

10DPWE4_1.5 series

10W - Single/Dual Output - Wide Input - Isolated & Regulated DC-DC Converter

DC-DC Converter 10 Watt

- ⊕ Ultra-wide 4:1 input voltage range
- ⊕ High efficiency up to 88%
- ⊕ No-load power consumption as low as 0.12W
- ⊕ I/O isolation test voltage: 1.5kVDC
- ⊕ Operating ambient temp. range: -40°C to +85°C
- ⊕ Input under-voltage protection, output short-circuit, over-current and over-voltage protection
- ⊕ Meet CISPR32/EN55032 CLASS A, without extra components
- ⊕ Industry standard pin-out
- ⊕ Meets EN50155 standards

The 10DPWE4_1.5 series are isolated 10W DC-DC converter products with an extremely wide voltage input range of 9-36VDC or 18-75VDC, input to output isolation voltage of 1500VDC, Input under-voltage protection, output short-circuit, over-current and over-voltage protection. They meet CLASS A of CISPR32/EN55032 EMI standards without external components and they are widely used in applications such as industrial controls, electric power, instrumentation, communications and railway.



Common specifications	
Short circuit protection:	Continuous, automatic recovery
Operation temperature range:	-40°C ~ +85°C (See Fig. 1)
Storage temperature range:	-55°C ~ +125°C
Storage humidity range:	5% ~ 95% RH MAX (Non-condensing)
Vibration(EN62368)	10-150Hz, 5G, 0.75mm. along X, Y and Z
Vibration(EN50155)	IEC/EN61373 - Category 1, Grade B
Pin welding resistance temperature:	+300°C MAX, 1.5mm away from case, 10sec
Case material:	Aluminium alloy
MTBF (MIL-HDBK-217F @25°C):	1000,000 hours
Cooling:	Free air convection
Dimensions:	32.00 x 20.00 x 10.80mm
Weight:	12.0g Typ.

Input specifications					
Item	Test condition	Min	Typ	Max	Units
Input current (full load/no load)	24VDC nominal input				
	• 3.3VDC single output		380/12	389/25	mA
	• 5VDC single output		474/6	485/15	mA
	• others		502/5	515/12	mA
48VDC nominal input	24VDC nominal input				
	• 3.3VDC single output		192/5	197/20	mA
	• 5VDC single output		240/6	245/15	mA
	• others		251/4	258/8	mA
Reflected ripple current	• 24V nominal input		40		mA
	• 48V nominal input		30		mA
Input impulse voltage (Isec max.)	• 24V nominal input	-0.7		50	VDC
	• 48V nominal input	-0.7		100	VDC
Starting voltage	• 24V nominal input			9	VDC
	• 48V nominal input			18	VDC
Input under voltage protection	• 24V nominal input	5.5	6.5		VDC
	• 48V nominal input	12	15.5		VDC
Input filter	Pi filter				
Hot plug	Unavailable				
Ctrl (The voltage of Ctrl pin is relative to input pin GND.)	• Module switch on		Ctrl pin open or pulled high (3.5-12VDC)		
	• Module switch off		Ctrl pin pulled low to GND (0-1.2VDC)		
	• Input current when switched off		6	10	mA

Example:

10DPWE4_2415S1.5

10 = 10Watt; D = DIP; P = Series; W4 = Wide input (4:1); E = Cost effective; 24 = 9-36Vin; 15 = 15Vout; S = Single output; 1.5 = 1500VDC isolation

Output specifications							
Item	Test condition	Min	Typ	Max	Units		
Voltage accuracy ¹	0%-100% load		± 0.5	± 2	%		
	• 3.3VDC/5VDC single output		±1	±3	%		
	• Others				%		
Line regulation @Full load	from low to high voltage		±0.2	±0.5	%		
	• Vo1		±0.5	±1	%		
	• Vo2				%		
Load regulation ² (5%-100% load)	• Vo1		±0.5	±1	%		
	• Vo2		±0.5	±1.5	%		
Cross regulation	Dual output, Vo1 load at 50%, Vo2 load at range of 25%-100%			±5	%		
Transient recovery time	25% load step change		300	500	µs		
Transient response deviation	25% load step change	• 3.3VDC/5VDC single output	±5	±5	%		
			• Others	±3	±3	%	
Temperature drift coefficient	Full load			±0.03	%/°C		
Ripple and noise ³	20MHz Bandwidth		40		mVp-p		
Switching frequency*:	PWM mode		350		mVp-p		
Over voltage protection	Input voltage range	110		160	%Vo		
Over current protection	Input voltage range	• 3.3VDC/5VDC single output	110	160	230	%Io	
			• Others	110	140	190	%Io

1. At 0% - 5% load, the Max. output voltage accuracy of ±5VDC output converter is ±5%, the Max. output voltage accuracy of 3.3VDC/5VDC output converter is ±3%;
2. Load regulation for 0% - 100% load increases to ±5%;
3. Under 0% - 5% load conditions, ripple & noise does not exceed 5%Vo. The "parallel cable" method is used for ripple and noise test.

