

20DAWE_1.5 series

20W - Single/Dual Output DC-DC Converter - Wide Input - Isolated



- ⊕ 2:1 input voltage range
- ⊕ Operating ambient temp. range: -40°C to +85°C
- ⊕ 1600VDC isolation voltage
- ⊕ Up to 90% efficiency

- ⊕ Short circuit protection (SCP)
- ⊕ Over current protection
- ⊕ Over voltage protection
- ⊕ MTBF: 1,000,000 hours



Common specifications

Short circuit protection	Input voltage range, continuous, self recovery
Switching frequency	300 kHz (PWM)
Operation temperature	-40°C ~+85°C (with derating)
Storage temperature	-55°C ~+125°C
Soldering Profile	Wave-soldering, 260°C (±5°C); time: 5 - 10s Manual-welding, 360°C (±10°C); time: 3 - 5s
Storage humidity	5-95% RH (non-condensing)
MTBF	> 1,000,000 hours (MIL-HDBK-217F@25°C))
Ctrl	Turn on module, ctrl pin open or pulled high (TTL2.7-12VDC) Turn off module, ctrl pin pulled low to GND (0-1.2VDC)
Input filter	PI Filter
Hot plug	Unavailable
Vibration	IEC/EN 61373 -Category 1, Grade B
Case material	Aluminum alloy
Mechanical dimensions	50.80 × 25.40 × 11.80mm
Weight	25.0g (typ.)
Cooling method	Free air convection

Note: The Ctrl pin voltage is referenced to input GND.

Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation Voltage	Input-output, test time 1 minute, leakage current less than 1mA	1600			VDC
Isolation Resistance	Input-output, resistance at 500VDC	1000			MΩ
Isolation Capacitance	Input-output, 100kHz/0.1V		2000		pF

Example:

20DAWE_2405S1.5

20 = 20Watt; D = DIP; A = Series; W = Wide input; E = Cost effective;
24 = 24Vin; 05 = 5Vout; S = Single Output; 1.5 = 1500VDC isolation

- The input voltage should not exceed the specified range value, otherwise it may cause permanent and irreparable damage;
- It is recommended to use at a load of over 5%. If the load is below 5%, the ripple index of the product may exceed the specifications, but it does not affect the reliability of the product;
- Suggested dual output module load imbalance: $\leq \pm 5\%$. If it exceeds $\pm 5\%$, it cannot be guaranteed that the product performance meets all performance indicators in this datasheet;
- The maximum capacitive load is tested within the input voltage range and under full load conditions;
- Unless otherwise specified, all indicators in this datasheet are measured at $T_a = 25^\circ\text{C}$, humidity <75% RH, nominal input voltage, and output rated load;
- All indicator testing methods in this datasheet are based on our company's standards;
- For specific requirements please contact our technical team directly;
- Product specifications are subject to change without prior notice.

DC-DC Converter

20 Watt

Introducing our new 20DAWE_1.5 series, a robust and efficient DC-DC converter solution designed for reliable operation in demanding industrial environments. Featuring a 2:1 input voltage range, the series offers design flexibility across a wide range of applications. The converters are specified for an operating ambient temperature range from -40 °C to +85 °C and provide a 1600 VDC isolation voltage, ensuring safe and stable performance. With efficiencies of up to 90 %, the 20DAWE_1.5 series helps minimize power losses and supports compact, thermally optimized designs. Integrated short circuit, over current, and over voltage protection enhance system reliability, while a high MTBF of 1,000,000 hours underlines the series' suitability for long-term and mission-critical applications.

Output specifications

Item	Test condition	Min	Typ	Max	Units
Output voltage accuracy (0% - 100% load)	Vo1 Vo2		±1.0 ±2.0	±3.0 ±5.0	%
Linear regulation (Vin = min. to max. @ full load)	Vo1 Vo2		±0.2 ±0.5	±0.5 ±1.0	%
Load regulation (5% - 100% load)	Vo1 Vo2		±0.5 ±0.5	±1.0 ±1.5	%
Load regulation	(0% - 100% load)		±1.0	±5.0	
Cross regulation	Dual out. with Positive out. at 50% load and negative out. from 10% - 100% load			±5.0	%
Ripple & noise*	20MHz bandwidth, 5% - 100% load, parallel cable method		50	100	mVp-p
Transient recovery time	25% load step change, nominal input voltage		300	500	μs
Transient response deviation	25% load step change, nominal input voltage		±5.0	±8.0	%
Temp. drift coefficient	Full load			±0.03	%/°C
Trim	Input voltage range		90		110
Over-voltage protection	Input voltage range		110		160
Over-current protection	Input voltage range		110	140	

Note: *Under 0% - 5% load conditions, ripple & noise does not exceed 5%Vo.

