Descriptions

20W isolated DC-DC converter



RoHS

UL62368-1 EN62368-1 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
- I/O isolation test voltage 3k VDC
- Operating ambient temperature range: -40℃ to +85℃
- Input under-voltage protection, output short-circuit, over-voltage, over-current protection
- CISPR32/EN55032 CLASS A EMI compliant without external components
- Industry standard pin-out
- Input reverse polarity protection available with chassis (E2S) or 35mm DIN-Rail mounting (D4S) version

Applications

- Electrical power industry
- Data transmission
- Battery powered devices
- Telecommunication
- Distributed power systems
- Hybrid module system
- Remote control systems
- Industrial robotic

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Full Load Efficiency③(%) Min./Typ.	Capacitive Load (μF)Max.
		Nominal (Range)	Max.②	Voltage (VDC)	Current (mA) Max./Min.		
EN/BS EN	DWLP20-F2403	24 (9-36)	40	3.3	5000/0	84/86	10000
UL/EN/BS EN	DWLP20-F2405			5	4000/0	87/89	10000
EN/BS EN	DWLP20-F2409			9	2222/0	86/88	4700
UL/EN/BS EN	DWLP20-F2412			12	1667/0	86/88	1600
EN/BS EN	DWLP20-F2415			15	1334/0	87/89	1000
	DWLP20-F2418			18	1111/0	87/89	680
UL/EN/BS EN	DWLP20-F2424			24	833/0	87/89	500
EN/BS EN	DWLP20-F4803	48 (18-75)	80	3.3	5000/0	83/85	10000
	DWLP20-F4805			5	4000/0	86/88	10000
	DWLP20-F4812			12	1667/0	86/88	1600
	DWLP20-F4815			15	1334/0	87/89	1000
	DWLP20-F4824			24	833/0	87/89	500

Notes:
①Use "E2S" suffix for chassis mounting and "D4S" suffix for DIN-Rail mounting;
②Exceeding the maximum input voltage may cause permanent damage;
③Efficiency is measured at nominal input voltage and rated output load; efficiencies for E2S and D4S Model's is decreased by 2% due to the input reverse polarity protection circuit;
④Product 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 output	--	799/40	819/45	mA
			5V output	--	936/40	958/45	
			Other output	--	947/10	969/20	
	Input Current (full load/no-load)	48VDC input	3.3V output	--	400/20	410/25	
			5V output	--	473/20	485/25	
			Other output	--	473/5	485/8	
	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		12.0	15.5	--	
	Start-up Time	Nominal input& constant resistance load		--	10	--	ms
	Input Filter			Pi filter			
	Hot Plug			Unavailable			
	Ctrl①	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	7	mA
Output Specifications	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	--	±5	±8	%
			Others	--	±3	±5	
	Temperature Coefficient	Full load		--	--	±0.03	%/℃
	Ripple & Noise②	20MHz bandwidth, 5%-100% load		--	50	100	mV p-p
	Over-voltage Protection	Input voltage range		110	--	160	%Vo
	Trim			90	--	110	
	Over-current Protection			110	--	190	%Io
	Short-circuit Protection			Hiccup, continuous, self-recovery			

General Specifications	Isolation	Input-output Electric Strength test for 1 minute with a leakage current of 1mA max.	3000	--	--	VDC
	Insulation Resistance	Input-output insulation at 500VDC	1000	--	--	MΩ
	Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	500	--	pF
	Operating Temperature	See Fig. 1	-40	--	+85	℃
	Storage Temperature		-55	--	+125	
	Storage Humidity	Non-condensing	5	--	95	%RH
	Pin Soldering Resistance Temperature③	Soldering spot is 1.5mm away from the case, 10 seconds max.	--	--	+300	℃
		Wave soldering, maximum 10 seconds	255	260	265	
	Vibration		10-55Hz, 2G, 30 Min. along X, Y and Z			
	Switching Frequency④	PWM mode	--	270	--	kHz
	MTBF	MIL-HDBK-217F@25℃	1000	--	--	k hours
Mechanical Specifications	Case Material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)				
	Dimensions	Horizontal package	51.50 × 26.50 × 12.00 mm			
		E2S chassis package	76.00 × 31.50 × 21.20 mm			
		D4S Din-raill package	76.00 × 31.50 × 25.80 mm			
	Weight	Horizontal package/E2S chassis package/D4S Din-rail package	23.7g/46.0g/66.0g (Typ.)			
	Cooling Method	Free air convection				

