- Continuous short-circuit protection
- No-load input current as low as 8mA
- Operating ambient temperature range: -40℃ to +105℃
- High efficiency up to 85%
- I/O isolation test voltage: 3k VDC
- Industry standard pin-out

STH01-XXXXS

RoHS

3-Year Warranty

Description

STH01-XXXXS series are specially designed for applications where an isolated voltage is required in a distributed power supply system. They are suitable for: pure digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits.

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.*
/	STH01-0303S	3.3 (2.97-3.63)	3.3	303/30	75/79	2400
	STH01-0305S		5	200/20	78/82	2400
	STH01-0309S		9	111/11	81/85	1000
	STH01-0312S		12	83/8	78/82	560
	STH01-0315S		15	67/7	78/82	560
	STH01-0324S		24	42/4	80/84	220

DC/DC Converter

Certification	Part No.	Input Voltage (Vdc) Nominal (Range)	Output Voltage (Vdc)	Output Current (mA)	Full Load Efficiency (%) Min./Typ.	Capacitive Load(μF) Max.
/	STH01-0503S	5 (4.5-5.5)	3.3	303/30	70/74	2400
	STH01-0505S		5	200/20	78/82	2400
	STH01-0509S		9	111/12	79/83	1000
	STH01-0512S		12	84/9	79/83	560
	STH01-0515S		15	67/7	79/83	560
	STH01-0524S		24	42/4	81/85	220
	STH01-0909S	9 （8.1-9.9）	9	111/12	77/81	470
	STH01-1203S	12 (10.8-13.2)	3.3	303/30	71/75	2400
	STH01-1205S		5	200/20	76/80	2400
	STH01-1209S		9	111/12	76/80	1000
	STH01-1212S		12	83/9	76/80	560
	STH01-1215S		15	67/7	77/81	560
	STH01-1224S		24	42/5	77/81	220
	STH01-1505S	15 (13.5-16.5)	5	200/20	76/80	2400
	STH01-1509S		9	111/12	76/80	1000
	STH01-1512S		12	83/9	76/80	560
	STH01-1515S		15	67/7	77/81	560
	STH01-1524S		24	42/5	77/81	220
	STH01-2403S	24 (21.6-26.4)	3.3	303/30	69/75	2400
	STH01-2405S		5	200/20	73/79	2400
	STH01-2407S		7.2	139/13	74/80	1000
	STH01-2409S		9	111/12	74/80	1000
	STH01-2412S		12	83/9	75/81	560
	STH01-2415S		15	67/7	75/81	560
	STH01-2424S		24	42/5	75/81	220

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	3.3VDC input	3.3VDC output	--	384/10	405/--	mA
		Other output	--	370/18	389/--	
	5VDC input	3.3VDC/5VDC output	--	270/8	286/--	
		9VDC/12VDC output	--	241/12	254/--	
		15VDC/24VDC output	--	241/18	254/--	
	9V input		--	137/8	144/--	
	12V input	3.3VDC output	--	112/8	118/--	
		5VDC/9VDC output	--	105/8	110/--	
		12VDC/15VDC output	--	103/8	109/--	
		24VDC output	--	105/8	110/--	
	15V input	5VDC/9VDC/12VDC output	--	84/8	88/--	
		15VDC/24VDC output	--	83/8	87/--	
	24V input	3.3VDC output	--	55/8	58/--	
		5VDC/9VDC/24VDC output	--	53/8	57/--	
		12VDC output	--	53/8	56/--	
		15VDC output	--	53/8	58/--	
Reflected Ripple Current			--	15	--	