Isolation specifications					
Item	Test condition	Min	Typ	Max	Units
Isolation voltage	1 min, leak current lower than 1mA	1500			VDC
Isolation resistance	Test at 500VDC	1000			MΩ
Isolation capacitance	Input-output, 100KHz/0.1V		2000		pF

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EMC specifications				
Emissions	CE	CISPR32/EN55032	CLASS A (without extra components)/ CLASS B (see Fig.3-② for recommended circuit)	
Emissions	RE		CLASS A (without extra components)/ CLASS B (see Fig.3-② for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±4KV	perf. Criteria B
Immunity	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
Immunity	EFT	IEC/EN61000-4-4	±2KV (See EMC recommended circuit, ①)	perf. Criteria B
Immunity	Surge	IEC/EN61000-4-5	line to line ±2KV (See EMC recommended circuit, ①)	perf. Criteria B
Immunity	CS	IEC/EN61000-4-6	10 Vr.m.s	perf. Criteria A
Immunity	Immunities of voltage dip, drop and short interruption	IEC/EN61000-4-29	0%-70%	perf. Criteria B

Product Selection Guide

Part Number	Input Voltage [VDC]		Output Voltage [VDC]	Output Current [mA, Max/Min]	Efficiency ^② (% , Min./Typ.) @ Full Load	Max. Capacitive load ^③ [μF]
	Nominal (Range)	Max ^①				
10DPWE4_2403S1.5	24 (9-36)	40	3.3	2400/0	84/86	1200
10DPWE4_2405S1.5	24 (9-36)	40	5	2000/0	85/87	1000
10DPWE4_2412S1.5	24 (9-36)	40	12	833/0	85/87	470
10DPWE4_2415S1.5	24 (9-36)	40	15	667/0	85/87	330
10DPWE4_2424S1.5	24 (9-36)	40	24	416/0	86/88	100
10DPWE4_4803S1.5	48 (18-75)	80	3.3	2400/0	83/85	1200
10DPWE4_4805S1.5	48 (18-75)	80	5	2000/0	84/86	1000
10DPWE4_4812S1.5	48 (18-75)	80	12	833/0	85/87	470
10DPWE4_4815S1.5	48 (18-75)	80	15	667/0	85/87	330
10DPWE4_4824S1.5	48 (18-75)	80	24	416/0	86/88	100

Part Number	Input Voltage [VDC]		Output Voltage [VDC]	Output Current [mA, Max/Min]	Efficiency ^② (% , Min./Typ.) @ Full Load	Max. Capacitive load ^③ [μF]
	Nominal (Range)	Max ^①				
10DPWE4_2405D1.5	24 (9-36)	40	±5	±1000/0	81/83	1000
10DPWE4_2412D1.5	24 (9-36)	40	±12	±416/0	85/87	470
10DPWE4_2415D1.5	24 (9-36)	40	±15	±333/0	85/87	330
10DPWE4_4805D1.5	48 (18-75)	80	±5	±1000/0	81/83	1000
10DPWE4_4812D1.5	48 (18-75)	80	±12	±416/0	85/87	470
10DPWE4_4815D1.5	48 (18-75)	80	±15	±333/0	85/87	330

①Exceeding the maximum input voltage may cause permanent damage;

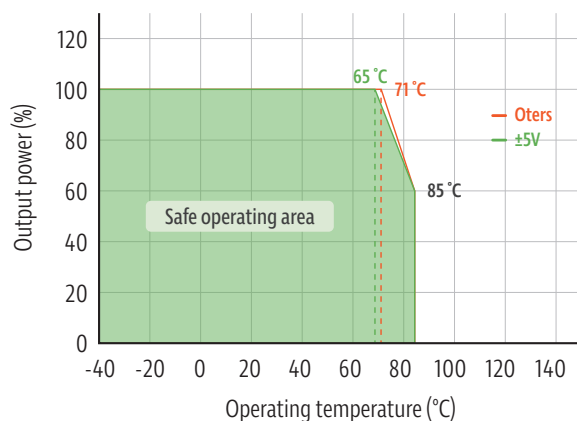
②Efficiency is measured at nominal input voltage and rated output load;

③The specified maximum capacitive load value for Vo1 and Vo2 output is identical;

④We suggest to connect an external electrolytic capacitor if there is a spike voltage at the input, details please refer to application circuit.

