

Descriptions

6W isolated, DC/DC Converter



CE Report
EN 62368-1

UKCA Report
BS EN 62368-1



Features

- Wide 4:1 input voltage range
- High efficiency up to 87%
- No-load power consumption bottom 0.12W
- I/O isolation test voltage 1.6k VDC
- Input under-voltage protection, output short-circuit, over-current protection
- Operating ambient temperature range: -40°C to +105°C
- Small SIP packaging
- International Standard Pin out

Applications

- Industrial control
- Electric Power
- Medical
- Instrumentation
- Communication

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency ^② (%) Min./Typ.	Capacitive Load (μF)Max.
		Nominal (Range)	Max. ^①	Voltage (VDC)	Current(mA) Max./Min.		
EN/BS EN	DWS6-B2403	24 (9-36)	40	3.3	1350/0	76/78	1800
EN/BS EN	DWS6-B2405			5	1200/0	80/82	1000
EN/BS EN	DWS6-B2409			9	667/0	82/84	470
EN/BS EN	DWS6-B2412			12	500/0	83/85	470
EN/BS EN	DWS6-B2415			15	400/0	83/85	220
EN/BS EN	DWS6-B2424			24	250/0	83/85	100
EN/BS EN	DWS6-B4803	48 (18-75)	80	3.3	1600/0	76/79	1200
EN/BS EN	DWS6-B4805			5	1200/0	80/83	680
EN/BS EN	DWS6-B4809			9	667/0	82/84	330
EN/BS EN	DWS6-B4812			12	500/0	84/86	330
EN/BS EN	DWS6-B4815			15	400/0	85/87	150
EN/BS EN	DWS6-B4824			24	250/0	85/87	68

Note:

①Exceeding the maximum input voltage may cause permanent damage;

②The above efficiency values are measured within 10 seconds of starting the product under the nominal input voltage and output rated load.

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit	
Input Specifications	Input Current (full load /no load)	24VCD nominal input series nominal input voltage	3.3V Ouput	--	238/5	245/12	mA	
			5V Ouput	--	305/5	313/12		
			Others	--	298/10	305/16		
		48VCD nominal input series nominal input voltage	3.3V, 5V Ouput	--	158/5	165/12		
			Others	--	143/10	156/16		
	Reflected Ripple Current			--	50	--		
	Surge Voltage (1sec. max.)	24VCD nominal input series		-0.7	--	50	VDC	
		48VCD nominal input series		-0.7	--	100		
	Start-up Voltage	24VCD nominal input series		--	--	9		
		48VCD nominal input series		--	--	18		
	Input Under-voltage Protection	24VCD nominal input series		5.5	6.5	--		
		48VCD nominal input series		13	14.5	--		
	Input Filter				Capacitive filter			
	Hot Plug				Unavailable			
Ctrl ①	Module on			Ctrl pin open or pulled high (TTL 3.5-12VDC)				
	Module off			Ctrl pin pulled low to GND (0-1.2VDC)				
	Input current when off			--	6	10	mA	
Output Specifications	Output Voltage Accuracy ^②	24VCD nominal input series	5%-100% load	--	±1	±2	%	
		48VCD nominal input series		--	--	±3		
	Linear Regulation	Input voltage variation from low to high at full load		--	±0.5	±1		
	Load Regulation ^③	5%-100% load		--	±0.5	±1.5		
	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	%/°C	
	Ripple & Noise ^④	20MHz bandwidth, 5%-100% load		--	50	100	mV p-p	
	Over-current Protection	Input voltage range		110	160	230	%Io	
	Short-circuit Protection			Continuous, self-recovery				
General Specifications	Isolation voltage	Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max.		1600	--	--	VDC	
	Insulation Resistance	Input-output resistance at 500VDC		1000	--	--	MΩ	
	Isolation Capacitance	Input-output capacitance at 100kHz/0.1V		--	1000	--	pF	
	Operating Temperature	See Fig. 1		-40	--	+105	°C	
	Storage Humidity	Non-condensing		5	--	95	%RH	
	Storage Temperature			-55	--	+125	°C	

	Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	+300	
	Vibration		10-150Hz, 5G, 0.75mm. along X, Y and Z			
	Switching Frequency ^⑤	PWM mode	--	500	--	kHz
	MTBF	MIL-HDBK-217F@25°C	1000	--	--	K hours
Mechanical Specifications	Case Material	Black flame-retardant and heat-resistant plastic branch (UL94 V-0)				
	Dimensions	22 × 9.50 × 12.00 mm				
	Weight	4.7g (Typ.)				
	Cooling Method	Free air convection				

Note:

①The Ctrl pin voltage is referenced to input GND.