Note:
①The Ctrl pin voltage is referenced to input GND;
②Under 0% -5% load conditions, ripple & noise does not exceed 5%Vo. The "parallel cable" method is used for ripple and noise tes;
③The 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;
④Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

Electromagnetic Compatibility (EMC)

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

Characteristic Curve

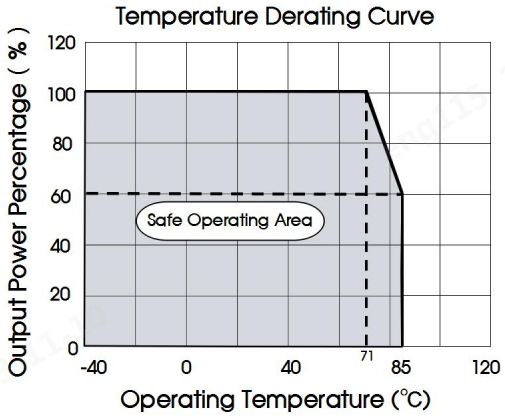
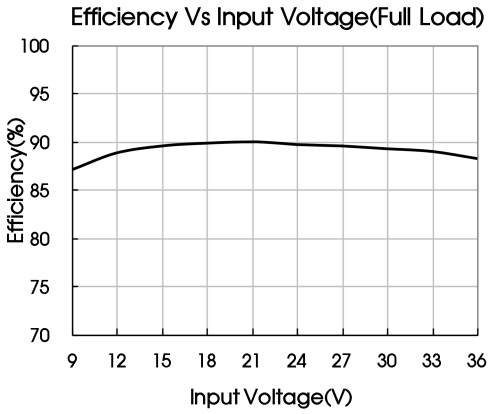
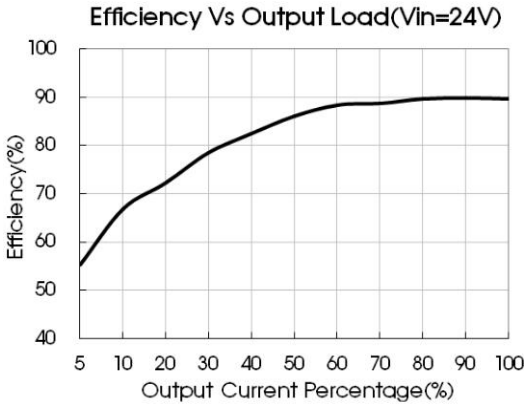


