Descriptions

6W 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 85%
- No-load power consumption as low as 0.24W
- I/O isolation test voltage 1.5k VDC
- Input under-voltage protection, output short-circuit, over-current protection
- Operating ambient temperature range: -40℃ to +85℃
- Industry standard pin-out

Applications

- Medical care
- Industrial control
- Electric power
- Instruments
- Communication fields

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency ② (%) Min./Typ.	Capacitive Load③ (μF)Max.
		Nominal (Range)	Max. ①	Voltage(VDC)	Current (mA) Max./Min.		
EN/BS EN	DWS6-A2405	24 (9-36)	40	±5	±600/0	78/80	470
	DWS6-A2409			±9	±333/0	81/83	220
	DWS6-A2412			±12	±250/0	81/83	120
	DWS6-A2415			±15	±200/0	81/83	100
	DWS6-A2424			±24	±125/0	80/82	68
--	DWS6-A4815	48 (18-75)	80	±15	±200/0	83/85	68

Notes:
① Exceeding the maximum input voltage may cause permanent damage;
② Efficiency is measured at nominal input voltage and rated output load;
③ The specified maximum capacitive load for positive and negative output is identical.

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load / no-load)	24VDC nominal input series,nominal input voltage	±5V output	--	313/12	320/16	mA
			±9V/±12V/±15V output	--	301/12	309/16	
			±24V output	--	305/12	313/16	
		48VDC nominal input series,nominal input voltage	±15V output	--	147/5	151/16	
	Reflected Ripple Current			--	50	--	
	Surge Voltage (1sec. max.)	24VDC nominal input series		-0.7	--	50	VDC
		48VDC nominal input series		-0.7	--	100	
	Start-up Voltage	24VDC nominal input series		--	--	9	
		48VDC nominal input series		--	--	18	
	Input Under-voltage Protection	24VDC nominal input series		5.5	6.5	--	
		48VDC nominal input series		13	14.5	--	
	Input Filter			Capacitance 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		--	6	10	mA
Output Specifications	Voltage Accuracy②	5%-100% load	Vo1	--	±1.5	±2	%
			Vo2		±2	±3	
	Linear Regulation	Input voltage variation from low to high at full load	Vo1	--	±0.5	±1	
			Vo2	--	±1.0	±1.5	
	Load Regulation③	5%-100% load	Vo1	--	±0.8	±1.5	
			Vo2	--	±1.2	±2	
	Cross Regulation	Dual output, Vo1 load at 50%, Vo2 load at range of 25%-100%		--	--	±5	
	Transient Recovery Time	25% load step change, nominal input voltage		--	450	500	μs
	Transient Response Deviation	25% load step change, nominal input voltage	±5V output	--	±5	±8	%
			Others	--	±3	±5	
	Temperature Coefficient	Full load		--	--	±0.03	%/℃
	Ripple & Noise④	20MHz bandwidth, 5%-100% load		--	120	150	mV p-p
	Over-current Protection	Input voltage range		110	160	230	%Io
	Short-circuit Protection	Input voltage range		Continuous, self-recovery			
General Specifications	Isolation	Input-output Electric Strength test for 1 minute with a leakage current of 1mA max.		1500	--	--	VDC
	Insulation Resistance	Input-output insulation at 500VDC		1000	--	--	MΩ
	Isolation Capacitance	Input-output capacitance at 100kHz/0.1V		--	1000	--	pF

	Operating Temperature	See Fig. 1	-40	--	+85	℃
	Storage Humidity	Without condensation	5	--	95	%RH
	Storage Temperature		-55	--	+125	℃
	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 Frequency⑤	PWM mode	--	500	--	kHz
	MTBF	MIL-HDBK-217F@25℃	1000	--	--	k hours
Mechanical Specifications	Case Material	Black plastic; flame-retardant and heat-resistant (UL94-V0)				
	Dimensions	22.00 × 9.50 × 12.00 mm				
	Weight	4.6g (Typ.)				
	Cooling method	Free air convection				

Note:

①The Ctrl pin voltage is referenced to input GND;

②At 0%~5% load, the Vo1 Max. output voltage accuracy is ±3%, the Vo2 Max. output voltage accuracy is ±5%;

③At 0%~100% load, the Vo1 regulation for 0%-100% load is ±4%, the Vo2 regulation for 0%-100% load is ±4.5%;

④Under 0% -5% load conditions, ripple & noise does not exceed 180mV. 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.

