DC/DC Converter

香亭科技 SHINETING

- Ultra-wide 4:1 input voltage range
- High efficiency up to 86%
- I/O isolation test voltage: 2.25k VDC
- Operating ambient temperfuature range: -40℃ to +85℃
- Input under-voltage protection, output short-circuit, over-current, over-voltage protection
- Low ripfiple & noise
- Input reverse polarity protection available with chassis(A2S) or Din-Rail mounting (A4S) version
- Meets EN50155 railway standard
- Industry standard pin-out

DUT6-1DXXMD

RoHS

3-Year Warranty

Description

DUT6-1DXXMD series are isolated 6W DC-DC converter products with 40-160VDC input voltage with efficiencies of up to 86%, input to output isolation is tested with 2250VDC and the converter safely operate ambient temperature of -40℃ to +85℃, input under-voltage protection, output short-circuit, over-current, over-voltage protection. They are widely used in railway vehicle applications using 72V, 96V and 110V battery voltages.

Selection Guide

Certification	Part No.	Input Voltage (VDC) Nominal (Range)	Input Voltage (VDC) Max	Output Voltage (VDC)	Output Current (mA) Max./Min.	Full Load Efficiency② (%) Min./Typ.	Capacitive Load (μF)Max.
/	DUT6-1D05YMD	24 (9-36)	40	5	1200/0	78/80	1000
	DUT6-1D12YMD			12	500/0	82/84	470
	DUT6-1D15YMD			15	400/0	83/85	220
	DUT6-1D24YMD			24	250/0	84/86	100

Note:

①se “H” suffix for heat sink mounting, “A2S” suffix for chassis mounting and “A4S” suffix for Din-Rail mounting. We recommend to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements;

②The minimum input voltage and starting voltage of A2S and A4S Model are 1VDC higher than those of DIP package due to input reverse polarity protection function;

③Exceeding the maximum input voltage may cause permanent damage;

④Efficiency is measure at nominal input voltage and rated output load; efficiencies for A2S and A4S Model’s is decreased by 2% due to the input reverse polarity protection circuit.

he specified maximum capacitive load for Vo1 and Vo2 output is identical.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	Nominal input voltage	--	68/3	70/8	mA
Reflected Ripple Current	Nominal input voltage	--	25	--	
Surge Voltage (1sec. max.)		-0.7	--	180	VDC
Start-up Voltage		--	--	40	
Input Under-voltage Protection		28	33	--	
Start-up Time	Nominal input voltage & constant resistance load	--	10	--	ms
Input Filter		Pi filter			
Hot Plug		Unavailable			
Ctrl *	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	--	3	8	mA

Note: *The Ctrl pin voltage is referenced to input GND.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy①	0%-100% load		--	±1	±3	%
Linear Regulation	Input voltage variation from low to high at full load	Vo1	--	±0.2	±0.5	
		Vo2	--	±0.5	±1	
Load Regulation②	0%-100% load	*DUT6-1DxxYMD*	--	±0.5	±1	
Cross Regulation	Dual output, Vo1 load at 50%, Vo2 load at range of 25%-100%		--	--	±10	
Transient Recovery Time	25% load step change, nominal input voltage		--	300	500	μs
Transient Response Deviation		5V, ±5V output	--	±3	±8	%
		Others	--	±3	±5	
Temperature Coefficient	Full load		--	±0.02	±0.03	%/℃
Ripple & Noise③	20MHz bandwidth, 5%-100% load		--	50	100	mVp-p
Over-voltage Protection	Input voltage range		110	--	160	%Vo
Over-current Protection			120	--	210	%Io
Short-circuit Protection			Continuous, self-recovery			

Note:
①Vo2 output voltage accuracy of ±5VDC output converter for 0%-5% load is ±5% max;
②Under 0% -5% load conditions, ripple & noise does not exceed 5%Vo. The ”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.	2250	--	--	VDC
	Input/output-case Electric Strength Test for 1 minute with a leakage current of 1mA max.	1600	--	--	
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	--	+85	℃
Storage Temperature		-55	--	+125	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	+300	
Storage Humidity	Non-condensing	5	--	95	%RH
Vibration		IEC61373 - Category 1, Grade B			
Switching Frequency *	PWM Mode	--	300	--	kHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	k hours

Mechanical Specifications

Case Material	Aluminum alloy	
Dimensions	Horizontal package(without heat sink)	25.40 × 25.40 × 11.70 mm
	Horizontal package(with heat sink)	25.40 × 25.40 × 16.20 mm
	A2S wiring package (without heat sink)	76.00 × 31.50 × 21.20 mm
	A2S wiring package(with heat sink)	76.00 × 31.50 × 25.20 mm
	A4S rail package(without heat sink)	76.00 × 31.50 × 25.80 mm
	A4S rail package(with heat sink)	76.00 × 31.50 × 29.80 mm
Weight	Without heat sink Horizontal package/A2S wiring package/A4S rail package	12.5g/36.0g/56.0g (Typ.)
	With heat sink Horizontal package/A2S wiring package/A4S rail package	17.0g/40.0g/59.0g (Typ.)
Cooling Methods	Free air convection	