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Reflected Ripple Current		--	15	--	mA
Surge Voltage(1sec. max.)	3.3VDC input	-0.7	--	5	VDC
	5VDC input	-0.7	--	9	
	9VDC input	-0.7	--	12	
	12VDC input	-0.7	--	18	
	15VDC input	-0.7	--	21	
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
Voltage Accuracy			See output regulation curves (Fig. 1)			
Linear Regulation	Input voltage change: ±1%	3.3VDC output	--	--	1.5	%
		Other output	--	--	1.2	
Load Regulation	3.3VDC input 10%-100% load	3.3VDC output	--	12	18	
		Other output	--	8	15	
	5VDC input 10%-100% load	3.3VDC output	--	15	20	
		5VDC output	--	10	15	
		9VDC output	--	8	10	
		12VDC output	--	7	10	
		15VDC output	--	6	10	
		24VDC output	--	5	10	
	9/12/15/24VDC input 10%-100% load	3.3VDC output	--	15	20	
		5VDC output	--	10	15	
		Other output	--	8	10	

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Ripple & Noise*	20MHz bandwidth	24VDC output	--	50	100	mVp-p
		Other output	--	30	75	
Temperature Coefficient	Full load		--	±0.02	--	%/℃
Short-Circuit Protection			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.		3000	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC		1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V		--	20	--	pF
Operating Temperature	5VDC input	Derating when operating temperature≥85℃, (see Fig. 2)	-40	--	105	℃
	Other output	Derating when operating temperature≥100℃, (see Fig. 2)	-40	--	105	
Storage Temperature			-55	--	125	
Case Temperature Rise	Ta=25℃		--	25	--	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds		--	--	300	
Storage Humidity	Non-condensing 3.3/5VDC input		--	--	95	%RH
	Non-condensing Other input		5	--	95	
Vibration	9/12/15/24VDC input		10-150Hz, 5G, 0.75mm. along X, Y and Z			
Switching Frequency	3.3VDC input, full load, nominal input voltage		--	220	--	kHz
	5VDC input, full load, nominal input voltage		--	270	--	
	9/12/15/24VDC input, full load, nominal input voltage		--	260	--	
MTBF	MIL-HDBK-217F @ 25℃		3500	--	--	k hours

Mechanical Specifications

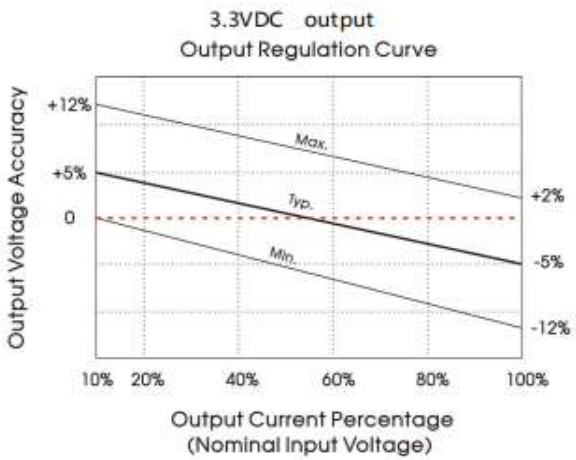
Case Material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Dimensions	19.65 x 6.00 x 10.16mm
Weight	2.1g(Typ.)
Cooling Method	Free air convection

