- 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 1.5k VDC
- Operating ambient temperature range: -40℃ to +85℃
- Input under-voltage, output over-voltage, short-circuit, over-current protection
- Industry standard pin-out

DUT6-2412ZP

RoHS

3-Year Warranty

Description

DUT06-xxyyZP series of isolated 6W DC-DC converter products with an ultra-wide range of voltage input of 9-36VDC(24VDC input), 18-75VDC(48VDC input), input to output isolation is tested with 1500VDC, input under-voltage protection, output over-voltage, short-circuit, over-current protection. They meet CLASS A of CISPR32/EN55032 EMI standards without external components and they are widely used in fields such as industrial control, electric power, instruments, communication and railway applications.

Selection Guide

Certification	Part No.	Input Voltage (Vdc) Nominal (Range)	Input Voltage (Vdc) Nominal (Range) Max.	Output Voltage (Vdc)	Output Current (mA)	Full Load Efficiency (% Min./Typ.	Capacitive Load(μF) Max.
/	DUT06-2403ZP	24 (9-36)	40	3.3	1500/0	75/77	1800
	DUT06-2405ZP			5	1200/0	80/82	1000
	DUT06-2409ZP			9	667/0	81/83	1000
	DUT06-2412ZP			12	500/0	83/85	470
	DUT06-2415ZP			15	400/0	84/86	220
	DUT06-2424ZP			24	250/0	84/86	100

Selection Guide

Certification	Part No.	Input Voltage (Vdc) Nominal (Range)	Input Voltage (Vdc) Nominal (Range) Max.	Output Voltage (Vdc)	Output Current (mA)	Full Load Efficiency (% Min./Typ.	Capacitive Load(μF) Max.
/	DUT06-4803ZP	48 (18-75)	80	3.3	1500/0	78/80	1800
	DUT06-4805ZP			5	1200/0	82/84	1000
	DUT06-4809ZP			9	667/0	83/85	680
	DUT06-4812ZP			12	500/0	85/87	470
	DUT06-4815ZP			15	400/0	86/88	220
	DUT06-4824ZP			24	250/0	85/87	100

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

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	24VDC input	--	302/5	333/12	mA
	48VDC input	--	156/4	160/8	
Reflected Ripple Current		--	20	--	
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			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy①	Vo1		--	±1	±3	%
	Vo2					
Balance Of Output Voltage	Dual output, balanced load		--	±0.5	±1.5	
Linear Regulation	Input voltage variation from low to high at full load	Vo1	--	±0.2	±0.5	
		Vo2	--	±0.5	±1	
Load Regulation②	5%-100% load	Vo1	--	±0.5	±1	
		Vo2	--	±0.5	±1.5	
Cross Regulation	Dual outputs, Vo1 load at 50%, Vo2 load at range of 10%-100%		--	--	±5	
Transient Recovery Time	25% load step change		--	300	500	μs
Transient Response Deviation		3.3V, 5V, ±5V output	--	±5	±8	%
		Others	--	±3	±5	
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple&Noise③	20MHz bandwidth		--	--	85	mVp-p
Over-voltage Protection	Input voltage range		110	--	160	%Vo
Over-current Protection			110	140	190	%Io
Short-circuit Protection			Continuous, self-recovery			

Note: ①Output voltage accuracy of ±5VDC/±9VDC output converter for 0%-5% load is ±5% max;
②Load regulation for 0%-100% load is ±5%;
③ he “parallel cable” method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max.	1500	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	1000	--	pF
Operating Temperature	Derating when operating temperature up to 71℃ (see Fig. 1)	-40	--	85	˚C
Storage Temperature		-55	--	125	
Storage Humidity	Non-condensing	5	--	95	%RH
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	˚C
Vibration		IEC/EN61373 - Category 1, Grade B			
Switching Frequency *	PWM mode	--	300	--	kHz
MTBF	MIL-HDBK-217F@25˚C	1000	--	--	k hours

Mechanical Specifications

Case Material	Aluminum alloy
Dimensions	32.00 × 20.00 × 10.80mm
Weight	12.0g(Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	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	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 ±2kV (see Fig.3-①for recommended circuit) perf. Criteria B
	CS	IEC/EN61000-4-6 3 Vr.m.s perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-29 0-70% perf. Criteria B

Electromagnetic Compatibility (EMC)