Input specifications

Item	Test condition	Min	Typ	Max	Units
Input current (full load/ no load)	12VDC Nominal input				
	• 15V Output (Dual)		1916/17	1960/25	
	• 24V Output (Dual)		1894/20	1938/30	
	24VDC Nominal input				
	• 3.3V Output (Single)		799/40	818/45	
	• 5/6/9V Output (Single)		947/40	969/80	
	• Others Output (Single)		936/6	958/10	
	• 3.3V Output (Dual)		818/40	838/45	
	• 5/6V Output (Dual)		969/40	993/80	
	• Others Output (Dual)		947/6	969/10	
	48VDC Nominal input				
	• 3.3V Output (Single)		400/20	409/25	
	• 5/6V Output (Single)		485/20	497/60	
	• Others Output (Single)		474/5	485/9	
	• 3.3V Output (Dual)		409/20	419/25	
	• 5/6V Output (Dual)		485/20	496/60	
	• Others Output (Dual)		474/5	485/9	
Reflected ripple current	Nominal input series		30		mA
Surge voltage (1 sec. max.)	12VDC Nominal input	-0.7		25	
	24VDC Nominal input	-0.7		50	
	48VDC Nominal input	-0.7		100	VDC
Starting voltage	12VDC Nominal input			9	
	24VDC Nominal input			18	
	48VDC Nominal input			36	VDC
Undervoltage protection	12/24VDC Nominal input	5.5	6.5		
	48VDC Nominal input	12	15.5		VDC
Start time	Nominal input and constant resistance load		10		ms

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EMC specifications				
EMC	EMI	CE	CISPR32/EN55032 CLASS A (without extra components)/CLASS B (see fig. 3-② for recommended circuit)	
EMC	EMI	RE	CISPR32/EN55032 CLASS A (without extra components)/CLASS B (see fig. 3-② for recommended circuit)	
EMC	EMS	ESD	IEC/EN61000-4-2 Contact±4kV	Perf. criteria B
EMC	EMS	RS	IEC/EN61000-4-3 10V/m	Perf. criteria A
EMC	EMS	EFT	IEC/EN61000-4-4 ±2kV (see fig. 3-③ for recommended circuit)	Perf. criteria B
EMC	EMS	Surge	IEC/EN61000-4-5 line to line ±2kV (see fig. 3-③ for recommended circuit)	Perf. criteria B
EMC	EMS	CS	IEC/EN61000-4-6 3Vr.m.s	Perf. criteria A

Product Selection Guide

Approval	Part number	Input Voltage Nominal Range** (VDC)	Input Voltage*** Max. (VDC)	Output Voltage (VDC)	Output Current (mA) max.	Full Load Efficiency**** % (typ.)	Capacitive Load max. (μF)
	20DAWE_2403S1.5	24 (18-36)	40	3.3	5000	86	10000
	20DAWE_2405S1.5	24 (18-36)	40	5	4000	88	10000
	20DAWE_2406S1.5	24 (18-36)	40	6	3333	88	8200
	20DAWE_2409S1.5	24 (18-36)	40	9	2222	88	4700
	20DAWE_2412S1.5	24 (18-36)	40	12	1667	89	1600
	20DAWE_2415S1.5	24 (18-36)	40	15	1333	90	1000
	20DAWE_2418S1.5	24 (18-36)	40	18	1111	90	820
	20DAWE_2424S1.5	24 (18-36)	40	24	833	90	500
	20DAWE_4803S1.5	48 (36-75)	80	3.3	5000	86	10000
	20DAWE_4805S1.5	48 (36-75)	80	5	4000	86	10000
	20DAWE_4806S1.5	48 (36-75)	80	6	3333	87	8200
	20DAWE_4809S1.5	48 (36-75)	80	9	2222	88	4700
	20DAWE_4812S1.5	48 (36-75)	80	12	1667	89	1600
	20DAWE_4815S1.5	48 (36-75)	80	15	1333	89	1000
	20DAWE_4818S1.5	48 (36-75)	80	18	1111	88	820
	20DAWE_4824S1.5	48 (36-75)	80	24	833	88	500