Fig. 1

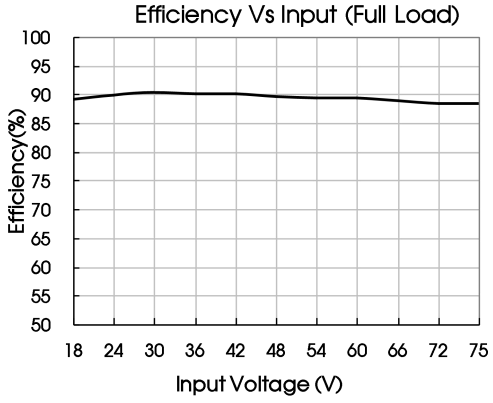
DWLP20-F2405



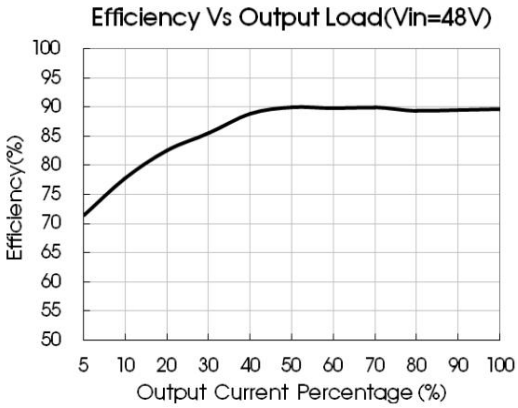
DWLP20-F2405



DWLP20-F4815



DWLP20-F4815



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.

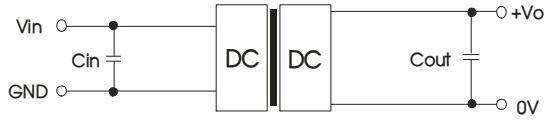


Fig. 2

Vout(VDC)	Cin	Cout
3.3/5	100μF/100V	470μF/15V
9/12/15		220μF/25V
18/24		100μF/50V

2.EMC compliance circuit

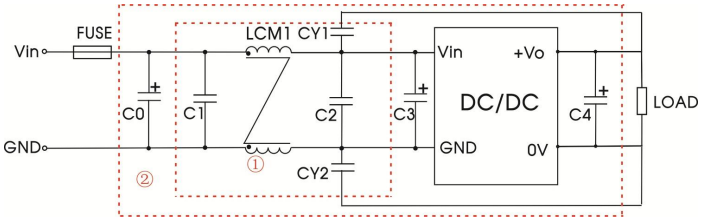


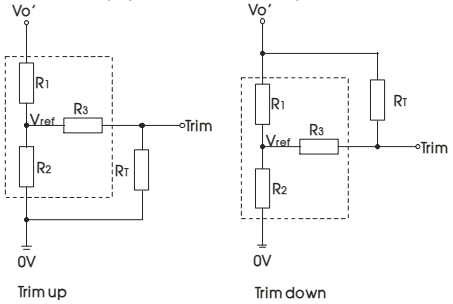
Fig. 3

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

Parameter description:

Model	Vin: 24VDC	Vin: 48VDC
FUSE	Choose according to actual input current	
C0	1000μF/50V	680μF/100V
C1/C2	1μF/50V	1μF/100V
C3	330μF/50V	330μF/100V
C4	Refer to the Cout in Fig.2	
LCM1	6.8mH	
CY1, CY2	1nF/3kV	

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



TRIM resistor connection (dashed line shows internal resistor network)

Trim resistor calculation

$$\text{up: } R_T = \frac{aR_2}{R_2-a} - R_3 \qquad a = \frac{Vref}{Vo'-Vref} \cdot R_1$$

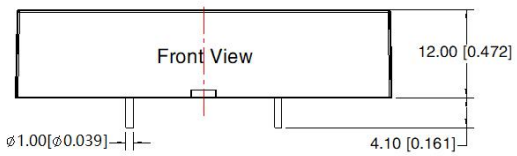
$$\text{down: } R_T = \frac{aR_1}{R_1-a} - R_3 \qquad a = \frac{Vo'-Vref}{Vref} \cdot R_2$$

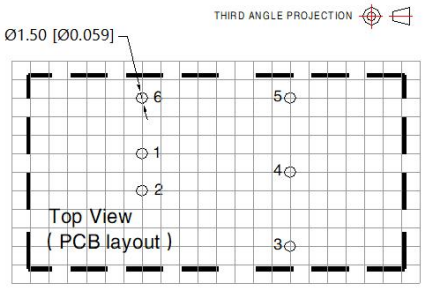
RT = Trim Resistor value;
a = self-defined parameter;
Vo' = desired output voltage.

