GAPTEC®
GREEN TECHNOLOGY

10DRW4_2.25 Series

10W - Single Output - Wide Input - Isolated & Regulated DC-DC Converter

DC-DC Converter 10 Watt

- Wide 4:1 input voltage range
- Isolation Voltage: 2.25KVDC
- Operating Temperature Range: -40°C to +85°C
- Short circuit protection (SCP)
- International standard pin-out
- Meet the IEC60950, UL60950, EN60950 approval
- High efficiency up to 85%
- Low ripple & noise
- EMI meet EN50121-3-2 and CISPR22/EN55022 CLASS A, without external components
- RoHS Compliance
- Over voltage protection
- Over load protection
- Input under voltage protection
- Meets requirements of railway standard EN50155

The 10DRW4_2.25 series are isolated 10W DC-DC products with 4:1 input voltage. They feature efficiency up to 86%, 2250VDC isolation with enhanced isolation, operating temperature of -40°C to +85°C, input under-voltage protection, output short circuit, over-current and over-voltage protection. Railway vehicle electronic equipment widely used in 72V, 96V and 110V.

Common specifications

Short circuit protection:	Continuous, automatic recovery
Cooling:	Free air convection
Operation temperature range:	-40°C~+85°C
Storage temperature range:	-55°C~+125°C
Pin welding resistance temperature:	300°C MAX, 1.5mm from case for 10sec
Switching frequency*:	300kHz TYP, PWM mode
Storage humidity range:	95% MAX
Shock and vibration test:	IEC 61373, car body 1 B mold
Case material:	Aluminum alloy
Potting material:	Epoxy (UL94V-0)
MTBF (MIL-HDBK-217F @25°C):	>1,000 Khours
Dimensions:	50.80*25.40*11.80mm 50.80*25.40*16.30mm (heatsink)
Weight:	26g/34g (heatsink)

* This series of products using reduced frequency technology, the switching frequency is test value of full load. When the load is reduced to below 50%, the switching frequency decreases with decreasing load.

Output specifications

Item	Test condition	Min	Typ	Max	Units
Voltage accuracy	0%-100% load		±1	±3	%
Line regulation	Full load, low to high		±0.2	±0.5	%
Load regulation	0%-100% load		±0.5	±1	%
Transient recovery time	25% load step change		300	500	μs
Transient response deviation	normal Vin, 25% load step change • 3.3V/5V output • Others		 ±3 ±3	 ±8 ±5	 % %
Temperature coefficient			±0.02	±0.03	%/°C
Ripple and noise*	20MHz Bandwidth		50	100	mVp-p
Over voltage protection	Input voltage range	110		160	%Vo
Over current protection	Input voltage range	120		210	%Io

* 0%-5% load ripple & noise is no more than 5%Vo. Ripple & noise are measured by "parallel cable" method, please see DC-DC converter application notes for specific operation.

Input specifications

Item	Test condition	Min	Typ	Max	Units
Input current (full load/no load)	• 3.3V output • Others		95/3 110/3	98/8 117/8	mA mA
Reflected ripple current	Nominal Vin and full load		25		mA
Surge voltage	1sec. max.	-0.7		180	VDC
Starting voltage	100% load			40	VDC
Shutdown voltage		28	33		VDC
Starting time	Nominal Vin and constant resistive load		10		ms
Input filter	Pi Type				
Hot plug	Unavailable				

Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation voltage*	• Input-output • Input and output respectively on the shell	2250 1600			VDC VDC
Isolation resistance	Input-output, test at 500VDC	1000			MΩ
Isolation capacitance	Input-output, 100KHz/0.1V		2200		pF

* Test time of 1 minute and the leak current lower than 1mA.

Example:
10DRW4_11005S2.25
10= 10Watt; D= DIP; R= series; W4= wide input (4:1) 40-160Vin; 5Vout; S= single output; 2.25= 2250VDC

Note:
1. Only typical model listed. Non-standard models will be different from the above, please contact us for more details.
2. All specifications are typical at nominal input, full load and 25°C unless otherwise stated.
3. In this datasheet, all the test methods of indications are based on corporate standards.