Approval	Part number	Input Voltage Nominal Range** (VDC)	Input Voltage*** Max. (VDC)	Output Voltage (VDC)	Output Current (mA) max.	Full Load Efficiency**** % (typ.)	Capacitive Load***** max. (μF)
	20DAWE_1215D1.5	12 (9-18)	20	±15	±667	87	625
	20DAWE_1224D1.5	12 (9-18)	20	±24	±417	88	220
	20DAWE_2403D1.5	24 (18-36)	40	±3.3	±2500	84	4800
	20DAWE_2405D1.5	24 (18-36)	40	±5	±2000	86	4800
	20DAWE_2406D1.5	24 (18-36)	40	±6	±1667	87	3300
	20DAWE_2409D1.5	24 (18-36)	40	±9	±1111	88	2200
	20DAWE_2412D1.5	24 (18-36)	40	±12	±833	88	800
	20DAWE_2415D1.5	24 (18-36)	40	±15	±667	89	625
	20DAWE_2418D1.5	24 (18-36)	40	±18	±556	89	470
	20DAWE_2424D1.5	24 (18-36)	40	±24	±417	89	330
	20DAWE_4803D1.5	48 (36-75)	80	±3.3	±2500	84	4800
	20DAWE_4805D1.5	48 (36-75)	80	±5	±2000	86	4800
	20DAWE_4806D1.5	48 (36-75)	80	±6	±1667	87	3300
	20DAWE_4809D1.5	48 (36-75)	80	±9	±1111	88	2200
	20DAWE_4812D1.5	48 (36-75)	80	±12	±833	88	800
	20DAWE_4815D1.5	48 (36-75)	80	±15	±667	89	625
	20DAWE_4818D1.5	48 (36-75)	80	±18	±556	89	470
	20DAWE_4824D1.5	48 (36-75)	80	±24	±417	89	330

Note:
Please note: Add suffix /CM for chassis mount option; add suffix /DR for DIN rail option; add suffix /HS for heat sink option i.e. 20DAWE_4824D1.5/DR
** The /CM and /DR start-up and minimum input voltages are increased by 1VDC due to the input reverse polarity protection circuit;
*** Absolute maximum stress rating without damage (not recommended);
**** Efficiency is measured at nominal input voltage and rated output load; efficiencies for „CW“ and „CR“ Model's is decreased by 2% due to the input reverse polarity protection circuit.
***** The specified maximum capacitive load value for positive and negative output is identical.

Typical characteristics

Temperature derating graph

(Single/Dual others)

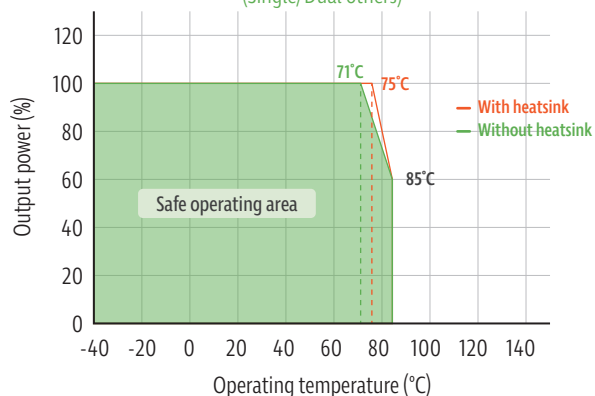


Figure 1

Temperature derating graph

(20DAWE_1215D1.5)

