GAPTEC®

10DMW4_1.5 series

10W - Dual/Single Output - 4:1 Wide Input - Isolated & Regulated
DC-DC Converter

DC-DC Converter   10 Watt

- 4:1 wide input voltage range
- Efficiency up to 88%
- 1.5kVDC isolation
- Short circuit protection (SCP)
- Output over voltage protection
- Output over current protection
- Operating Temperature range: -40°C ~ +85°C
- Input under-voltage protection
- No-load power consumption as low as 0.12W
- International standard pinout
- UL60950 , EN60950 and IEC60950 approved
- Meet CISPR32/EN55032 CLASS A

UL-60950-1 (E347551)

The 10DMW4 series, with wide input of 9-36VDC and 18-75VDC, are specially designed for applications where a wide range input voltage power supplies are isolated from the input power supply in a distributed power supply system on a circuit board.

These products apply to:
1) Where the voltage of the input power supply is wide range (voltage range ≤ 4:1)
2) Where isolation is necessary between input and output (Isolation Voltage ≤ 1500VDC)
3) Where the regulation of the output voltage and the output ripple noise are demanded

Common specifications

Short circuit protection:	Continuous, automatic recovery
Cooling:	Free air convection
Operation temperature range (power derating above 71°C):	-40°C~+85°C
Storage temperature range:	-55°C ~+125°C
Lead temperature range:	300°C MAX, 1.5mm from case for 10 sec
No-load power consumption:	500mW TYP
Switching frequency (PWM mode):	350KHz TYP
Storage humidity range:	< 95%
Vibration:	10-55Hz,10G,30 Min. along X, Y and Z
Case material:	Aluminium alloy
MTBF (MIL-HDBK-217F@25°C):	>1,000,000 hours
Weight:	12,5g

Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Tested for 1 minute and 1mA max	1500			VDC
Isolation resistance	Test at 500VDC	1000			MΩ
Isolation capacitance	Input/Output, 100KHz/0.1V		1000		pF

Example:
10DMW4_2405S1.5
10 = 10Watt; D = DIP; M =series; W4 = wide input (4:1) 9-36Vin;
5Vout; S = single output; 1.5 = 1500VDC isolation

Output specifications

Item	Test condition	Min	Typ	Max	Units
Output voltage accuracy	Refer to recommended circuit		±1	±3	%
Output voltage balance	Dual outputs, balanced loads		±0.5	±1.5	%
Line regulation	Full load, Input voltage from low to high		±0.2	±0.5	%
Load regulation	5% to 100% load		±0.5	±1	%
Cross regulation	Dual output, main output 50% load, secondary output from 10% to 100% load			±5	%
Temperature coefficient	100% load			±0.03	%/°C
Ripple & Noise*	20MHz Bandwidth		40	80	mVp-p
Transient recovery time	25% load step change		300	500	µs
Transient response deviation	25% load step change		±3	±5	%
Over voltage protection	Input voltage range	110		160	%Vo
Over current protection	Input voltage range	110	140	190	%Io

* Ripple and noise tested by "parallel cable" method. See detailed operation

Note:
1. Min. load shouldn't be less than 5%, otherwise ripple may be increased dramatically, If the product operates under min. load, it may not be guaranteed to meet all specifications listed. Operation under minimum load will not damage the converter.
2. Recommended Dual output models unbalanced load is ≤±5%, If the product operates >±5%, it may not be guaranteed to meet all specifications listed. Please contact our technical support for more details.
3. Max. Capacitive Load is tested at input voltage range and full load.
4. All specifications measured at Ta = 25°C, humidity <75%, nominal input voltage and rated output load unless otherwise specified.
5. In this datasheet, all test methods are based on our corporate standards.
6. All characteristics are for listed models, and non-standard models may perform differently. Please contact our technical support for more details.
7. Please contact our technical support for any specific requirement.

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Specifications subject to change without notice.