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B (see Fig.3 or Fig.4-② for recommended circuit)
	RE	CISPR32/EN55032 CLASS B (see Fig.3 or Fig.4-② for recommended circuit)
Immunity	ESD	IEC/EN61000-4-2 Contact ±6kV/Air ±8kV perf. Criteria B
	RS	IEC/EN61000-4-3 20V/m perf. Criteria A
	EFT	IEC/EN61000-4-4 ±4kV(see Fig.3 or Fig.4-① for recommended circuit) perf. Criteria B
	Surge	line to line ±2kV (2Ω, 18μF see Fig.3 for recommended circuit) line to ground ±4kV (12Ω, 9μF see Fig.3 for recommended circuit)
	CS	IEC/EN61000-4-6 10 Vr.m.s perf. Criteria A

Electromagnetic Compatibility (EMC)（EN50155）

Emissions	CE	EN50121-3-2 150kHz-500kHz 99dBuV 500kHz-30MHz 93dBuV
	RE	EN50121-3-2 30MHz-230MHz4OdBuV/m at 10m 230MHz-1GHz47dBuV/m at 10m
Immunity	ESD	EN50121-3-2 Contact ±6kV/Air ±8kV perf. Criteria B
	RS	EN50121-3-2 20V/m perf. Criteria A
	EFT	EN50121-3-2 ±2kV 5/50ns 5kHz perf. Criteria A
	Surge	line to line ±1kV (42Ω, 0.5μF) line to ground ±2kV (42Ω, 0.5μF)
	CS	EN50121-3-2 0.15MHz-80MHz 10Vr.m.s perf. Criteria A

Note: All the tests are measured under the conditions of input capacitor 100μF/200V or FC-C01D.

Typical Characteristic Curves

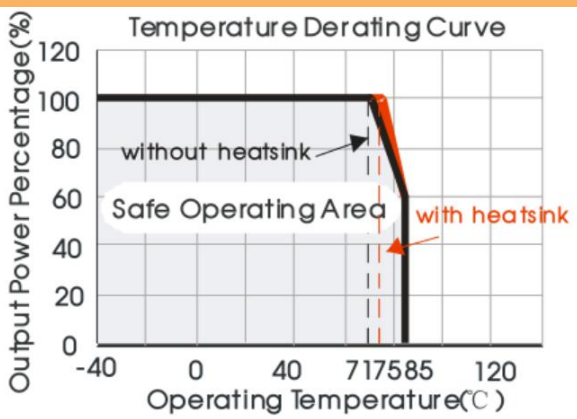
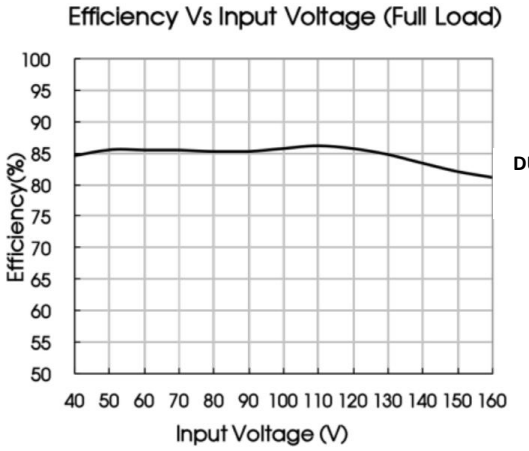
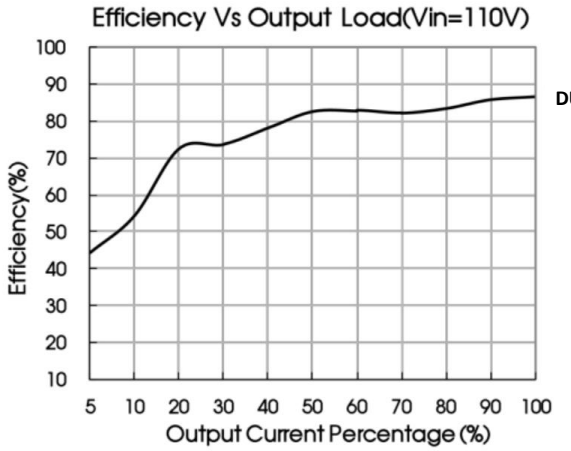


Fig. 1

Typical Characteristic Curves



DUT6-1D15YMD



DUT6-1D15YMD

Design Reference

1.Ripple & noise
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.