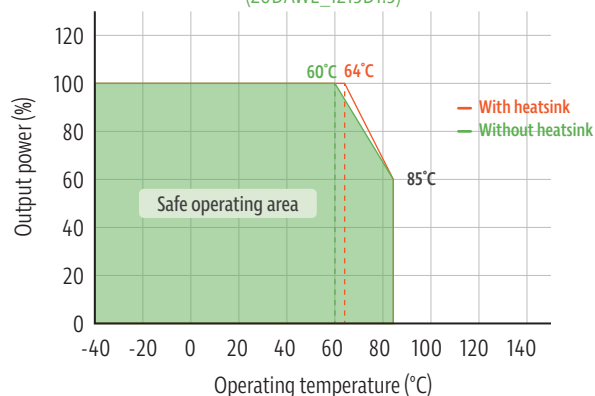
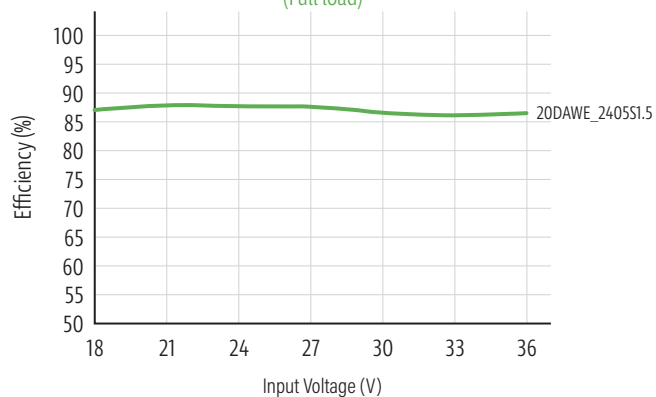


Figure 1

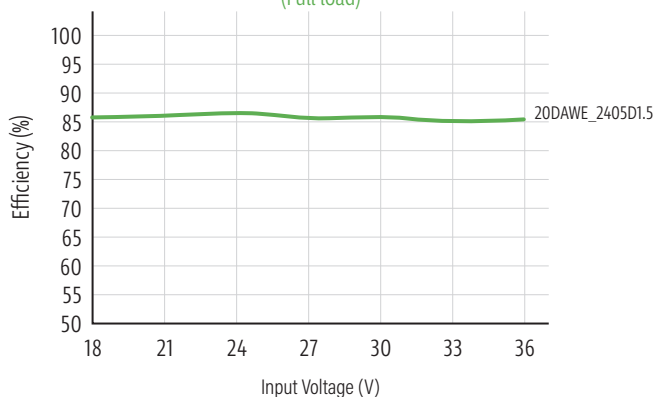
Efficiency vs input voltage

(Full load)



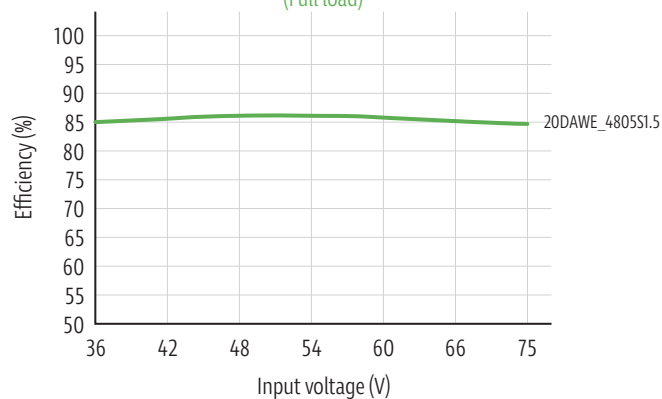
Efficiency vs input voltage

(Full load)



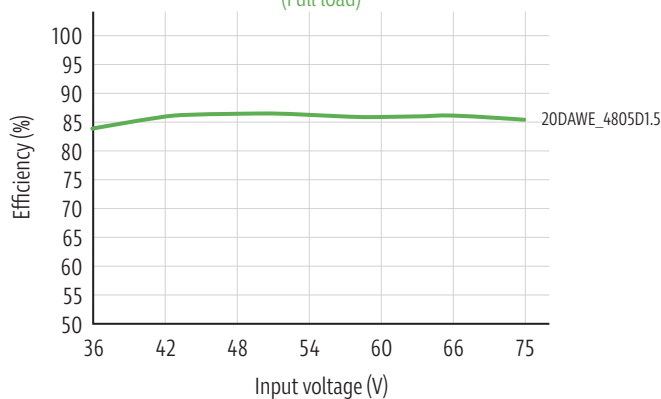
Efficiency vs input voltage

(Full load)