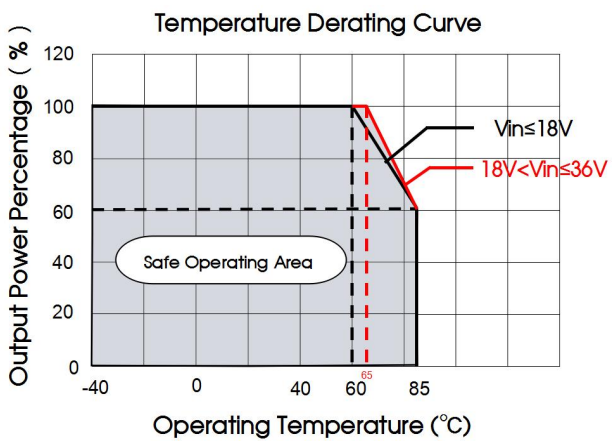
Electromagnetic Compatibility (EMC)

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

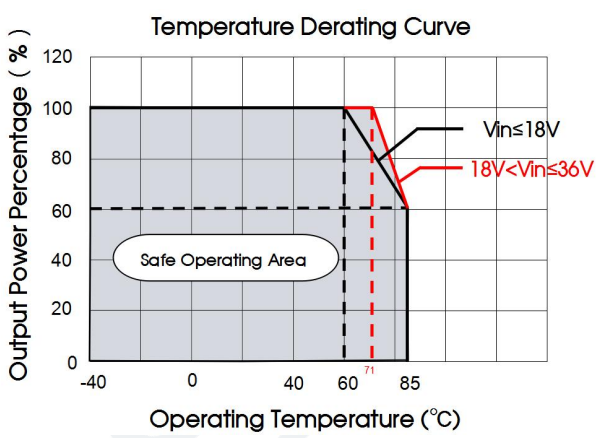
Characteristic Curve

DWS6-A24xx Series

±5V output



Others output



DWS6-A48xx Series

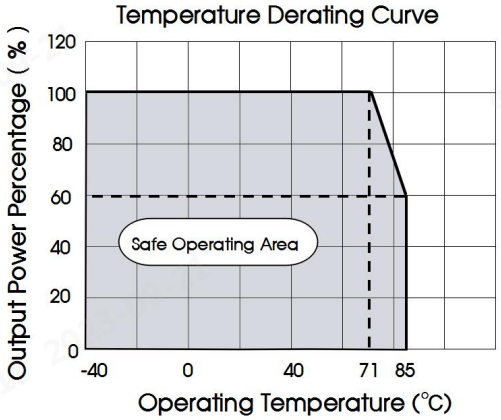
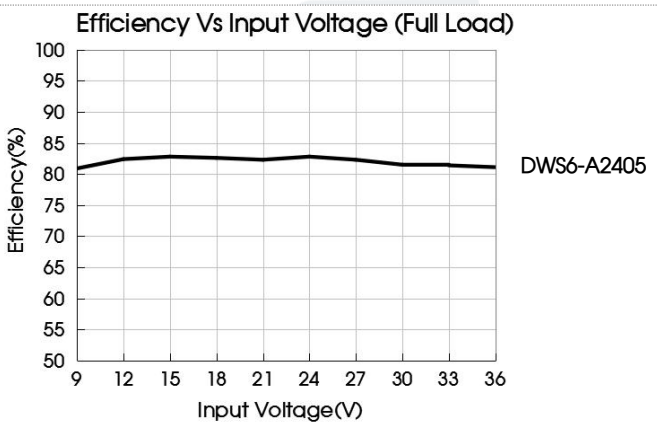
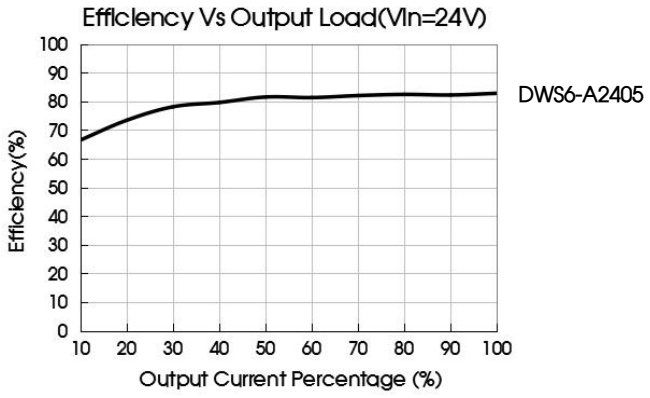
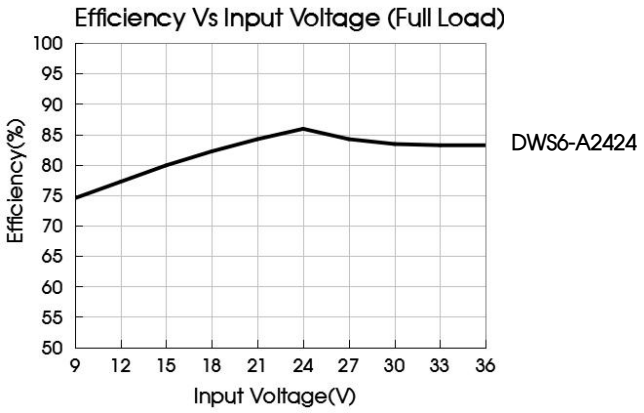
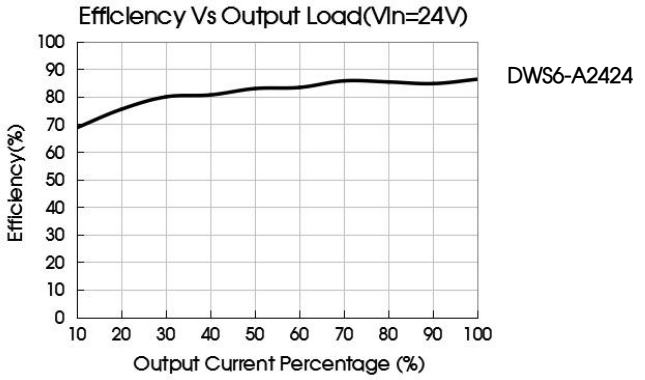