Typical characteristics

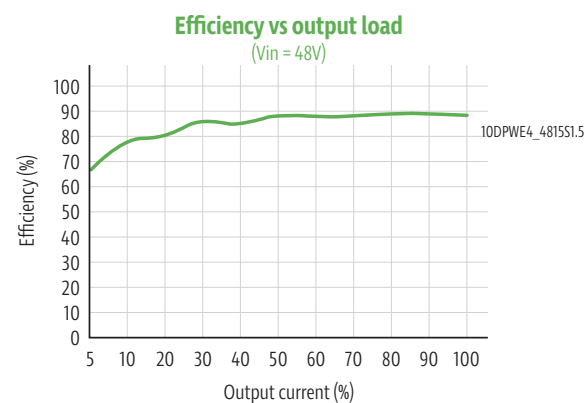
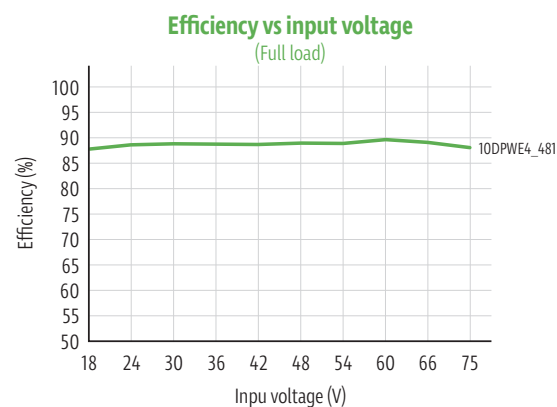
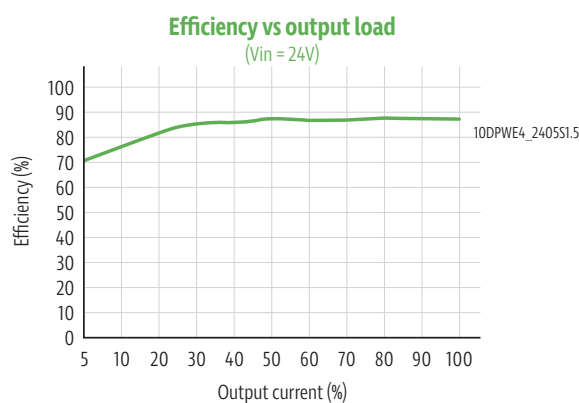
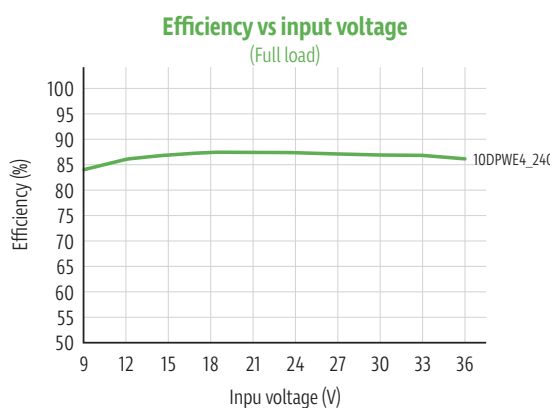
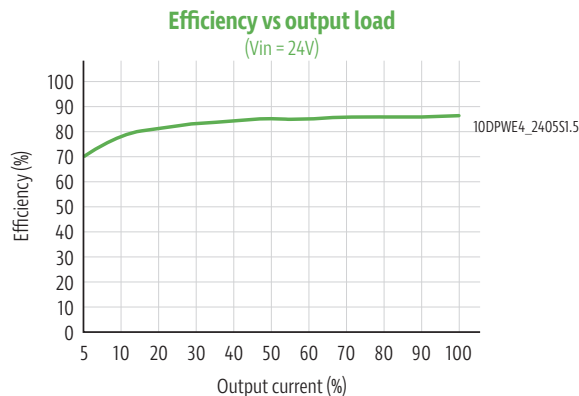
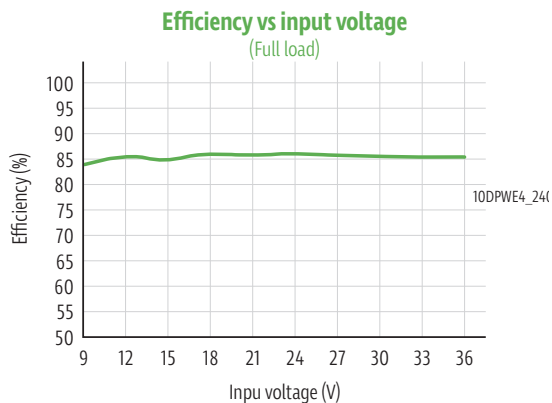
Temperature derating graph



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Recommended test circuit



Typical application

All 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.