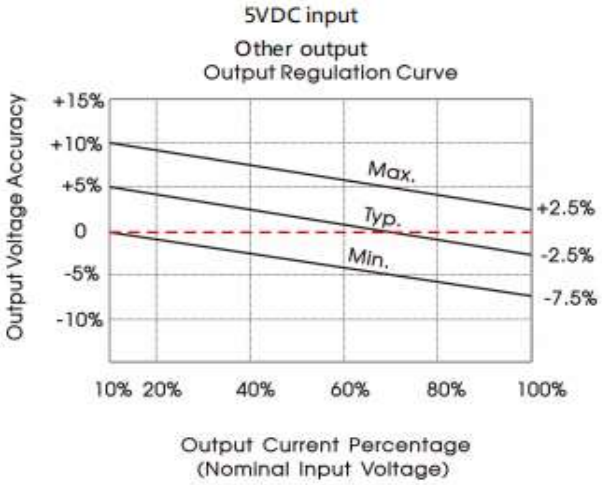
EMC Specifications

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 Performance Curves





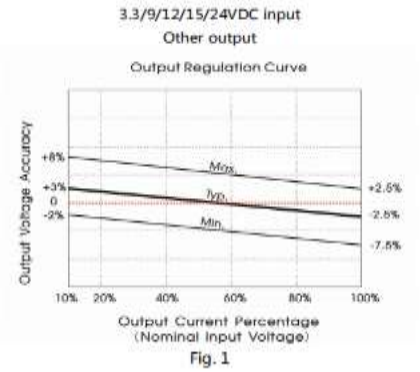
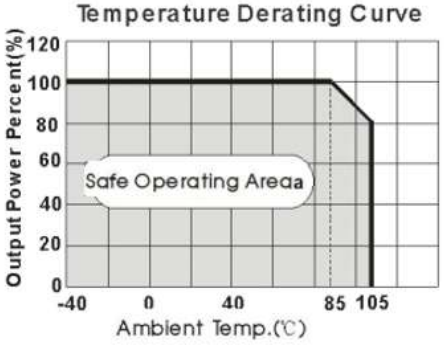


Fig. 1

5VDC input



3.3/9/12/15/24VDC input

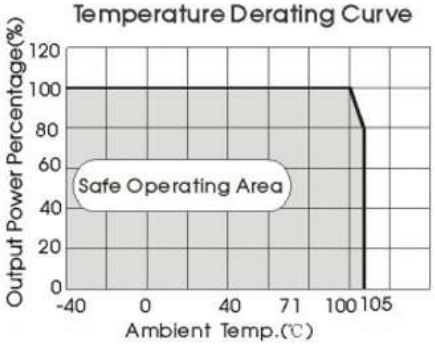
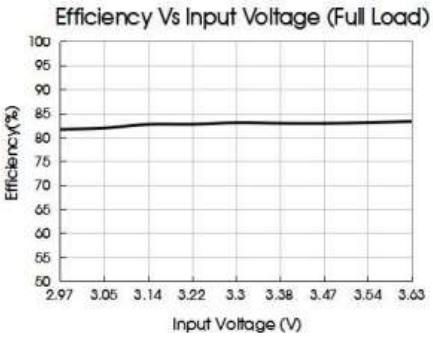
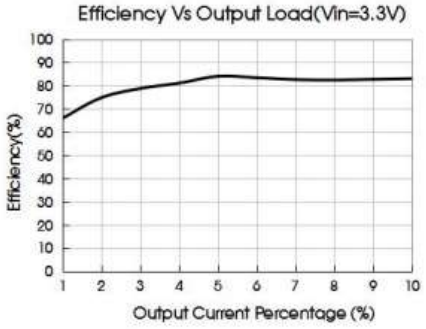


Fig. 2



STH01-0305S



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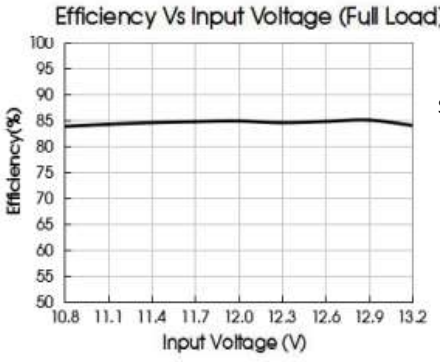

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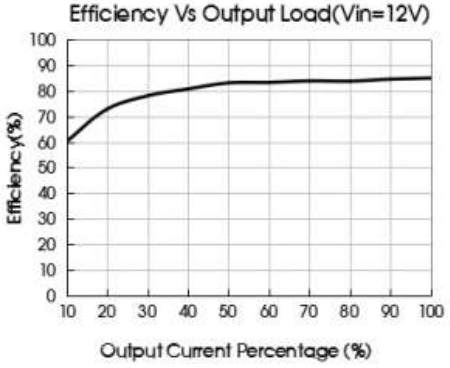


STH01-1205S

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 problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