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Input specifications

Item	Test condition	Min	Typ	Max	Units
Input filter	PI				
Input current (full load / no load)	• 24VDC input • 48VDC input		502/5 251/4	514/12 258/8	mA mA
Reflected ripple current	• 24VDC input • 48VDC input		40 30		mA mA
Input impulse Voltage (1sec. max.)	• 24VDC input • 48VDC input	-0.7 -0.7		50 100	VDC VDC
Start-up voltage	• 24VDC input • 48VDC input			9 18	VDC VDC
Input under-voltage protection	• 24VDC input • 48VDC input	5.5 12			VDC VDC
Start-up time	Nominal input & constant resistance load		10		ms
Hot plug	Unavailable				
Ctrl [1]	• Models ON	Ctrl pin open or pulled high (3.5-12VDC)			
	• Models OFF	Ctrl pin pulled low to GND (0-1.2VDC)			
	• Input current (models OFF)		6	10	mA

1. The CTRL pin voltage is referenced to GND.

EMC specifications

EMI	CE	CISPR32/EN55032 CLASS A (Bare component) CLASS B (External Circuit Refer to EMC recommended circuit, ②)
EMI	RE	CISPR32/EN55032 CLASS A (Bare component) CLASS B (External Circuit Refer to recommended circuit, ②)
EMS	ESD	IEC/EN61000-4-2 Contact ±4KV perf. Criteria B
EMS	RS	IEC/EN61000-4-3 10V/m perf. Criteria A
EMS	EFT	IEC/EN61000-4-4 ±2KV perf. Criteria B (External Circuit Refer to recommended circuit,①)
EMS	Surge	IEC/EN61000-4-5 ±2KV perf. Criteria B (External Circuit Refer to recommended circuit,①)
EMS	CS	IEC/EN61000-4-6 3 Vr.m.s perf. Criteria A
EMS	Voltage dips, short and interruptions immunity	IEC/EN61000-4-29 0%-70% perf. Criteria B

Part Number [1]	Nominal	Input Voltage [VDC]			Output Voltage [VDC]	Output current [mA]		Capacitive load [3] [µF, Max.]	Efficiency [4] [%, Typ.]
		Range	Max [2]			Max	Min		
10DMW4_2403S1.5	24	9-36	40		3.3	2400	120	2200	79
10DMW4_2405S1.5	24	9-36	40		5	2000	100	2200	83
10DMW4_2409S1.5	24	9-36	40		9	1111	56	680	86
10DMW4_2412S1.5	24	9-36	40		12	833	42	470	87
10DMW4_2415S1.5	24	9-36	40		15	667	33	330	87
10DMW4_2424S1.5	24	9-36	40		24	416	21	100	88
10DMW4_4803S1.5	48	18-75	80		3.3	2400	120	2200	79
10DMW4_4805S1.5	48	18-75	80		5	2000	100	2200	83
10DMW4_4812S1.5	48	18-75	80		12	833	42	470	87
10DMW4_4815S1.5	48	18-75	80		15	667	33	330	87
10DMW4_4824S1.5	48	18-75	80		24	416	21	100	88
10DMW4_2405D1.5	24	9-36	40		±5	±1000	±50	1000	83
10DMW4_2409D1.5	24	9-36	40		±9	±555	±28	680	86
10DMW4_2412D1.5	24	9-36	40		±12	±416	±21	470	87
10DMW4_2415D1.5	24	9-36	40		±15	±333	±16	330	87
10DMW4_2424D1.5	24	9-36	40		±24	±208	±10	100	87
10DMW4_4805D1.5	48	18-75	80		±5	±1000	±50	1000	83
10DMW4_4812D1.5	48	18-75	80		±12	±416	±21	470	87
10DMW4_4815D1.5	48	18-75	80		±15	±333	±16	330	87
10DMW4_4824D1.5	48	18-75	80		±24	±208	±10	100	87