Emissions	CE	EN50121-3-2 150kHz-500kHz 99dBμV (see Fig.3-② for recommended circuit) EN55016-2-1 500kHz-30MHz 93dBμV (see Fig.3-② for recommended circuit)
	RE	EN50121-3-2 30MHz-230MHz 40dBμV/m at 10m (see Fig.3-② for recommended circuit) EN55016-2-1 230MHz-1GHz 47dBμV/m at 10m (see Fig.3-② for recommended circuit)
Immunity	ESD	EN50121-3-2 Contact ±6kV/Air ±8kV perf. Criteria A
	RS	EN50121-3-2 20V/m perf. Criteria A
	EFT	EN50121-3-2 ±2kV 5/50ns 5kHz (see Fig.3-① for recommended circuit) perf. Criteria A
	Surge	EN50121-3-2 line to line ±1kV (42Ω, 0.5μF) (see Fig.3-① for recommended circuit) perf. Criteria A
	CS	EN50121-3-2 0.15MHz-80MHz 10V r.m.s perf. Criteria A

Typical Characteristic Curves

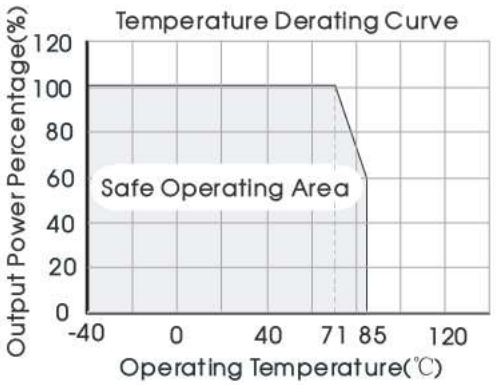
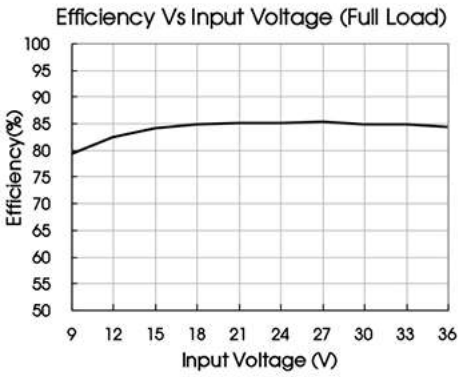
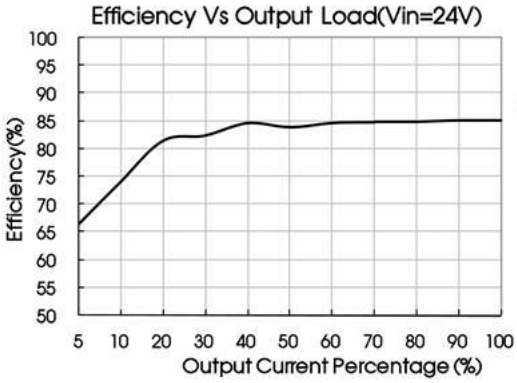


Fig. 1



DUT06-2405ZP



DUT06-2405ZP

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.

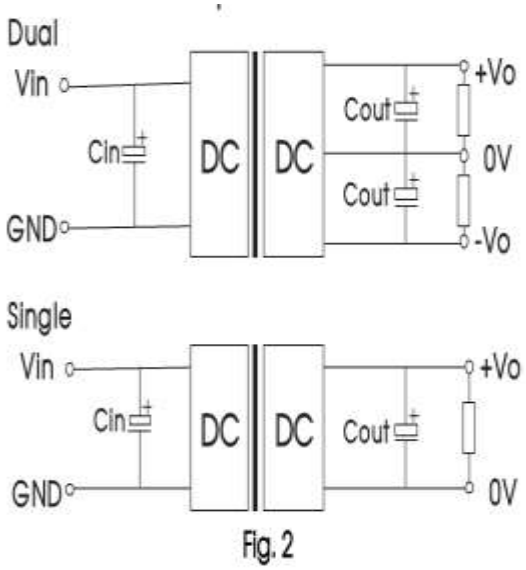
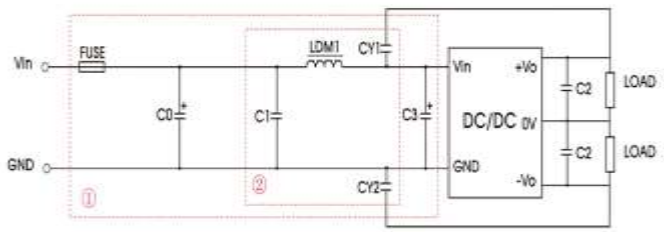


Fig. 2

Vin(VDC)	Cin	Vo(VDC)	Cout
24	100μF/50V	3.3/5/9/±5/±9	10μF/16V
		12/15/±12/±15	10μF/25V
		24/±24	10μF/50V
48	10μF/100V~47μF/100V	3.3/5/9/±5	10μF/16V
		12/15/±12/±15	10μF/25V
		24	10μF/50V