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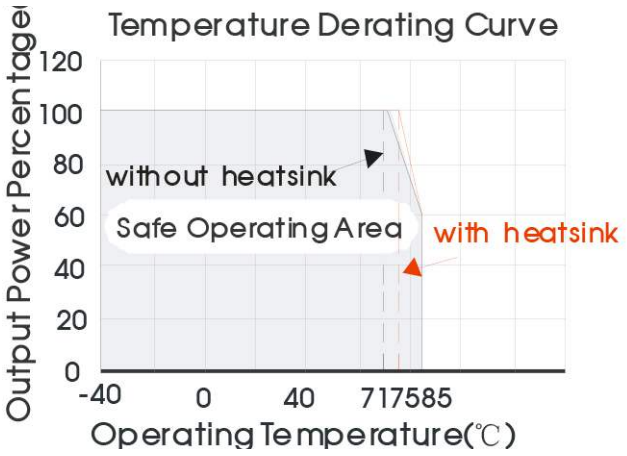
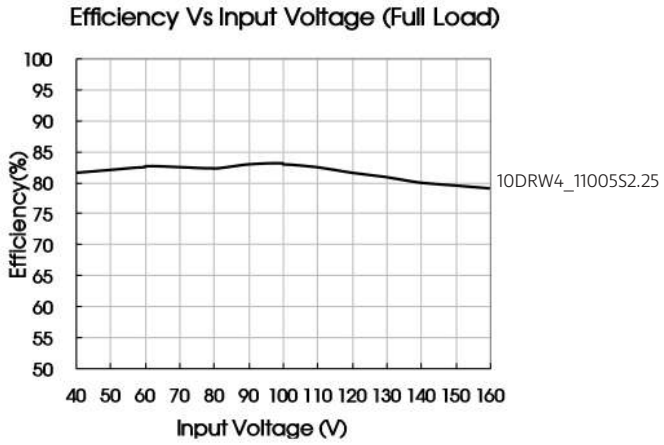
EMC specifications				
EMI	CE	CISPR22/ EN55022	CLASS A (without external components) CLASS B (see EMC recommended circuit, fig. 3)	
EMI	RE	CISPR22/ EN55022	CLASS A (without external components) CLASS B (see EMC recommended circuit, fig. 3)	
EMS	ESD	IEC/EN61000-4-2	Contact ±6KV/Air ±8KV	perf. Criteria B
EMI	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
EMI*	EFT	IEC/EN61000-4-4	±4KV (EMC recommended circuit, fig. 2 or fig. 3)	perf. Criteria B
EMS	Surge	IEC/EN61000-4-5	line to line ±2KV (2Ω 0.5uF see EMC recommended circuit, fig. 2) line to ground ±4KV (12Ω 0.5uF see EMC recommended circuit, fig. 2)	perf. Criteria B
EMS	Surge	EN50121-3-2	line to line ±1KV (42Ω 0.5uF see EMC recommended circuit, fig. 3) line to ground ±2KV (42Ω 0.5uF see EMC recommended circuit, fig. 3)	perf. Criteria B
EMI	CS	IEC/EN61000-4-6	10 Vr.m.s	perf. Criteria A

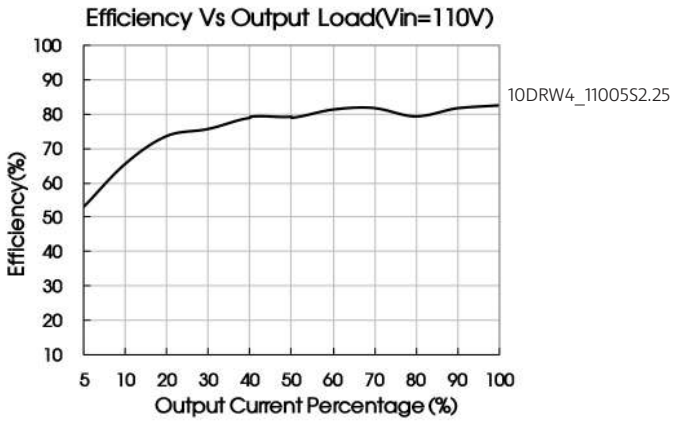
Part Number	Input Voltage [VDC] Nominal	Range	Output Voltage [VDC]	Output Current [mA] Full load	Efficiency [%, typ.]	Capacitor load [µF, max.]
10DRW4_11003S2.25	110	40-160	3.3	2400	76	5400
10DRW4_11005S2.25	110	40-160	5	2000	80	5400
10DRW4_11012S2.25	110	40-160	12	833	84	470
10DRW4_11015S2.25	110	40-160	15	667	84	330
10DRW4_11024S2.25	110	40-160	24	417	85	100

