Selection Guide

- Continuous short-circuit protection
- No-load input current as low as 8mA
- Operating ambient temperature range:
  -40℃ to +105℃
- High efficiency up to 86%
- High power density
- I/O isolation test voltage 1.5k VDC
- Industry standard pin-out

ST02-AXXXXS

RoHS

3-Year Warranty

Description

ST02-AXXXXS series series are specially designed for applications where an (two) isolated voltage is required in a distributed power supply system. They are suitable for:
1.The voltage of the input power supply is relatively stable with a variation of ±10%Vin or less;
2.An input to output isolation voltage of up to 1500VDC is necessary;
3.The requirement for a tight output regulation is not as strict.

Selection Guide

Certification	Part No.	Input Voltage (Vdc) Nominal (Range)	Output Voltage (Vdc)	Output Current (mA) Max./Min.	Full Load Efficiency (%) Min./Typ.	Capacitive Load(μF) Max.
/	ST02-A0503S	5 (4.5-5.5)	±3.3	±303/±30	71/75	1200
	ST02-A0505S		±5	±200/±20	80/84	1200
	ST02-A0509S		±9	±111/±11	81/85	470
	ST02-A0512S		±12	±83/±8	81/85	220
	ST02-A0515S		±15	±67/±7	82/86	220
	ST02-A0524S		±24	±42/±4	82/86	100

Selection Guide

Certification	Part No.	Input Voltage (Vdc) Nominal (Range)	Output Voltage (Vdc)	Output Current (mA) Max./Min.	Full Load Efficiency (%) Min./Typ.	Capacitive Load(μF) Max.
/	ST02-A1203S	12 (10.8-13.2)	±3.3	±303/±30	71/75	1200
	ST02-A1205S		±5	±200/±20	76/80	1200
	ST02-A1207S		±7.2	±139/±13	76/80	470
	ST02-A1209S		±9	±111/±11	78/82	470
	ST02-A1212S		±12	±83/±8	79/83	220
	ST02-A1215S		±15	±67/±7	79/83	220
	ST02-A1224S		±24	±42/±4	79/83	100
	ST02-A1505S	15 (13.5-16.5)	±5	±200/±20	76/80	1200
	ST02-A1515S		±15	±67/±7	78/82	220
	ST02-A2403S	24 (21.6-26.4)	±3.3	±303/±30	70/76	1200
	ST02-A2405S		±5	±200/±20	74/80	1200
	ST02-A2407S		±7.2	±139/±13	74/80	470
	ST02-A2409S		±9	±111/±11	75/81	470
	ST02-A2412S		±12	±83/±8	77/83	220
	ST02-A2415S		±15	±67/±7	77/83	220
	ST02-A2424S		±24	±42/±4	77/83	100

Note:* The specified maximum capacitive load value for positive and negative output is identical.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	5VDC input	3.3VDC output	--	534/8	564/--	mA
		5VDC/7.2VDC output	--	477/8	500/--	
		9VDC/12VDC output	--	471/8	494/--	
		15VDC/24VDC output	--	466/8	488/--	

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	12VDC input	3.3VDC output	--	223/8	235/--	mA
		5VDC/7.2VDC output	--	208/8	219/--	
		9VDC output	--	203/8	214/--	
		12VDC/15VDC/24VDC output	--	201/8	211/--	
	15VDC input	5VDC output	--	167/8	176/--	
		15VDC output	--	163/8	171/--	
		24VDC output	--	165/8	174/--	
	24VDC input	3.3VDC output	--	110/8	120/--	
		5VDC/7.2VDC output	--	104/8	112/--	
		9VDC output	--	103/8	111/--	
		12VDC/15VDC/24VDC output	--	101/8	108/--	
Reflected Ripple Current*			--	15	--	
Surge Voltage (1sec. max.)	5VDC input		-0.7	--	9	VDC
	12VDC input		-0.7	--	18	
	15VDC input		-0.7	--	21	
	24VDC input		-0.7	--	30	
Input Filter			Capacitance filter			
Hot Plug			Unavailable			