[1] - Suffix „X" means the model with CTRL pin, for example 10DMW4_2403S1.5/X.
  - Suffix „CM" means the model with chasis mounting, for example 10DMW4_2403S1.5/CM
  - Suffix „DR" means the model with DIN rail option, for example 10DMW4_2403S1.5/DR
[2] Absolute maximum rating without damage on the converter, but it isn't recommended;
③ Efficiency is measured In nominal input voltage and rated output load.
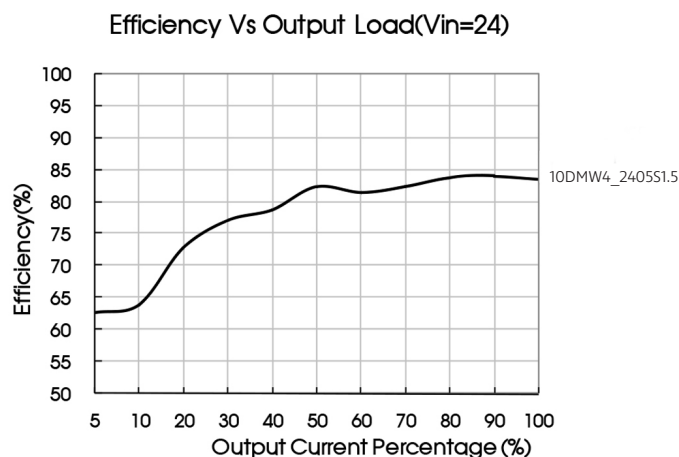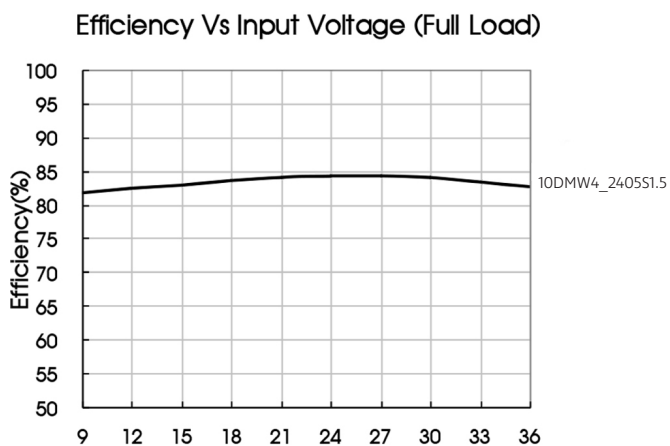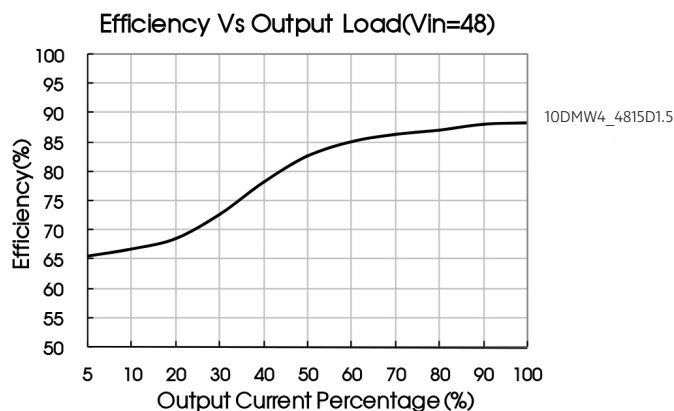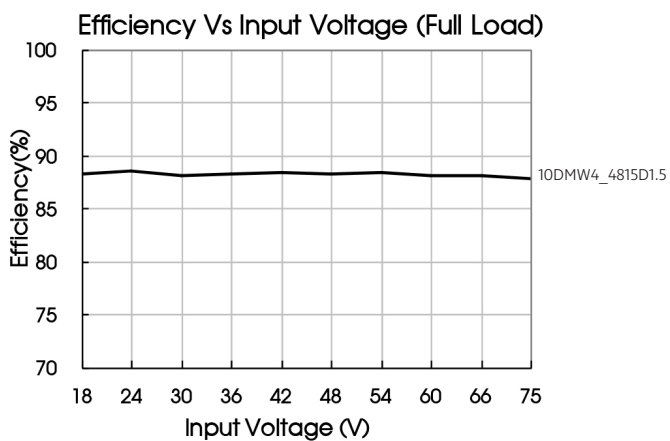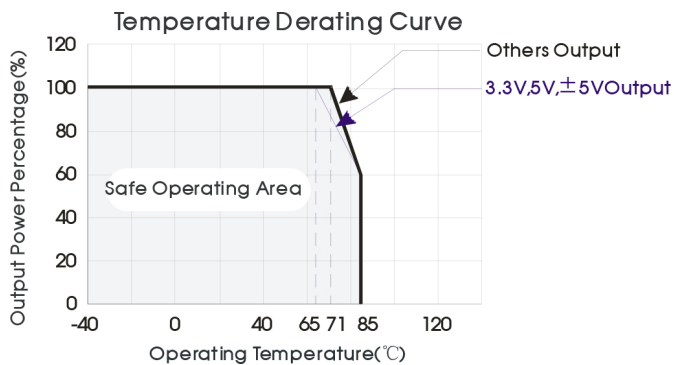 The capacitive loads of positive and negative outputs are identical.
[3] For dual-output-converters the given value is for one output (for both outputs the same value).
[4] Absolute maximum rating without damage on the converter.

