Descriptions

20W isolated, DC-DC Converter



RoHS

CE Report EN62368-1

UKCA Report BS EN62368-1

Features

- Ultra-wide 4:1 input voltage range
- High efficiency up to 89%
- No-load power consumption as low as 0.12W
- Operating ambient temperature range: -40℃ to +85℃
- Reinforced insulation, I/O isolation test voltage 5k VAC, rated for 250VAC working voltage
- Transformer creepage 8mm, Transformer clearance 8mm
- Low leakage current < 5 μA
- Meets CISPR32/EN55032 CLASS A, without extra components
- Input under-voltage protection, output short-circuit, over-current, over-voltage protection
- Input reverse polarity protection available with rail mounting(D4S) version
- Industry standard pin-out

Applications

- Medical application
- High isolation required area

Selection Guide

Certification	Part No.①	Input Voltage (VDC)		Output		Full Load Efficiency④ (%) Min./Typ.	Capacitive Load (μF)Max.
		Nominal② (Range)	Max.③	Voltage (VDC)	Current (mA) Max./Min.		
EN/BS EN	DWLP20-H2403	24 (9-36)	40	3.3	5000/0	83/85	10000
	DWLP20-H2405			5	4000/0	83/85	10000
	DWLP20-H2412			12	1666/0	84/86	4700
	DWLP20-H2412*						
	DWLP20-H2415			15	1333/0	85/87	1600
EN/BS EN/TUV	DWLP20-H2424			24	833/0	87/89	470
EN/BS EN	DWLP20-H2424*						
--	DWLP20-H4803	48 (18-75)	80	3.3	5000/0	83/85	10000
	DWLP20-H4805			5	4000/0	85/87	10000
EN/BS EN	DWLP20-H4812			12	1666/0	84/86	4700
--	DWLP20-H4815			15	1333/0	84/86	1600

EN/BS EN	DWLP20-H4824			24	833/0	87/89	470

Note:
①The product model suffix plus "*" is the expansion of the rail package;
②The D4S (rail type) product model has the input anti-reverse polarity protection function, and the minimum input voltage range and starting voltage are 1VDC higher than those of the horizontal package model;
③The input voltage should not exceed this value, otherwise it may cause permanent irreparable damage;
④The above efficiency value is measured when the nominal voltage is input and the rated load is output; D4S (DIN rail type) product model has input reverse connection protection, and the minimum efficiency is greater than Min.-2 is qualified;
⑤Product images are for reference only; the actual product shall prevail.

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load/no-load)	24VDC input	3.3V, 5V output	--	969/40	992/50	mA
			Others	--	958/8	992/15	
		48VDC input	3.3V, 5V output	--	479/20	491/30	
			Others	--	473/5	491/10	
	Reflected Ripple Current	24VDC input		--	30	--	
		48VDC input		--	30	--	
	Surge Voltage (1sec. max.)	24VDC input		-0.7	--	50	VDC
		48VDC input		-0.7	--	100	
	Start-up Voltage	24VDC input		--	--	9	
		48VDC input		--	--	18	
	Input Under-voltage Protection	24VDC input		5.5	6.5	--	
		48VDC input		12	15.5	--	
	Input Filter			Pi filter			
	Hot Plug			Unavailable			
	Ctrl ①	Module on		Ctrl pin open or pulled high (3.5-12VDC)			
		Module off		Ctrl pin pulled low to GND (0-1.2VDC)			
		Input current when off		--	4	8	mA
Output Specifications	Voltage Accuracy	0%-100% load		--	±1	±2	%
	Linear Regulation	Input voltage variation from low to high at full load		--	±0.2	±0.5	
	Load Regulation②	5%-100% load		--	±0.5	±1	
	Transient Recovery Time	25% load step change, nominal input voltage		--	300	500	μs
	Transient Response Deviation		3.3V④, 5V output	--	±5	±8	%
			Others	--	±3	±5	
	Temperature Coefficient	Full load		--	--	±0.03	%/℃
	Ripple & Noise③	20MHz bandwidth	3.3V, 5V output	--	100	200	mVp-p
			DWLP20-H2415 DWLP20-H2424* DWLP20-H4824	--	80	150	
			DWLP20-H2412* DWLP20-H4812 DWLP20-H4815	--	50	100	
	Over-current Protection	Input voltage range		110	180	260	%Io