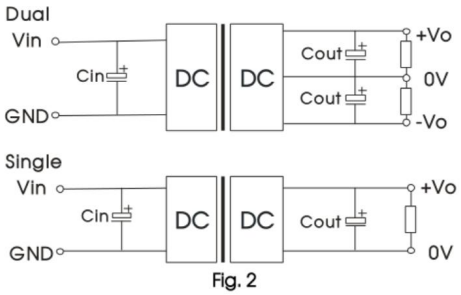


Fig. 2

Cin	Vo(VDC)	Cout
10μF/250V -47μF/250V	±5/5	10μF/16V
	±12/12/±15/15	10μF/25V
	24	10μF/50V

2. EMC compliance circuit

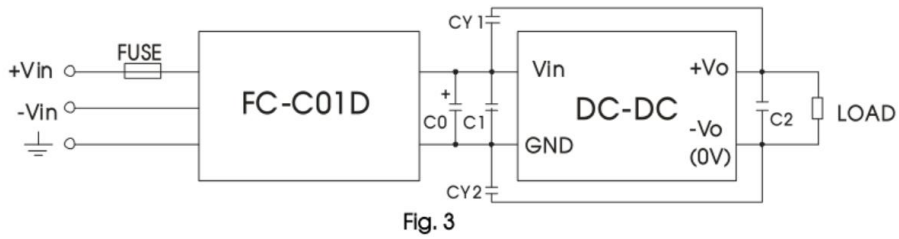


Fig. 3

Fig. 3 Parameter description:

FUSE	**Choose according to actual input current**
FC-C01D	**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.2**
C2	**Refer to the Cout in Fig.2**
CY1/CY2	**1nF/3kV**

Design Reference

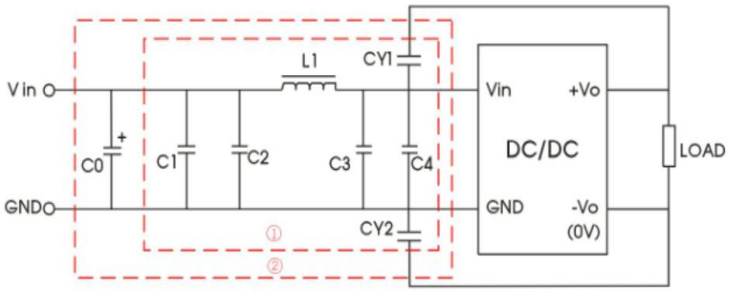


Fig. 4

Fig. 4 Parameter description:

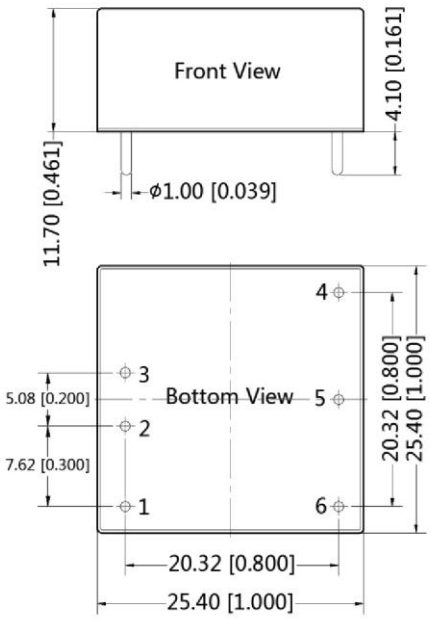
C0	100μF/200V
C1/C2/C3/C4	0.22μF/250V
L1	68μH
CY1/CY2	1nF/3kV

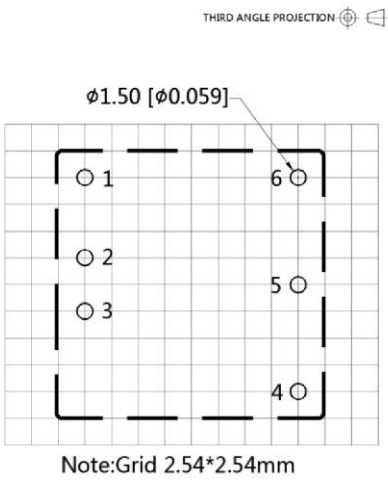
3. The products do not support parallel connection of their output

Horizontal Package (without heat sink) Dimensions and Recommended Layout

units: mm [inch]
tolerance: ±0.50[±0.020]
pin diameter tolerance: ±0.10[±0.004]

PIN Out		
PIN	Single	Dual
1	no pin	ctrl
2	GND	GND
3	Vin	Vin
4	+Vo	+Vo
5	no pin	0V
6	0V	-Vo





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. Other product application information, please see DC-DC（railway power supply）Converter Application Notes for specific operation methods--2016 Edition;
4. All index testing methods in this datasheet are based on company corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";