Typical characteristics

Temperature Derating Curve

Others Output

3.3V,5V,±5VOutput

Safe Operating Area

Output Power Percentage(%) vs Operating Temperature(℃)

Efficiency Vs Input Voltage (Full Load)

10DMW4_4815D1.5

Efficiency(%) vs Input Voltage (V)

Efficiency Vs Output Load(Vin=48)

10DMW4_4815D1.5

Efficiency(%) vs Output Current Percentage (%)

Efficiency Vs Input Voltage (Full Load)

10DMW4_2405S1.5

Efficiency(%)

Efficiency Vs Output Load(Vin=24)

10DMW4_2405S1.5

Efficiency(%) vs Output Current Percentage (%)

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Typical application

All the DC/DC converters of this series are tested according to the re-commended circuit (see Fig. 1) before delivery.
If it is required to further reduce input and output ripple, properly incre-ase the input & output of additional capacitors Cin and Cout or select capacitors of low equivalent impedance provided that the capacitance is no larger than the max. capacitive load of the product.

Vin (VDC)	Cin (µF)	Cout (µF)
24	100	10
48	10-47	10

Dual Output

Single Output

Figure 1

EMC solution recommended circuit

Recommended external circuit parameters:

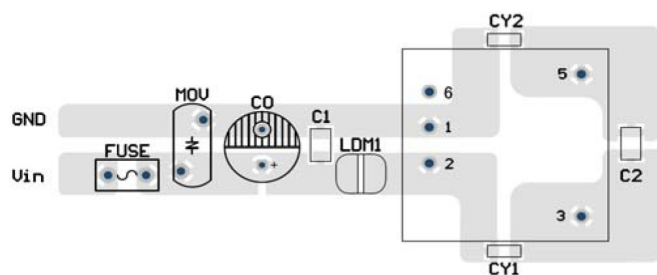| Model	Vin: 24V	Vin: 48V
FUSE	Choose according to practical input current	
MOV	S20K30	S14K60
C0	330µF/50V	330µF/100V
C1	1µF/50V	1µF/100V
C2	Refer to the Cout in typical application	
LDM1	4.7µH	
CY1/CY2	1nF/2KV	