②Under 0%-5% load, the maximum output voltage accuracy is ±3%;

③Load regulation for 0%-100% load is ±3%;

④Under 0%-5% load conditions, ripple & noise does not exceed 150mV. The "parallel cable" method is used for Ripple and Noise test.

⑤Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B (24VDC nominal input series: See Figure 4-② for the recommended circuit; 48VDC nominal input series: See Figure 5-① for the recommended circuit;)				
	RE	CISPR32/EN55032 CLASS B (24VDC nominal input series: See Figure 4-② for the recommended circuit; 48VDC nominal input series: See Figure 5-① for the recommended circuit;)				
Immunity	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	(24VDC nominal input series: See Figure 4-① for the recommended circuit; 48VDC nominal input series: See Figure 5-① for the recommended circuit;)		perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2kV	(24VDC nominal input series: See Figure 4-① for the recommended circuit; 48VDC nominal input series: See Figure 5-① for the recommended circuit;)		perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s			perf. Criteria A

Characteristic Curve

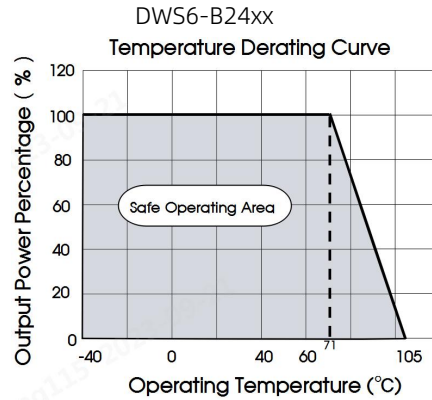


Fig. 1

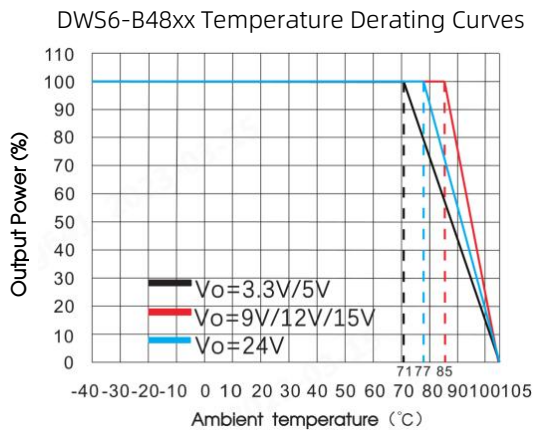


Fig. 1-①

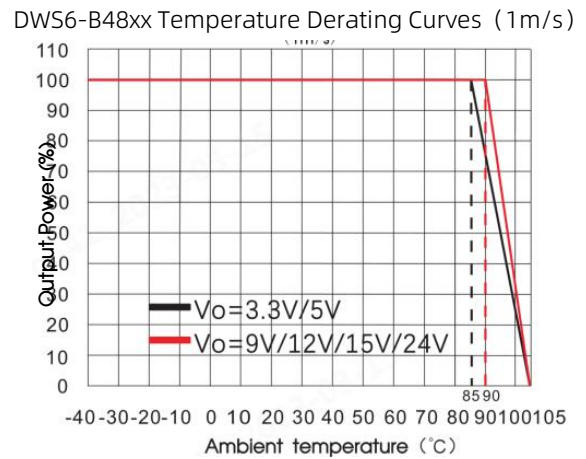


Fig. 1-②

Design Reference

1. Ripple & noise

The general performance of all DC/DC converters of this series is tested in accordance with the test circuit recommended in Figure 2 before leaving the factory. Figure 3 is used for ripple noise test.