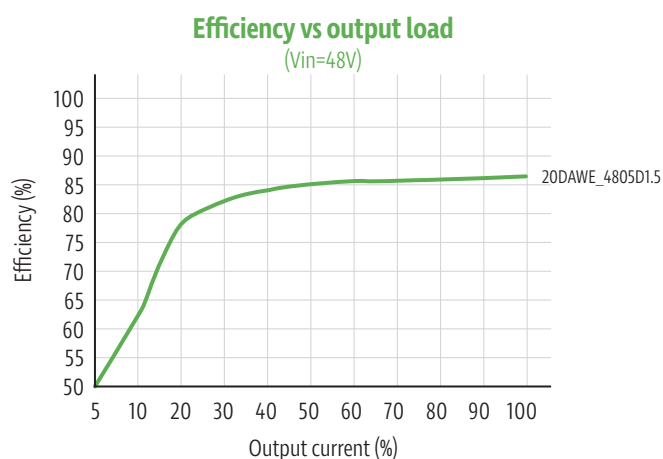
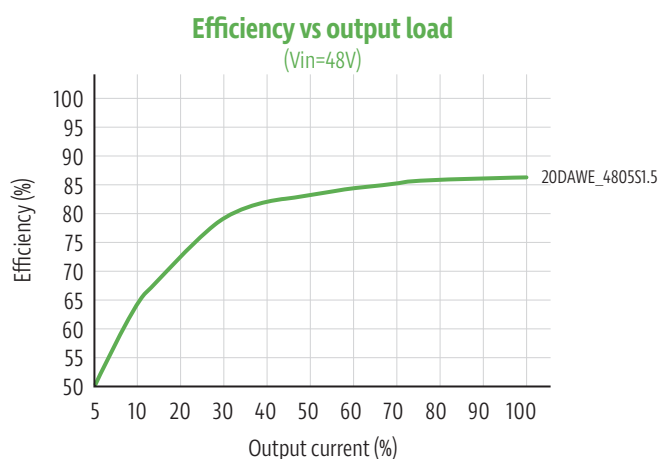
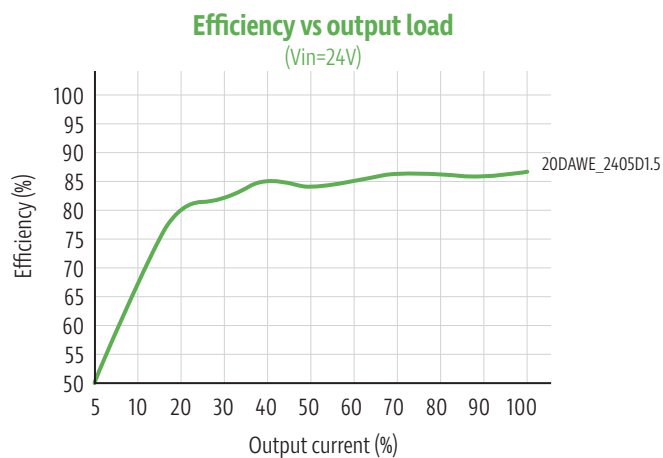
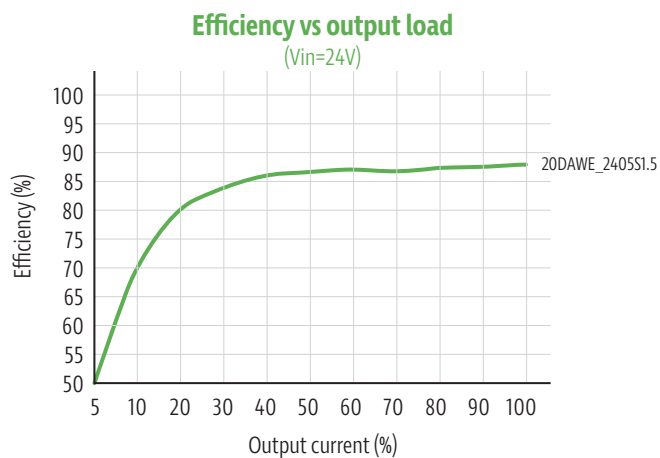


Efficiency vs input voltage

(Full load)