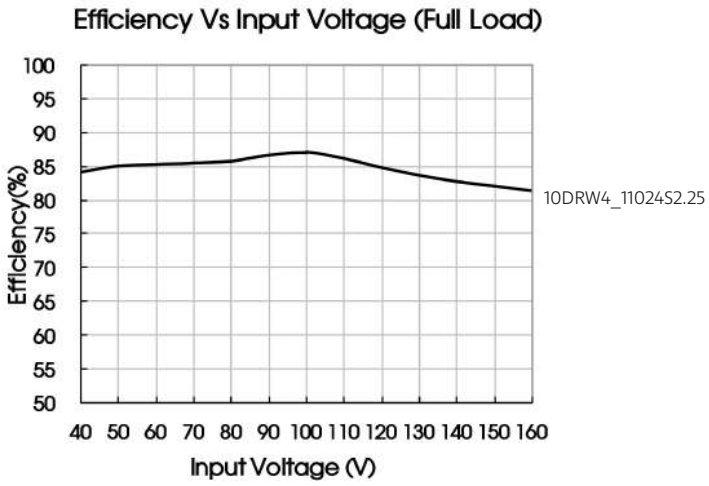
Typical characteristics

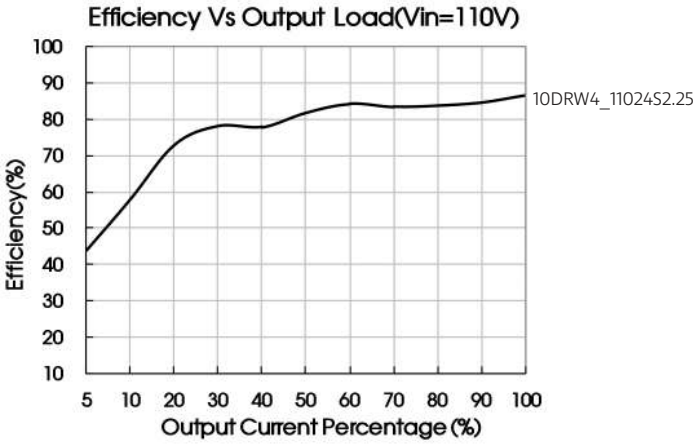


Efficiency









Typical application

All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 1) before delivery.

If it is required to further reduce input and output ripple, properly increase 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.

figure 1

Vout (VDC)	Fuse	Cin	Cout
3.3/5	2A slow blow	10µF - 47µF	100µF
12/15	2A slow blow	10µF - 47µF	47µF
24	2A slow blow	10µF - 47µF	22µF

EMC solution recommended circuit

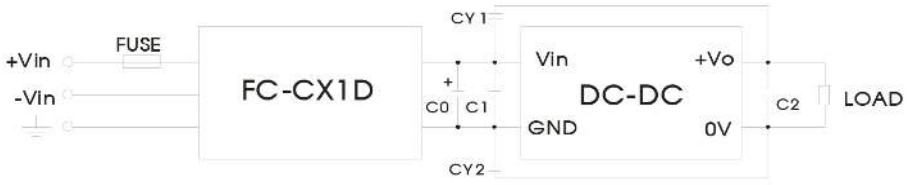
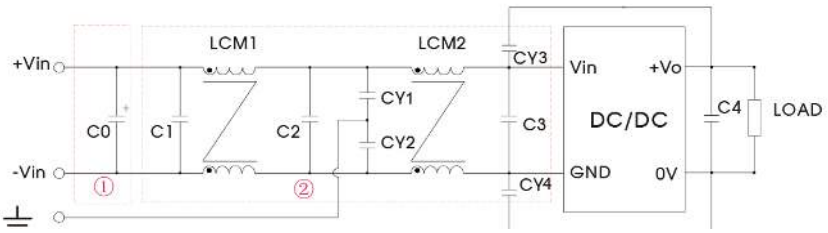


figure 2

Figure 2 parameter descripction:

FUSE	Choose according to actual input current
FC-CX1D	FC-CX1D is the EMC auxiliary component of our company. Input voltage range: 40V-160V
C0	100μF/200V
C1	Refer to the Cin in Fig. 1
C2	Refer to the Cout in Fig. 1
CY1, CY2	1000pF/400VAC



Note: Part ① in the Fig. 3 is used for EMS test and part ② for EMI filtering; selected based on needs.