Vout(V)	R1(kΩ)	R2(kΩ)	R3(kΩ)	Vref(V)
3.3	4.775	2.87	12.4	1.25
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
18	17.953	2.87	17.4	2.5
24	24.872	2.87	17.8	2.5

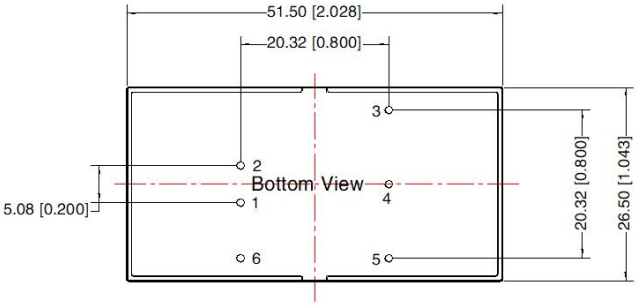
4.The products do not support parallel connection of their output

DWLP20-Fxxxx Dimensions and Recommended





Note: Grid 2.54*2.54mm

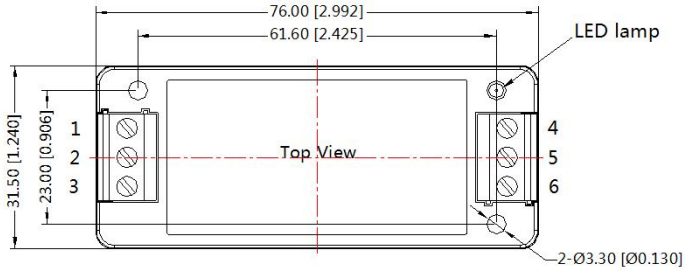


Note:
Unit: mm[inch]
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]

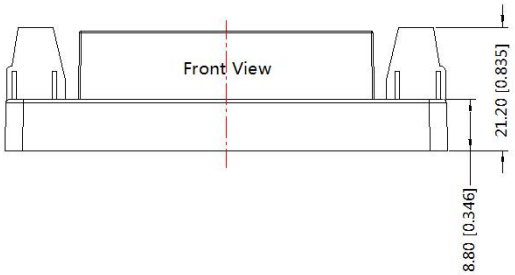
Pin–Out	
Pin	Mark
1	GND
2	Vin
3	+Vo
4	Trim
5	0V
6	Ctrl

DWLP20-FxxxxE2S Dimension





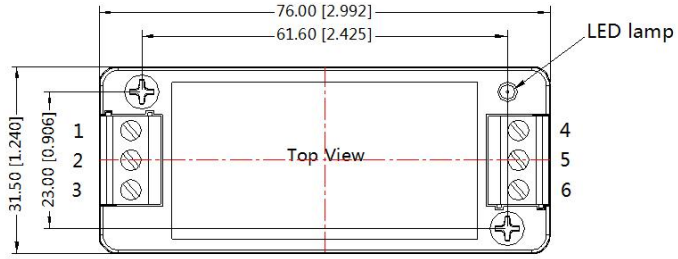
Pin-Out						
Pin	1	2	3	4	5	6
Function	Ctrl	GND	Vin	0V	Trim	+Vo



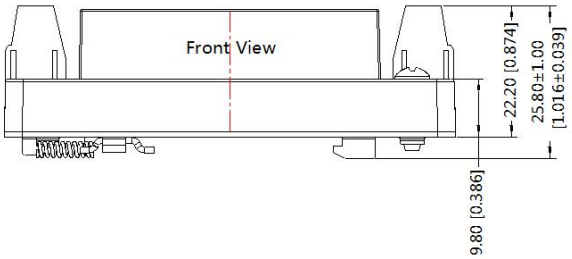
Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ±1.00[±0.039]

DWLP20-FxxxxD4S Dimension

THIRD ANGLE PROJECTION



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



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

Notes:

1. The maximum capacitive load offered were tested at input voltage range and full load;
2. Unless otherwise specified, data in this datasheet should be tested under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated 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.