Note: * Refer to DC-DC Converter Application Notes for detailed description of reflected ripple current test method.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy			See output regulation curve(Fig. 1)			
Linear Regulation	Input voltage change: ±1% 3.3VDC output		--	--	±1.5	--
	Input voltage change: ±1% Others		--	--	±1.2	
Load Regulation	10%-100% load 5VDC input	3.3VDC output	--	10	20	%
		5VDC/7.2VDC output	--	8	15	
		9VDC/12VDC/15VDC output	--	7	10	
		24VDC output	--	5	10	
	10%-100% load 12/15/24 VDC input	3.3VDC output	--	15	20	
		5VDC output	--	7	15	
		7.2VDC output	--	6	15	
		9VDC output	--	5	15	
		12VDC output	--	5	10	
		15VDC output	--	4	10	
		24VDC output	--	3	10	
Ripple & Noise*	20MHz bandwidth 5VDC input		--	75	200	mVp-p
	20MHz bandwidth 12/15/24VDC input		--	75	180	
Temperature Coefficient	Full load		--	±0.02	--	%/℃
Short-circuit Protection③			Continuous, self-recovery			

Note: * 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.	1500	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	20	--	pF
Operating Temperature	Derating when operating temperature≥85℃, (see Fig. 2)	-40	--	105	℃
Storage Temperature		-55	--	125	
Case Temperature Rise	Ta=25℃ 5VDC input	--	25	--	
	Ta=25℃ 12/15/24VDC input	--	15	--	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	
Storage Humidity	Non-condensing	5	--	95	%RH
Vibration		10-150Hz, 5G, 0.75mm. along X, Y and Z			
Switching Frequency	Full load, nominal input voltage 5VDC input	--	220	--	kHz
	Full load, nominal input voltage 12/15/24VDC input	--	260	--	
MTBF	MIL-HDBK-217F @ 25℃	3500	--	--	k hours

Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0)
Dimensions	19.65 x 7.05 x 10.16mm
Weight	2.4g(Typ.)
Cooling Method	Free air convection

EMC Specifications

Emissions	CE	CISPR32/EN55032 CLASS B
	RE	CISPR32/EN55032 CLASS B
Immunity	ESD	IEC/EN61000-4-2 Air ±8kV, Contact ±6kV perf. Criteria B
Note: Refer to Fig. 4 for recommended circuit test		