Fig. 2

Cin		Vo(VDC)	Cout	Cout0	Cout1
Vin:24VDC	100μF/100V	3.3/5/9	22μF/16V	1μF/50V	10μF/50V Tantalum Capacitors
		12/15	22μF/25V	1μF/50V	10μF/50V Tantalum Capacitors
		24	22μF/50V	1μF/50V	10μF/50V Tantalum Capacitors
Vin:48VDC	100μF/100V	3.3/5	22μF/16V	1μF/50V	10μF/50V Tantalum Capacitors
		9/12/15/24	10μF/50V	1μF/50V	10μF/50V Tantalum Capacitors

2. Typical application

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. 3

C_{in}		$V_o(VDC)$	C_{out}
$V_{in}: 24VDC$	$100\mu F/100V$	3.3/5/9	$22\mu F/16V$
		12/15	$22\mu F/25V$
		24	$22\mu F/50V$
$V_{in}: 48VDC$	$100\mu F/100V$	3.3/5	$22\mu F/16V$
		9/12/15/24	$10\mu F/50V$

3. EMC compliance circuit

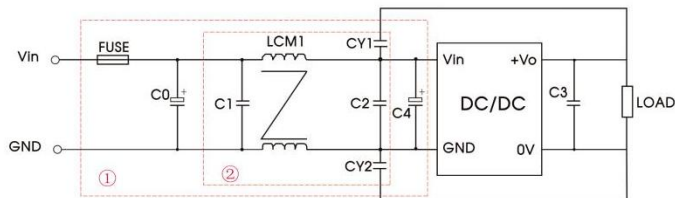


Fig. 4

Notes: We use Part ① in Fig. 4 for Immunity test and part ② for Emissions test. Selecting based on needs.

Parameter description:

Model	$V_{in}: 24VDC$
FUSE	Choose according to actual input current
C_0/C_4	$330\mu F/50V$
C_1/C_2	$10\mu F/50V$
C_3	$22\mu F/50V$
LCM1	$470\mu H$
CY_1/CY_2	$1nF/400VAC$

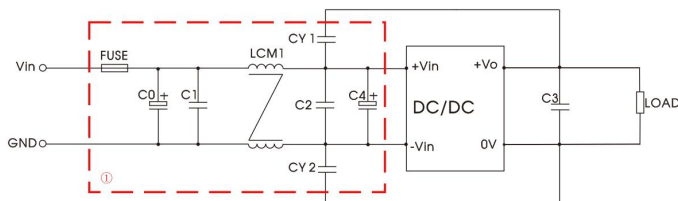


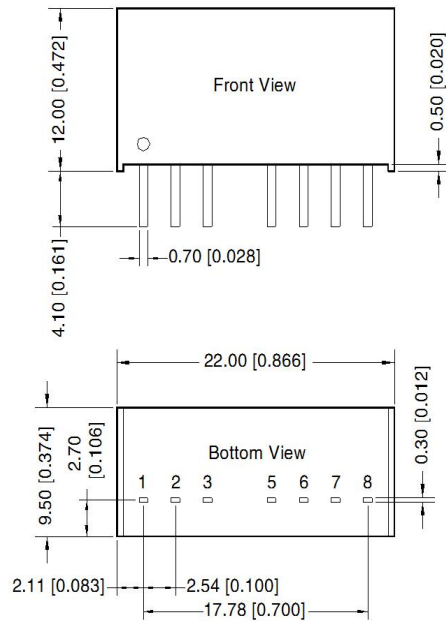
Fig. 5

Notes: For EMC and EMI tests we use Part ① in Fig. 5.

Parameter description:

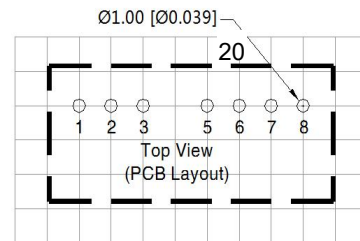
Model	$V_{in}: 48VDC$
FUSE	Choose according to actual input current
C_0	$200\mu F/100V$
C_1/C_2	$10\mu F/100V$
C_3	$22\mu F/100V$
LCM1	$470\mu H$
C_4	$330\mu F/100V$
CY_1/CY_2	$1nF/400VAC$

Dimensions and Recommended Layout



Note:
Unit: mm[inch]
Pin section tolerances: $\pm 0.10 [\pm 0.004]$
General tolerances: $\pm 0.50 [\pm 0.020]$

THIRD ANGLE PROJECTION



Note: Grid 2.54*2.54mm

Pin-Out	
Pin	Mark
1	GND
2	Vin
3	Ctrl
5	NC
6	+Vo
7	0V
8	NC

NC: Pin to be isolated from circuitry

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 $T_a=25^{\circ}\text{C}$, 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. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. The products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified companies.