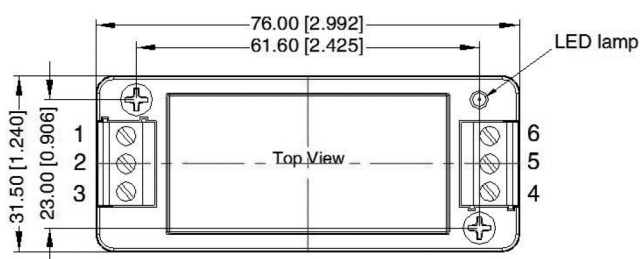
Wire range: 24~12 AWG

Tightening torque: Max 0.4 N · m

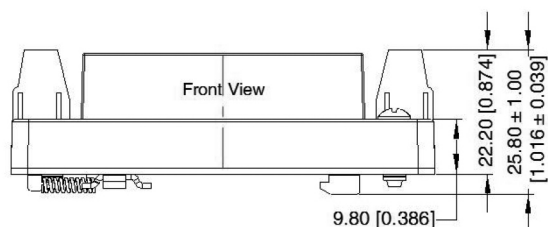
General tolerances: $\pm 1.00 [\pm 0.039]$

Din-rail mounting (without heat sink) Dimensions and Layout

THIRD ANGLE PROJECTION 



Pin-Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	Vin	+Vo	0V	Trim
Dual	Ctrl	GND	Vin	+Vo	0V	-Vo



Note:

Unit: mm[inch]

Mounting rail: TS35

Wire range: 24~12 AWG

Tightening torque: Max 0.4 N · m

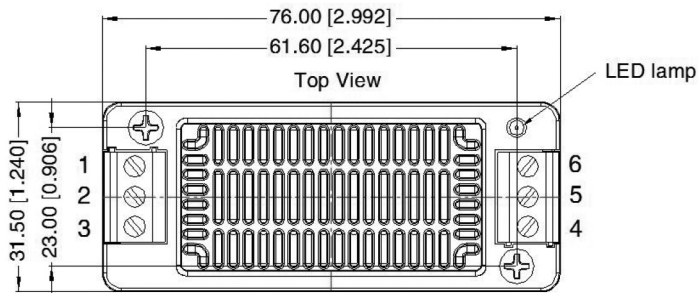
General tolerances: $\pm 1.00 [\pm 0.039]$

30DAW4_1.5 series

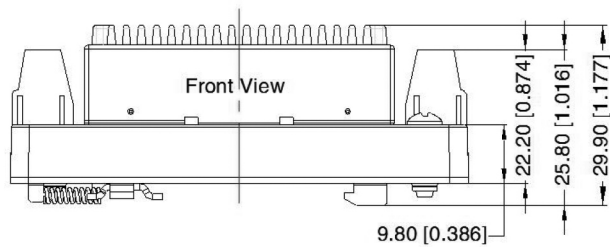
30W isolated DC-DC converter
Ultra-wide input and regulated dual/single output

Din-rail mounting (with heat sink) Dimensions and Layout

THIRD ANGLE PROJECTION



Pin-Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	Vin	+Vo	0V	Trim
Dual	Ctrl	GND	Vin	+Vo	0V	-Vo



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