	Over-voltage Protection		110	--	160	%Vo
	Short-circuit Protection		Continuous, self-recovery			
	Trim		90	--	110	%Vo
General Specifications	Isolation	Input-output Electric Strength test for 1 minute with a leakage current of 1mA max.	5000	--	--	VAC
	Insulation Resistance	Input-output resistance at 500VDC	10000	--	--	MΩ
	Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	40	--	pF
	Patient Leakage Current	240VAC/60Hz	--	3.6	5	uA
	Reinforced Insulation	Transformer creepage	8.0	--	--	mm
		Transformer clearance	8.0	--	--	
	Operating Temperature	See Fig. 1	-40	--	85	℃
	Storage Humidity	Non-condensing	5	--	95	%RH
	Storage Temperature		-55	--	125	℃
	Pin Soldering Resistance Temperature⑤	Soldering spot is 1.5mm away from the case, 10 seconds max.	--	--	+300	
		Wave soldering, maximum 10 seconds	255	260	265	
	Vibration		10-150Hz, 5G, 0.75mm. along X, Y and Z			
	Switching Frequency⑥	PWM mode(nominal input voltage, full load)	--	280	--	kHz
	MTBF	MIL-HDBK-217F@25℃	1000	--	--	k hours
Mechanical Specifications	Case Material	Black plastic; flame-retardant and heat-resistant (UL94-V0)				
	Dimensions	Horizontal package	51.50 x 26.50 x 12.00 mm			
		D4S rail package	76.00 x 31.50 x 25.80 mm			
	Weight	Horizontal package/D4S rail package	27.0g/71g(Typ.)			
	Cooling Method	Free air convection				

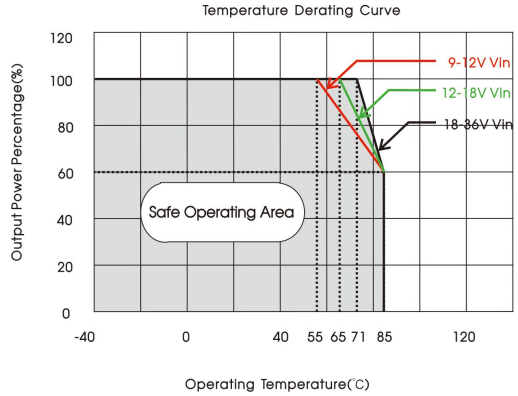
Note:
①The Ctrl pin voltage is referenced to input GND.
②Load regulation for 0%-100% load is ±5% max.;
③Ripple & Noise of 3.3VDC/5VDC output converter for 0%-5% load is ±10% max; Ripple & Noise of other output converter for 0%-5% load is 5%Vo max. The "parallel cable" method is used for Ripple and Noise test;
④It is required connecting an external 270uF electrolytic capacitor for 3.3V output voltage model;
⑤The pin soldering temperature tolerance is not the actual temperature set by the soldering iron but the temperature required for proper solder joints. The actual temperature set by the customer should be determined comprehensively based on factors such as PCB thickness, copper coverage, soldering iron power, and soldering iron tip selection;
⑥Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

Electromagnetic Compatibility (EMC)

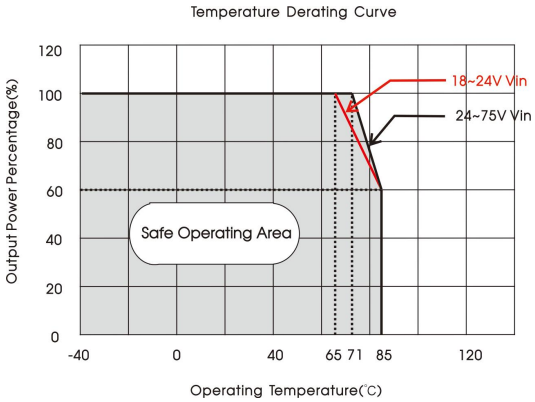
Emissions	CE	DWLP20-H2412*	CISPR32/EN55032	CLASS A (without extra components) CLASS B (see Fig.3 for recommended circuit)
		Others	CISPR32/EN55032	CLASS A (without extra components) CLASS B (see Fig.4-② for recommended circuit)
	RE	DWLP20-H2412*	CISPR32/EN55032	CLASS B (without extra components)
		Others	CISPR32/EN55032	CLASS A (without extra components) CLASS B (see Fig.4-② for recommended circuit)
Immunity	ESD	IEC/EN61000-4-2	air ±15kV, contact ±8kV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	100kHz ±2kV (see Fig.4-① for recommended circuit)	perf. Criteria B