Note:
Part ① is EMS recommended external circuit, part ② is EMI recommended external circuit. Choose according to requirements.
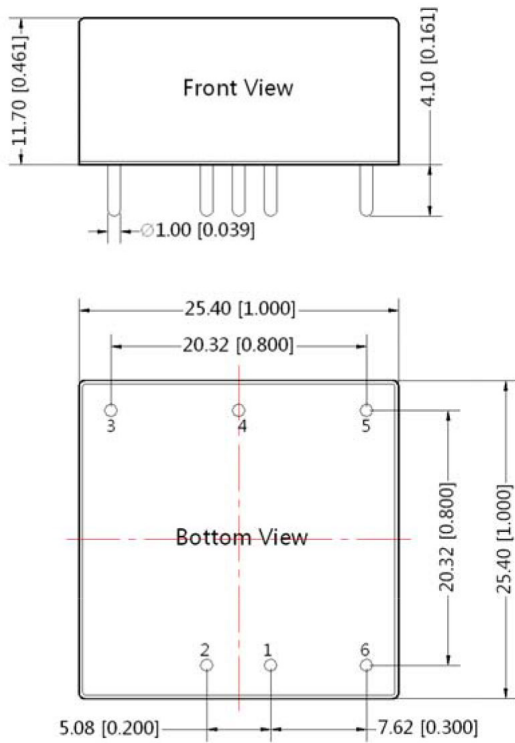
EMC recommended circuit PCB layout

Note:
The min. distance of the bonding pads between input & output isolation capacitors (CY1/CY2) shall be ≥ 2mm.

The product does not support output in parallel with power per liter.

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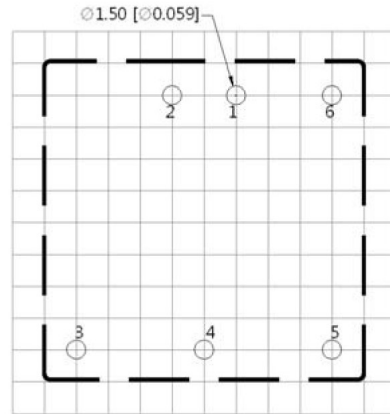DC-DC Converter

Mechanical dimensions and footprint

THIRD ANGLE PROJECTION

Note:Grid 2.54*2.54mm

Pin-Out		
Pin	Single	Dual
1	GND	GND
2	Vin	Vin
3	+Vo	+Vo
4	No Pin	0V
5	0V	-Vo
6	Ctrl	Ctrl

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

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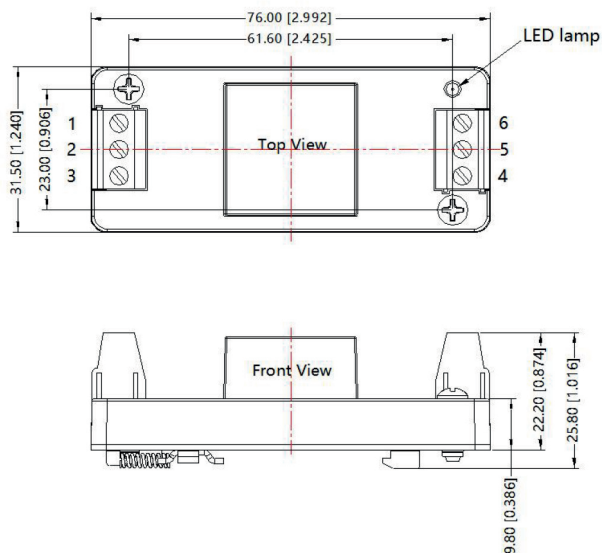# Mechanical dimensions and footprint

THIRD ANGLE PROJECTION

Pin-Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	Vin	+Vo	NC	0V
Dual	Ctrl	GND	Vin	+Vo	0V	-Vo

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

10DMW4_2403S1.5/CM

THIRD ANGLE PROJECTION

Pin-Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	Vin	+Vo	NC	0V
Dual	Ctrl	GND	Vin	+Vo	0V	-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]

10DMW4_2403S1.5/DR

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