Typical characteristics



Typical circuit design and application

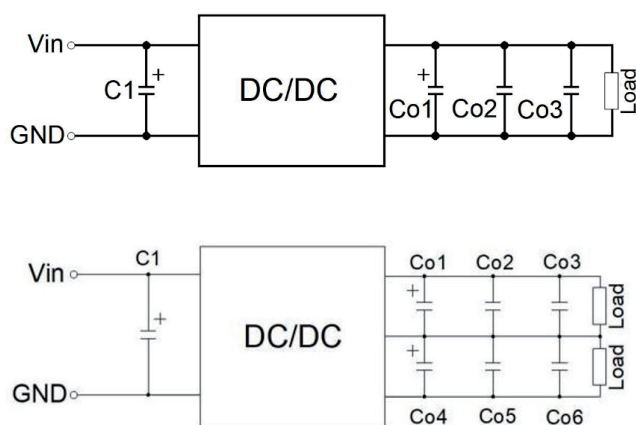


Figure 2

Recommended Capacitive Load Value Table

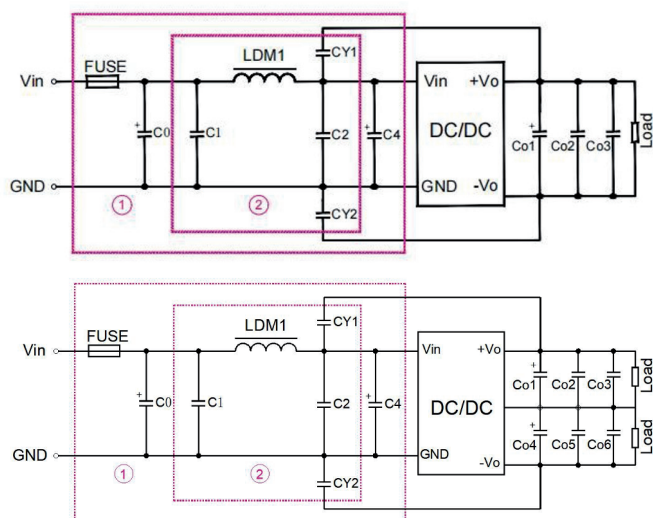
Vout (VDC)	C1	Co1/Co4	Co2/Co5	Co3/Co6
3.3/5/6	100μF/100V	100uF/16V	10uF/50V	0.1uF/16V
9/12/15	100μF/100V	100μF/25V	10μF/50V	0.1μF/25V
18/24	100μF/100V	47μF/50V	10μF/50V	0.1μF/50V

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 C1 and Co1/Co2/Co3 /Co4/Co5/Co6/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.

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EMI recommended component parameters

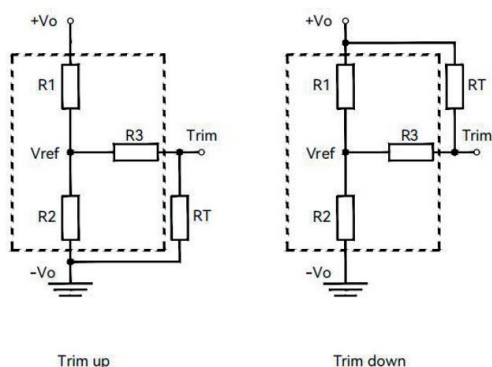


EMI recommended component parameters

Model	Vin: 12V/24V	Vin: 48V
FUSE	Select according to the actual input current of the customer	
C0/C4	330uF/50V	330uF/100V
C1/C2	4.7uF/50V	4.7uF/100V
LDM1	10uH/4A	10uH/2A
Co1/Co2/Co3/Co4/Co5/Co6	Refer figure 2 capacitive load value table	
CY1/CY2	1nF/2kVDC	

Notes: For EMC tests we use Part ① in fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

Trim recommended circuit



Pin Definition Table

Vout(V)	R1 (KΩ)	R2 (KΩ)	R3 (KΩ)	Vref (V)
3.3	10	6.064	13.622	1.24
5	2.4	2.344	13.622	2.5
6	10	6.982	13.622	2.5
9	12	4.602	17.346	2.5
12	8.2	2.153	17.346	2.5
15	12	2.388	21.016	2.5
18	24	3.868	33.275	2.5
24	10	1.158	10.714	2.5