	Surge	IEC/EN61000-4-5 line to line ±2kV (see Fig.4-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6 10 Vr.m.s	perf. Criteria A
	PFM	IEC/EN61000-4-8 30 A/m, continuous	perf. Criteria A

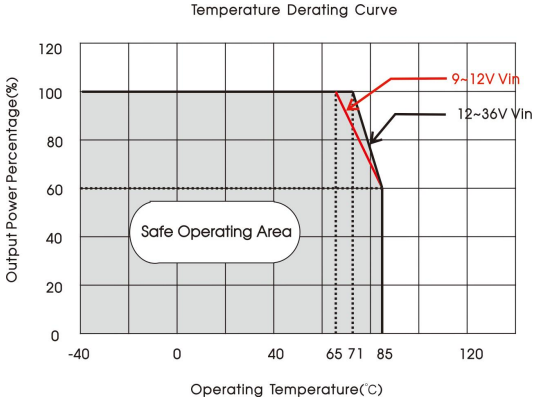
Characteristic Curve



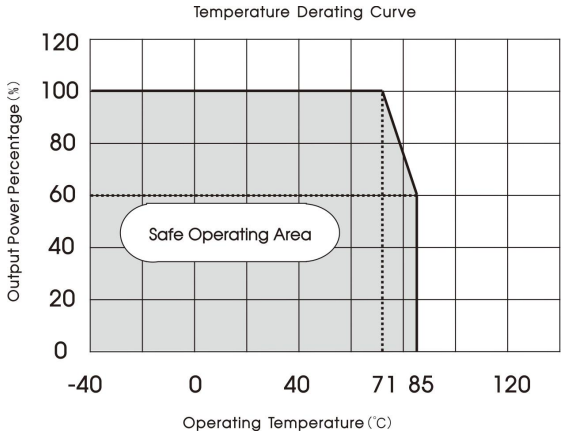
DWLP20-H2403, DWLP20-H2405 Temperature Derating Curve



DWLP20-H4803, DWLP20-H4805 Temperature Derating Curve

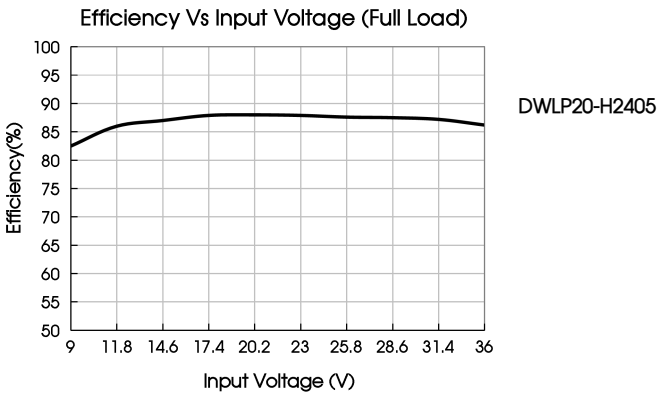


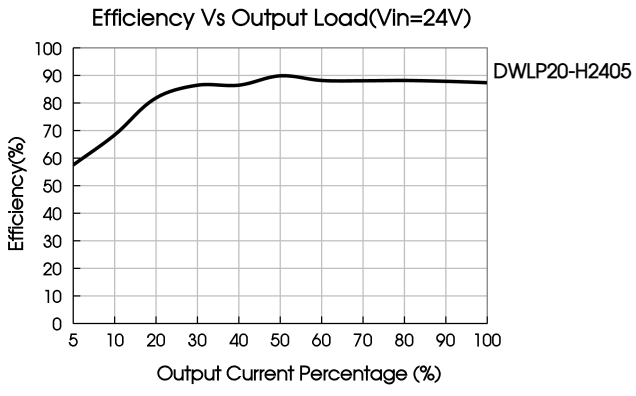
DWLP20-H2412*, DWLP20-H2415 Temperature Derating Curve