Fig. 1









Design Reference

1. Typical application

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 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

Parameter description:

Vin	Cin	Cout
24VDC	100μF/100V	22μF/50V
48VDC	100μF/100V	22μF/50V

2. EMC compliance circuit

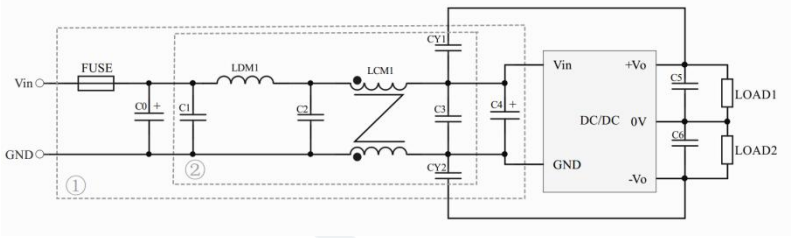


Fig. 3

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

Parameter description:

Components	Vin: 24VDC
FUSE	Choose according to actual
C0/C4	330μF/100V
C1/C2/C3	10μF/50V
LDM1	10uH
LCM1	1.4-1.7mH
CY1/CY2	1nF/2kV

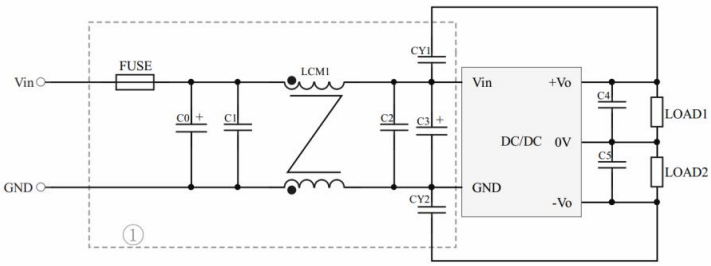


Fig. 4

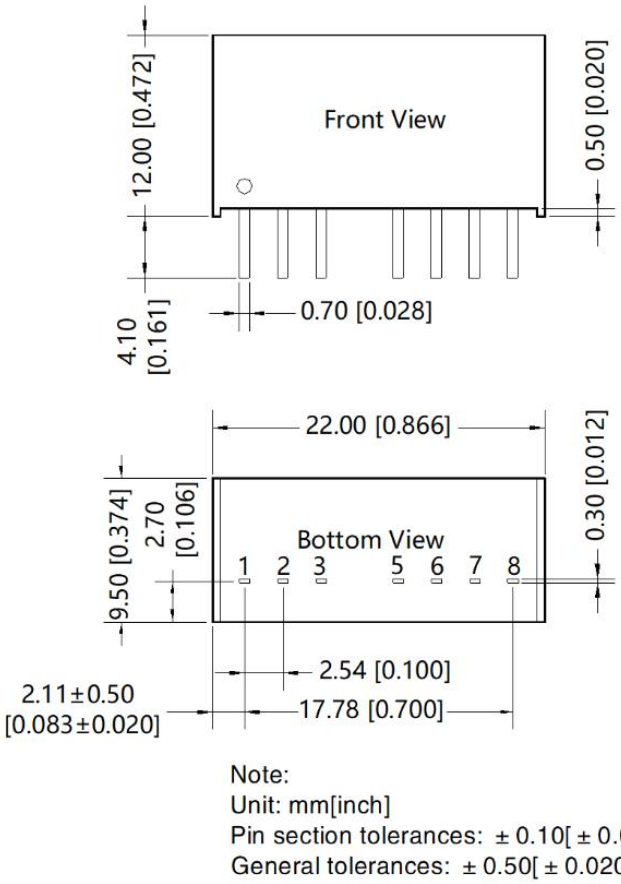
Notes: For EMC tests we use Part ① in Fig. 4 for immunity and emissions test.

Parameter description:

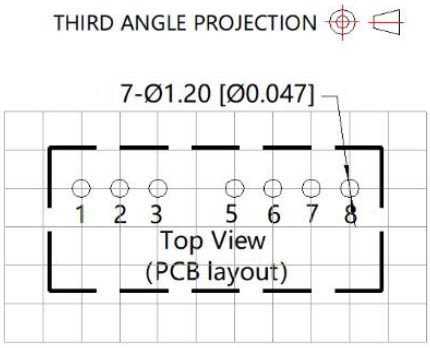
Components	Vin: 48VDC
FUSE	Choose according to actual
C0	200μF/100V
C1/C2	10μF/100V
LCM1	470μH
C3	330μF/100V
CY1/CY2	1nF/400VAC
C4/C5	22μF/50V

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

Dimensions and Recommended Layout



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



Note: Grid 2.54*2.54mm

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

NC: No connection

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. 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. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.