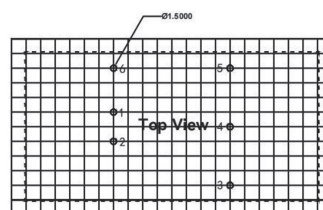
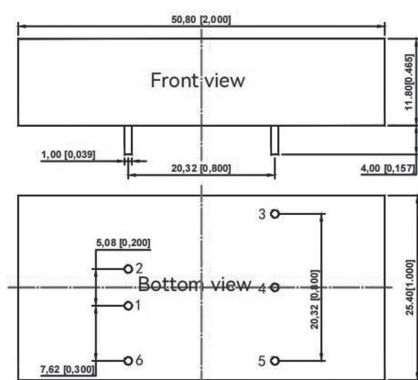
$$\text{Up: } R_t = \frac{nR_2}{R_2 - n} - R_3$$

$$n = \frac{V_{ref}}{V_o - V_{ref}} * R_1$$

$$\text{Down: } R_t = \frac{nR_1}{R_1 - n} - R_3$$

$$n = \frac{V_o - V_{ref}}{V_{ref}} * R_2$$

Mechanical dimensions



The grid distance is 2.54mm x 2.54mm

Note:
Unit: mm [inch]
Pin section tolerances: ±0.10 [±0.004]
General tolerances: ±0.5 0 [±0.020]

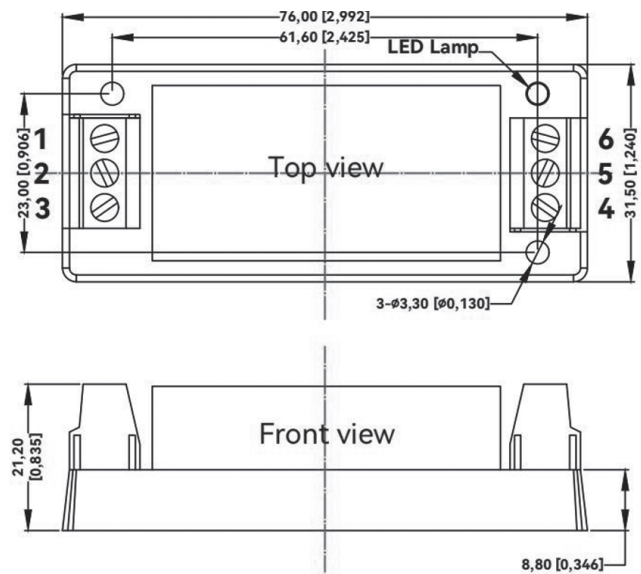
Pin definition table

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

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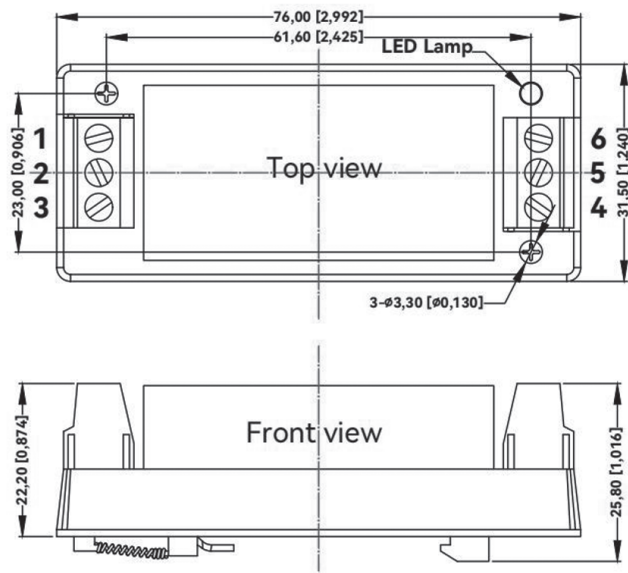
Chassis mounting dimensions



Pin definition table		
Pin	Single	Dual
1	Ctrl	Ctrl
2	GND	GND
3	Vin	Vin
4	+Vo	+Vo
5	Trim	COM
6	-Vo	-Vo

Note:
Unit: mm [inch]
Wire range: 24-12 AWG
General tolerances: ±1.00 [±0.039]
Tightening torque: Max 0.4 N·m

DIN rail mounting dimensions



Pin definition table		
Pin	Single	Dual
1	Ctrl	Ctrl
2	GND	GND
3	Vin	Vin
4	+Vo	+Vo
5	Trim	COM
6	-Vo	-Vo

Note:
Unit: mm [inch]
Wire range: 24-12 AWG
General tolerances: ±1.00 [±0.039]
Tightening torque: Max 0.4 N·m