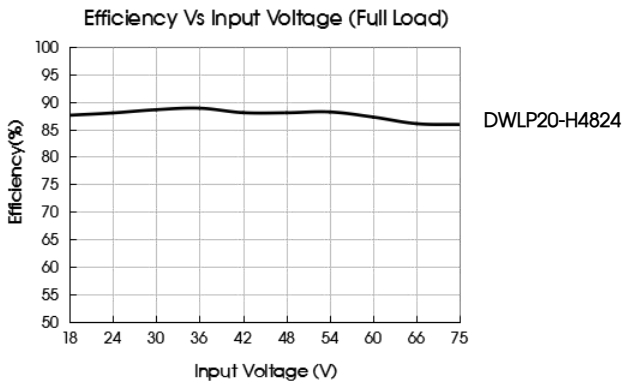


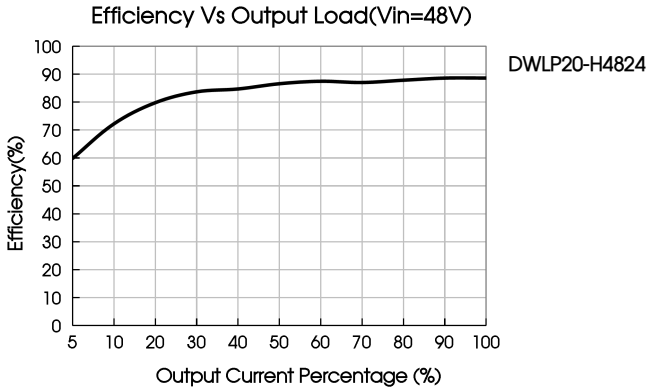
DWLP20-H2424*, DWLP20-H4812
DWLP20-H4815, DWLP20-H4824 Temperature Derating Curve

Fig. 1









Design Reference

1. Typical application

①All the DC/DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2.

②Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values Cin and Cout 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.

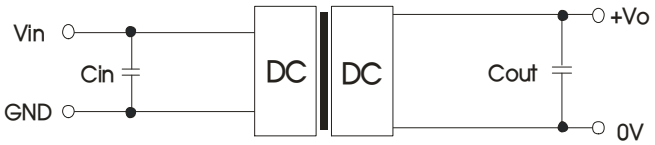


Fig. 2

Vin (VDC)	Vout (VDC)	Cin	Cout
24	3.3	100μF/50VDC	270μF/16VDC
	5		10μF/16VDC
	12/15		10μF/25VDC
	24		10μF/50VDC
48	3.3	10~47μF/100VDC	270μF/16VDC
	5		10μF/16VDC
	12/15		10μF/25VDC
	24		10μF/50VDC

2. EMC compliance circuit

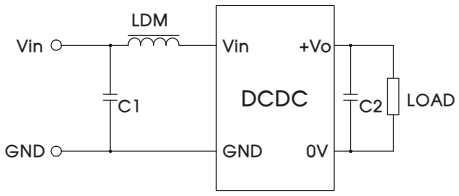


Fig. 3

Parameter description

Model	DWLP20-H2412*
C1	10μF/50V
C2	Refer to the Cout in Fig.2
LDM	4.7μH

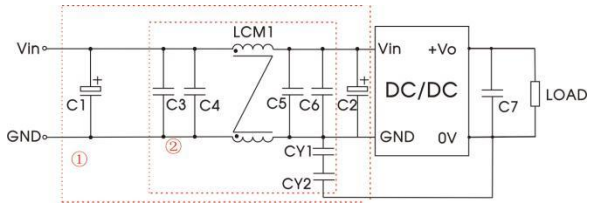


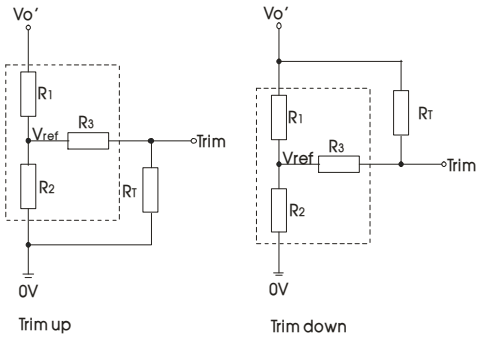
Fig. 4

Notes: For EMC tests we use Part ① in Fig. 4 for immunity and part ② for emissions test. Selecting based on needs.