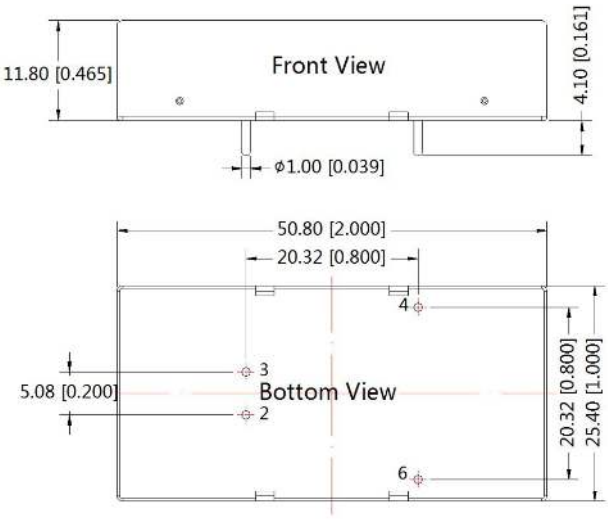
figure 3

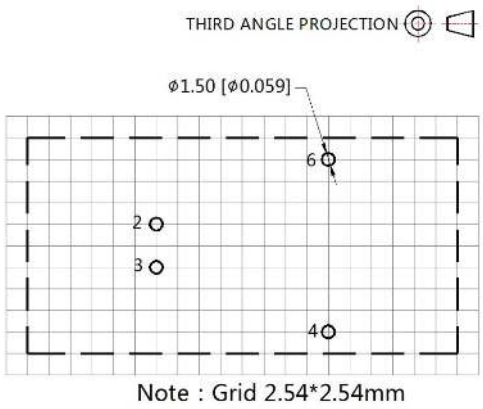
Figure 4 parameter descripction:

C0	100μF/200V
C1, C2	0.22μF/250V
C3	Refer to the Cin in Fig. 1
LCM1	2.2mH (FL2D-10-222 - the EMC auxiliary component of our company.)
LCM2	1.1mH (material:TN150P-RH12.7*12.7*7.9)
CY1, CY2, CY3, CY4	1000pF/400VAC
C4	Refer to the Cout in Fig. 1

It is not allowed to connect modules output in parallel to enlarge the power.

Mechanical dimensions



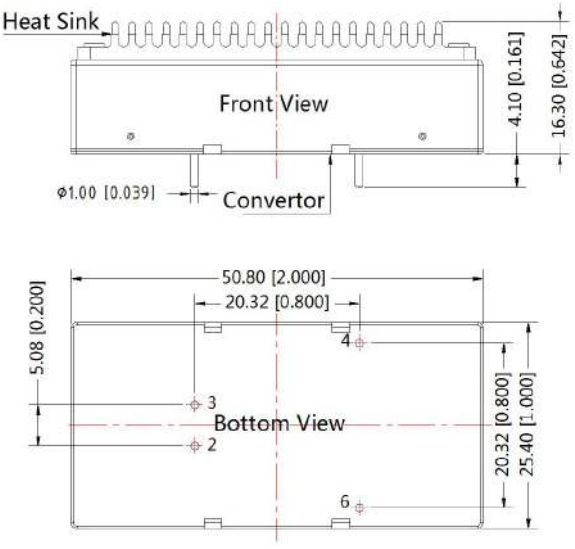


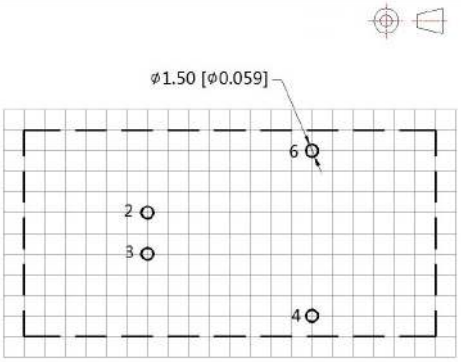
Note : Grid 2.54*2.54mm

Pin-Out	
Pin	Function
2	GND
3	Vin
4	+Vo
6	0V

Note:
Unit: mm[inch]
Pin diameter tolerances: ±0.10 [±0.004]
General tolerances: ±0.5 [±0.02]

Mechanical dimensions (with heatsink)





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