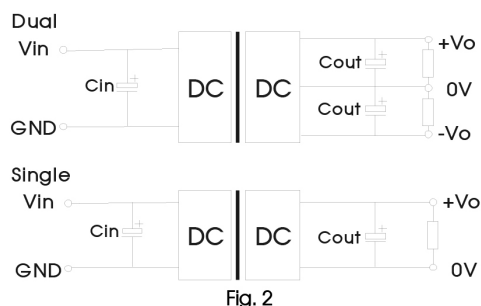


Fig. 2

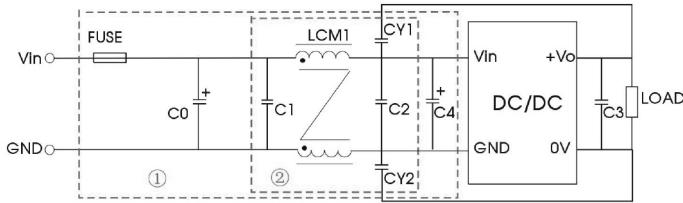
Vin (VDC)	C_{in}	C_{out}	C_{out}
24	3/5/±5	100µF/50V	10µF/16V
	12/15/±12/±15		10µF/25V
	24		10µF/50V
48	3/5/±5	10µF - 47µF/100V	10µF/16V
	12/15/±12/±15		10µF/25V
	24		10µF/50V

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EMC compliance circuit

3.3VDC/5VDC single output:



Parameter description:

Model	Vin: 24VDC	Vin: 48VDC
FUSE	Select FUSE value according to actual input current	
C0, C4	330µF/50V	330µF/100V
C1, C2	10µF/50V	10µF/100V
LDM1	10µH	
LCM1	1.4-1.7mH	
C3	Refer to the Cout in Fig.2	
CY1, CY2	1nF/2kV	

Others:

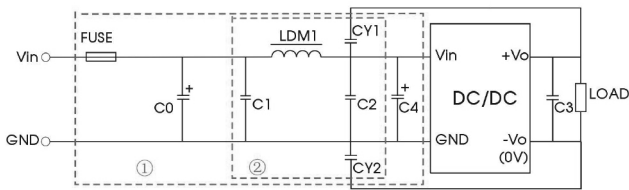
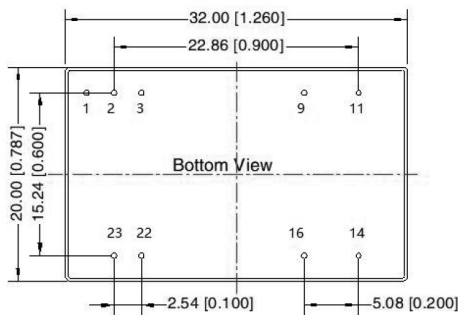
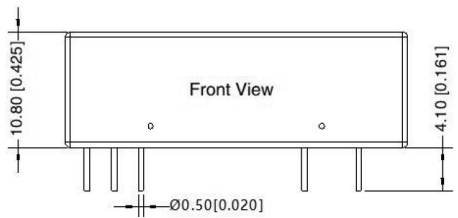


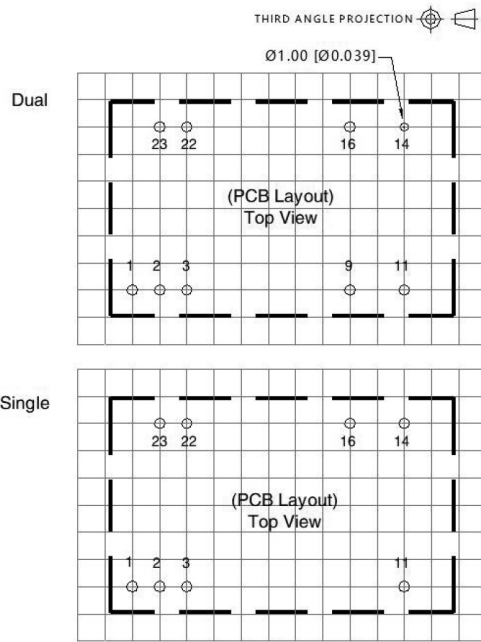
Fig. 3

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

Mechanical dimensions



Note:
Unit: mm[inch]
Pin diameter tolerances: ± 0.10 [± 0.004]
General tolerances: ± 0.50 [± 0.020]



Pin-Out		
Pin	Single	Dual
1	Ctrl	Ctrl
2,3	GND	GND
9	No Pin	0V
11	NC	-Vo
14	+Vo	+Vo
16	0V	0V
22,23	Vin	Vin

NC: Pin to be isolated from circuit

- Note:**
- The maximum capacitive load offered were tested at input voltage range and full load;
 - 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;
 - All index testing methods in this datasheet are based on Company's corporate standards;
 - We can provide product customization service, please contact our technicians directly for specific information;
 - Products are related to laws and regulations: see „Features“ and „EMC“;
 - Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.