Parameter description

Model	Vin: 24VDC	Vin: 48VDC
C1/C2	680μF/50V	330μF/100V
C3/C4 C5/C6	10uF/50V	10uF/100V
C7	Refer to the Cout in Fig.2	
LCM1	2.2mH	
CY1/ CY2	Y1：47pF/400VAC (12V/15V/24V output no need)	

3. Trim Function for Output Voltage Adjustment (open if unused)



TRIM resistor connection (dashed line shows internal resistor network)

Calculating Trim resistor values:

$$\text{up: } R_T = \frac{aR_2}{R_2-a} - R_3 \qquad a = \frac{V_{ref}}{V_o'-V_{ref}} \cdot R_1$$

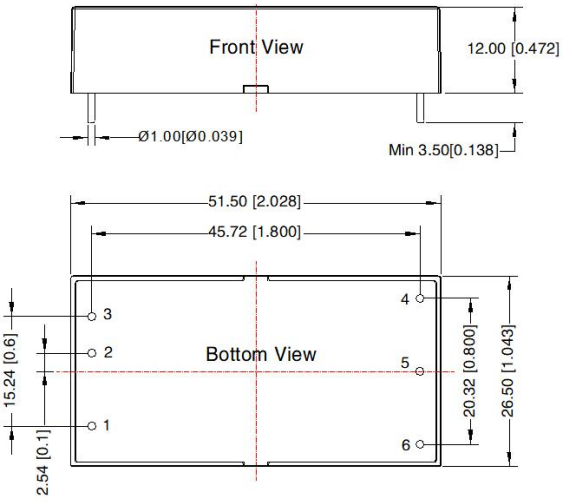
$$\text{down: } R_T = \frac{aR_1}{R_1-a} - R_3 \qquad a = \frac{V_o'-V_{ref}}{V_{ref}} \cdot R_2$$

R_T= Trim Resistor value;
a= self-defined parameter;
Vo'= desired output voltage.

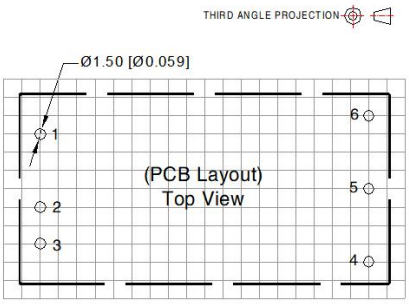
Vout(V)	R1(kΩ)	R2(kΩ)	R3(kΩ)	Vref(V)
3.3	4.801	2.87	10	1.24
5	2.883	2.87	8.2	2.5
12	10.909	2.87	15	2.5
15	14.354	2.87	15	2.5
24	24.771	2.87	17.4	2.5

4. The products do not support parallel connection of their output

DWLP20-Hxxxx Dimensions and Recommended Layout



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

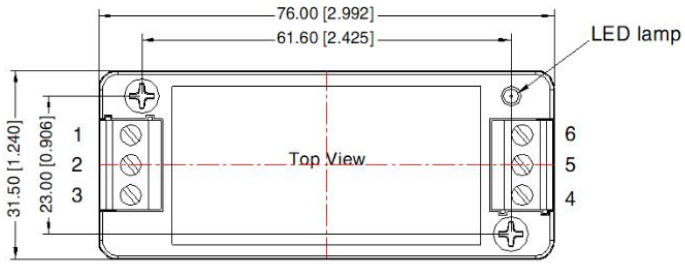


Note: Grid 2.54*2.54mm

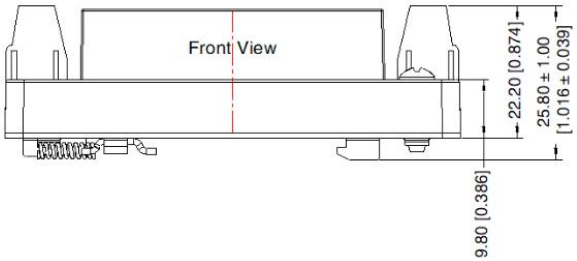
Pin–Out	
Pin	Mark
1	Ctrl
2	GND
3	Vin
4	+Vo
5	0V
6	Trim

DWLP20-HxxxxD4S Dimension





Pin–Out						
Pin	1	2	3	4	5	6
Mark	Ctrl	GND	Vin	+Vo	0V	Trim



Note:
Unit: mm[inch]
Mounting rail: TS35
Wire range: 24–12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ± 0.50[± 0.020]

Note:

1. The maximum capacitive load offered were tested at input voltage range and full load;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
3. All index testing methods in this datasheet are based on company corporate standards;
4. Products are related to laws and regulations: see "Features" and "EMC";
5. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
6. The image certification marks are for reference only; please refer to the selection table for actual specifications. Certification is based on the physical mark or packaging label.