Typical Characteristic Curves

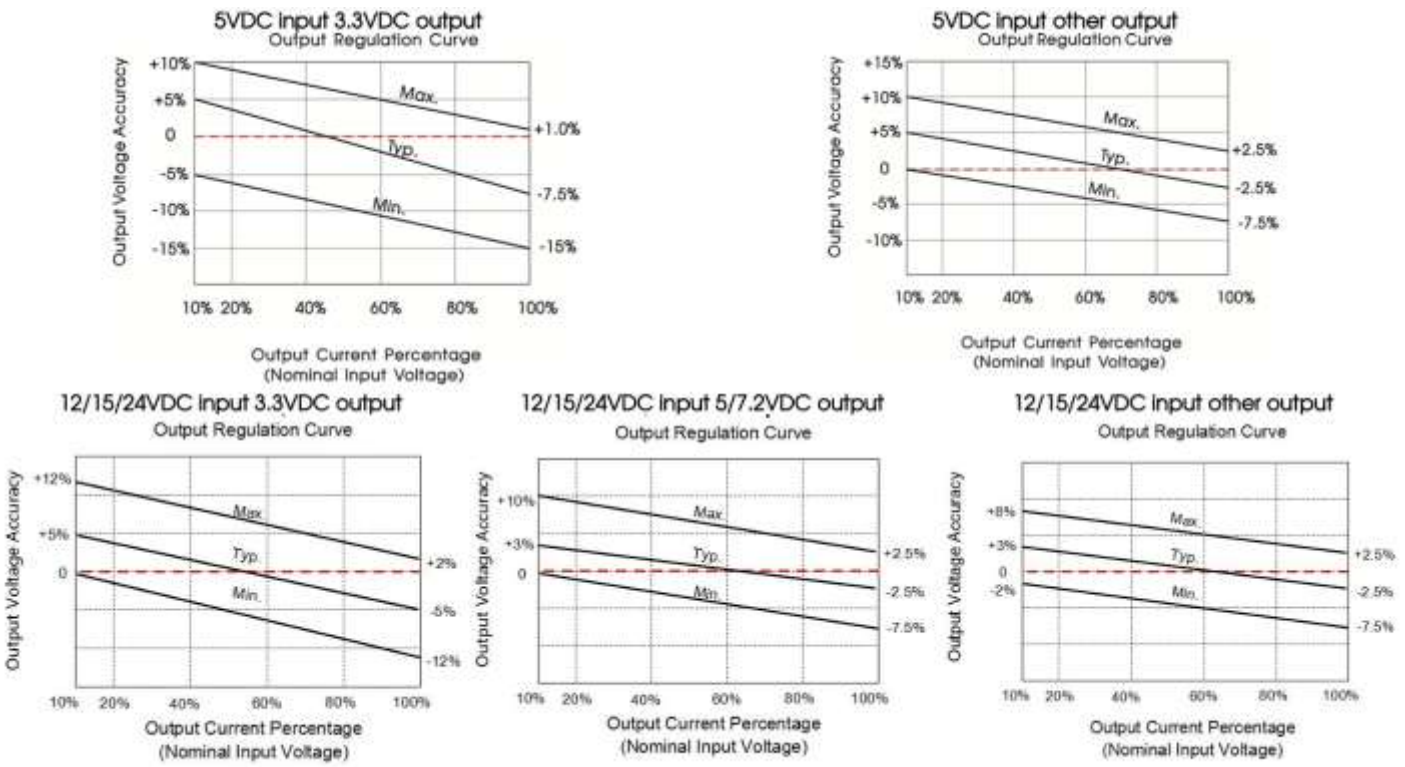


Fig. 1

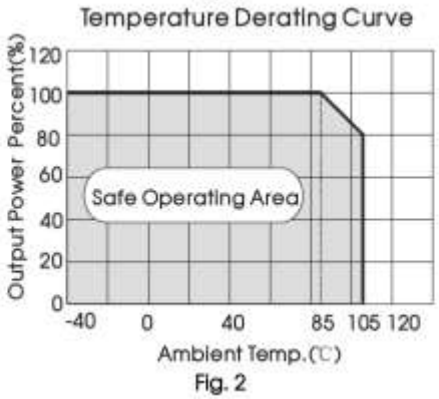


Fig. 2

Design Reference

1. Typical application

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig. 3.

Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problem caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

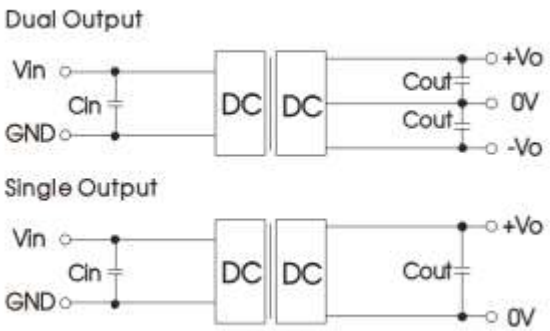


Fig. 3

Table 1: Recommended input and output capacitor values

Vin	Cin	Single Vout	Cout	Dual Vout	Cout*
5VDC	10μF/16V	3.3VDC	10μF/16V	±3.3VDC	4.7μF/16V
12VDC	2.2μF/25V	5VDC	10μF/16V	±5VDC	4.7μF/16V
15VDC	2.2μF/25V	7.2VDC	10μF/16V	±7.2VDC	2.2μF/25V
24VDC	1μF/50V	9VDC	2.2μF/25V	±9VDC	2.2μF/25V
–	–	12VDC	2.2μF/25V	±12VDC	1μF/25V
–	–	15VDC	1μF/25V	±15VDC	1μF/25V
–	–	24VDC	1μF/50V	±24VDC	0.47μF/50V

Note: *The capacitor value of the positive and the negative output is identical.