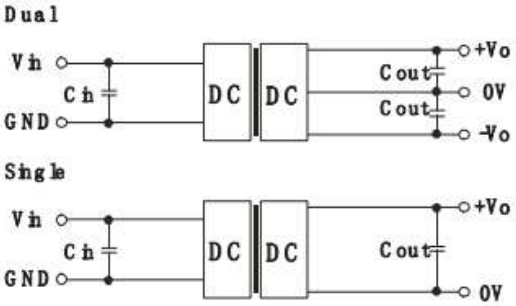


Fig. 3

Table 1: Recommended input and output capacitor values

Vin	Cin	Single output	Cout	Dual output	Cout
3.3VDC	10μF/16V	3.3VDC	10μF/16V	±3.3VDC	4.7μF/16V
5VDC	4.7μF/16V	5VDC	10μF16V	±5VDC	4.7μF/16V
9VDC	2.2μF/25V	7.2VDC	2.2μF/16V	±9VDC	1μF/16V
12VDC	2.2μF/25V	9VDC	2.2μF/16V	±12VDC	1μF/25V
15VDC	2.2μF/25V	12VDC	2.2μF/25V	±15VDC	0.47μF/25V
24VDC	1μF/50V	15VDC	1μF/25V	±24VDC	0.47μF/50V
--	--	24VDC	1μF/50V	--	--

2. EMC compliance circuit

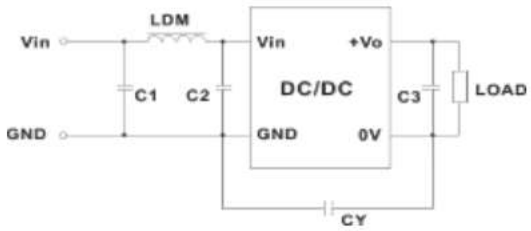


Fig. 4

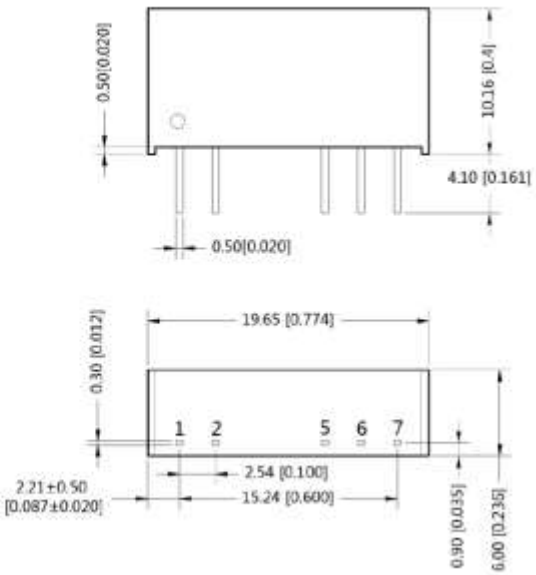
Table 2: EMC recommended circuit value table

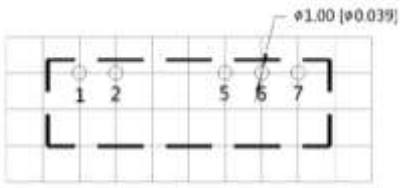
Input voltage		3.3VDC		5VDC		Other input
Output voltage		3.3/5VDC	9/12/15/24VDC	3.3/5/9VDC	12/15/24VDC	--
EMI	C1/C2	4.7uF/16V	4.7uF/16V	4.7uF/25V	4.7uF/25V	4.7uF/50V
	CY	--	270pF /4kVDC VISHAY HGZ102MBP TDK CD45-E2GA102M-GKA	100pF/4kV	1000pF/4kV	270pF /3kVDC
	C3/C4	Refer to the Cout in table 1				
	LDM	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	Dual
1	Vin	Vin
2	GND	GND
5	0V	-Vout
6	No Pin	0V
7	+Vout	+Vout





Note : Grid 2.54*2.54mm
Recommended PCB Layout
Top View

Note:

1. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
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 our 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";