2. EMC compliance circuit

Dual output:



Single output:

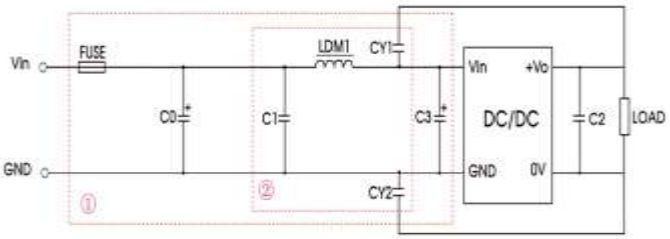


Fig. 3

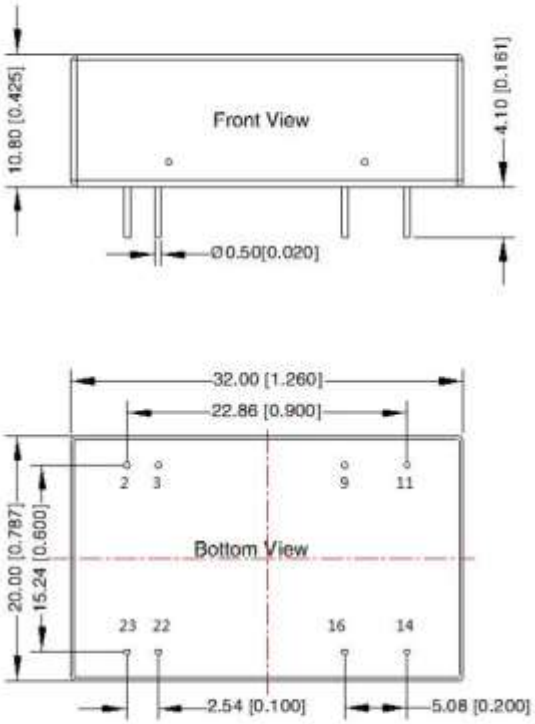
Notes: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

Parameter description:

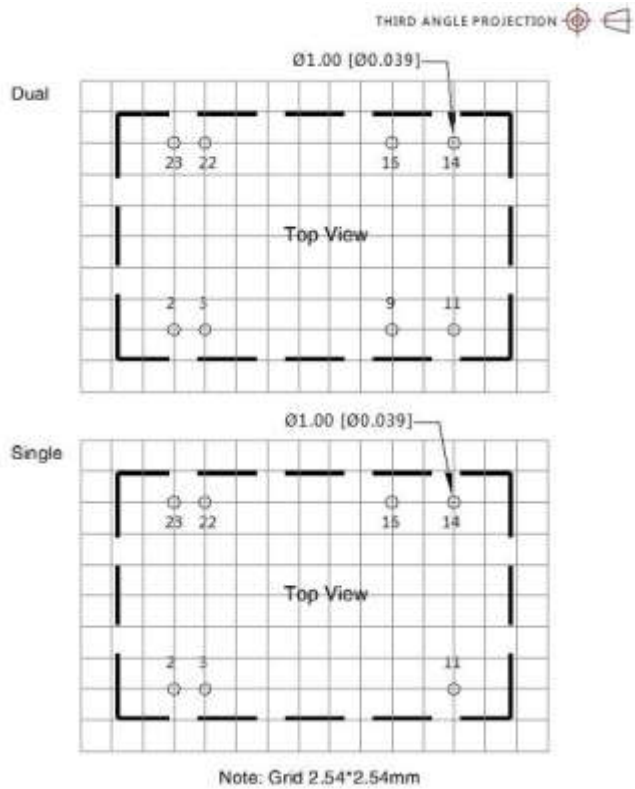
Model	Vin:24VDC	Vin:48VDC
FUSE	Choose according to actual input current	
C0/C3	330μF/50V	330μF/100V
C1	1μF/50V	1μF/100V
C2	Refer to the Cout in Fig.2	
LDM1	4.7μH	
CY1/CY2	1nF/2kV	

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

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	Single	Dual
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:

1. It is recommended that the load imbalance of the dual output is ≤±5%. If it exceeds ±5%, the performance of the product cannot be guaranteed to meet as datasheet marked. For details, please contact our technical staff;
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. 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;
4. All index testing methods in this datasheet are based on company corporate standards;
5. The performance indexes of the product models listed in this datasheet are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technicians for specific information;
6. We can provide product customization service;
7. Products are related to laws and regulations: see "Features" and "EMC";