2. EMC compliance circuit

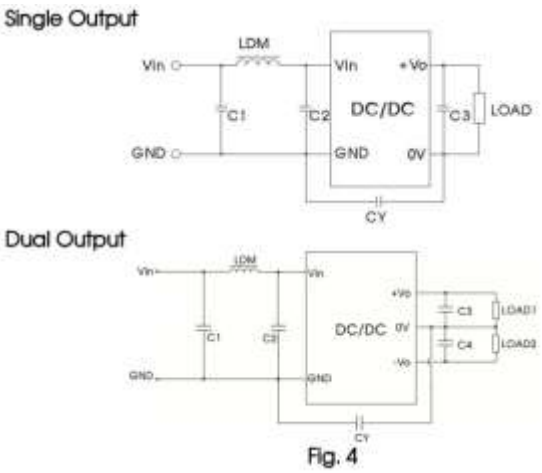


Fig. 4

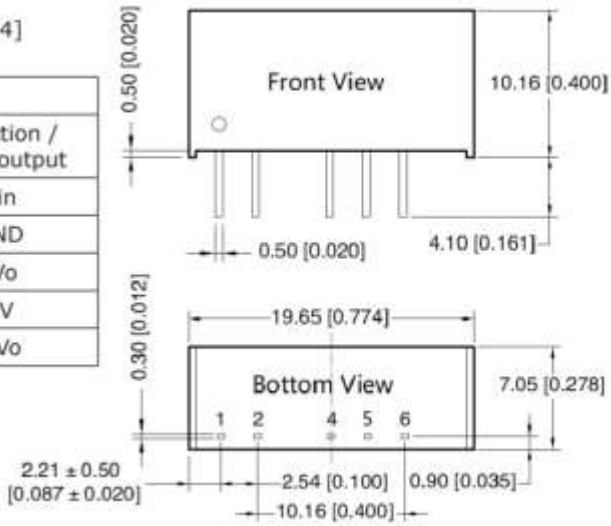
Input voltage		5 VDC	12/15/24 VDC
Emissions	C1/C2	4.7μF /16V	4.7μF /50V
	CY	270pF/2kV	
	C3	Refer to Cout in Fig. 3	
	LDM	6.8μH	

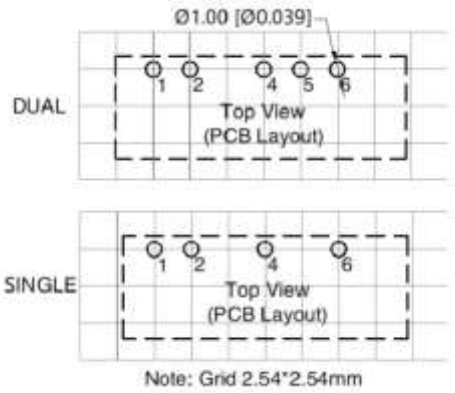
Input voltage		5 VDC	12/15/24 VDC
Emissions	C1/C2	4.7μF /16V	4.7μF /50V
	CY	270pF/2kV	
	C3/C4	Refer to Cout in Fig. 3	
	LDM	6.8μH	

Dimensions and Recommended Layout

units: mm [inch]
tolerance: ±0.25[±0.010]
pin section tolerance: ±0.10[±0.004]

PIN CONNECTIONS		
PIN	Function / Single output	Function / Dual output
1	Vin	Vin
2	GND	GND
4	0V	-Vo
5	No pin	0V
6	+Vo	+Vo





Note:

1. In order to guarantee product performance and datasheet compliance, the product must be operated within specifications and load range requirement;
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. 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";