

STK78XX-1.0T

- High efficiency up to 95%
- No-load input current as low as 0.2mA
- Operating ambient temperature range:
-40°C to +85°C
- Output short-circuit protection
- SMD package



RoHS 3-Year Warranty

Description

STK78XX-1.0T series are high efficiency switching regulators. The converters feature high efficiency, low loss and short circuit protection in a compact SMD package. These products are widely used in applications such as industrial control, instrumentation and electric power.

Selection Guide

Certification	Part No.	Input Voltage (Vdc) Nominal (Range)	Output Voltage (VDC)	Output Current (mA) Max.	Full Load Efficiency (%) Typ. Vin Min./Vin Max.	Capacitive Load(μF) Max.
/	STK7801-1.0T	12 (4.75-32)	1.5	1000	76/66	680
	STK78X2-1.0T	12 (4.75-32)	1.8	1000	79/69	680
	STK7802-1.0T	12 (4.75-32)	2.5	000	86/74	680
	STK7803-1.0T	24 (6.5-36)	3.3	1000	90/80	680
	STK7805-1.0T	24 (8-36)	5	1000	93/85	680
	STK78X6-1.0T	24 (10-36)	6.5	1000	93/86	680
	STK7809-1.0T	24 (13-36)	9	1000	94/89	680
	STK7812-1.0T	24 (16-36)	12	800	95/92	680

Note:*For input voltage exceeding 30 VDC, an input capacitor of 22uF/50V is required.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
No-load Input Current		--	0.2	1	mA
Reverse Polarity at Input		Avoid / Not protected			
Input Filter		Capacitance filter			
Ctrl	Module on	Open or pulled high (TTL level 3.2-5.5VDC)			
	Module off	Pulled low to GND level (0-0.8VDC)			
	Input current when off	--	0.2	1	mA

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy	Full load, input voltage range	1.5/1.8/2.5/3.3VDC output	--	±2	±4	%
		Other output	--	±2	±3	
Linear Regulation	Full load, input voltage range	1.5/1.8/2.5VDC output	--	±0.3	±0.6	
		Other output	--	±0.2	±0.4	
Load Regulation	Nominal input voltage, 10% -100% load	1.5/1.8/2.5VDC output	--	0.8	±1.5	
		Other output	--	0.3	±0.6	
Ripple & Noise*	20MHz bandwidth		--	30	75	mVp-p
Temperature Coefficient	Operating temperature range -40°C to +85°C		--	--	±0.03	%/°C
Transient Response Deviation	Nominal input voltage, 25% load step change		--	50	150	mV
Transient Recovery Time			--	0.2	1	ms
Short-circuit Protection	Nominal input		Continuous, self-recovery			
Vadj	Input voltage range		-10	--	+10	%Vo

Note: *

① The “parallel cable” method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information;

② With light loads at or below 20%, Ripple & Noise increases to 150mVp-p max.

General Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Operating Temperature	See Fig. 1		-40	--	+85	°C
Storage Temperature			-55	--	+125	
Storage Humidity	Non-condensing		5	--	95	%RH
Reflow Soldering Temperature	Peak temperature ≤245°C, duration ≤60s max. over 217°C. Also refer to IPC/JEDEC J-STD-020D.1.					
Switching Frequency	Full load, nominal input	1.5/1.8/2.5VDC output	--	370	--	kHz
		3.3/5/6.5VDC output	--	520	--	
		9/12VDC output	--	700	--	
MTBF	MIL-HDBK-217F@25°C		2000	--	--	k hours
Moisture Sensitivity Level (MSL)*	IPC/JEDEC J-STD-020D.1		Level 1			
Note: * For actual application, please refer to IPC/JEDEC J-STD-020D.1.						

Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0)
Dimensions	15.24 x11.40 x 8.25 mm
Weight	1.7g (Typ.)
Cooling Method	Free air convection

EMC Specifications

Emissions	CE	CISPR32/EN55032 CLASS B (see Fig. 4-② for recommended circuit)
	RE	CISPR32/EN55032 CLASS B (see Fig. 4-② for recommended circuit)
Immunity	ESD	IEC/EN 61000-4-2 Contact ±4kV perf. Criteria B
	RS	IEC/EN 61000-4-3 10V/m perf. Criteria A
	EFT	IEC/EN 61000-4-4 ±1kV (see Fig. 4-① for recommended circuit) perf. Criteria B
	Surge	IEC/EN 61000-4-5 line to line ±1kV (see Fig. 4-① for recommended circuit) perf. Criteria B

Typical Characteristic Curves

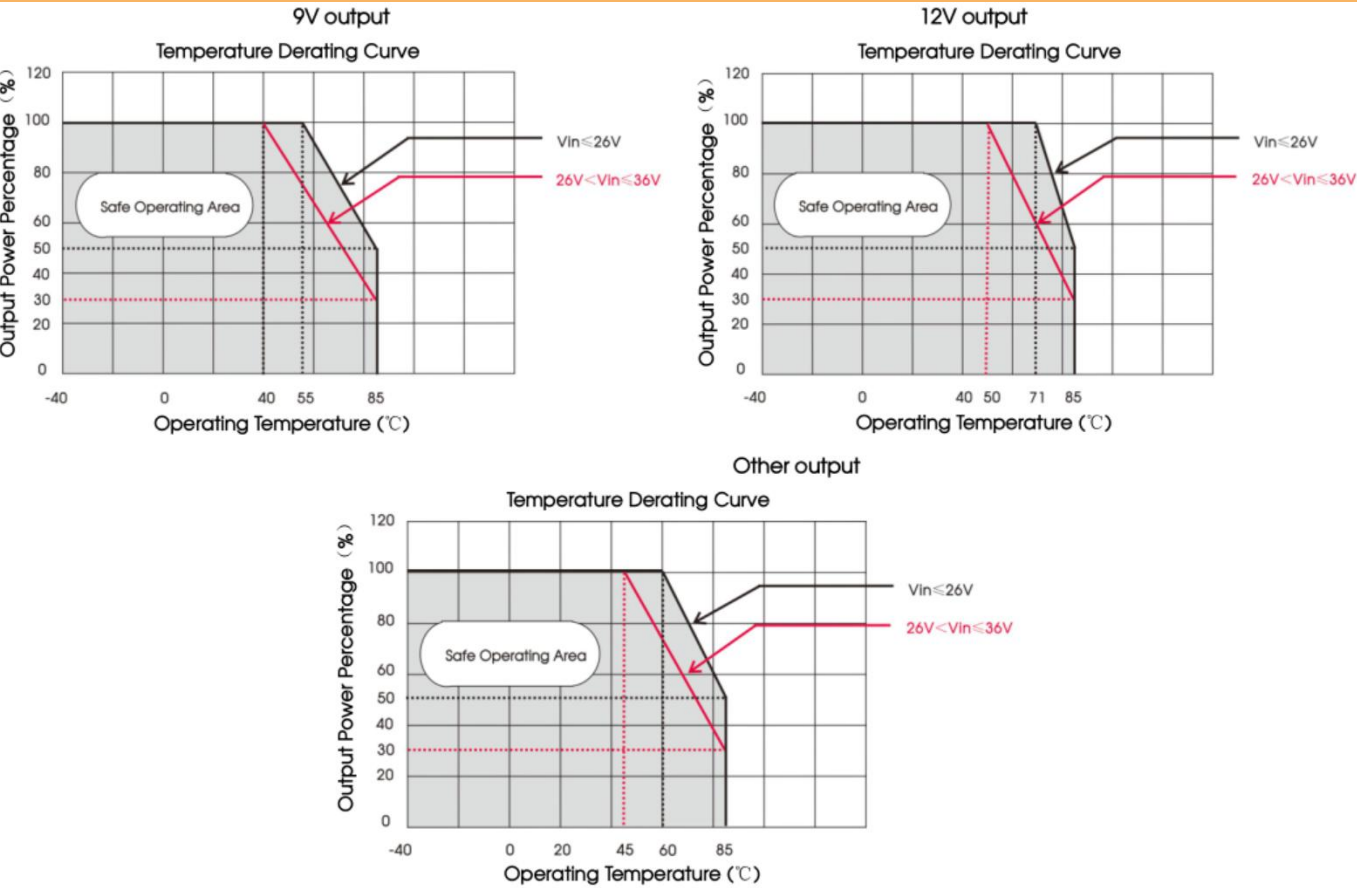
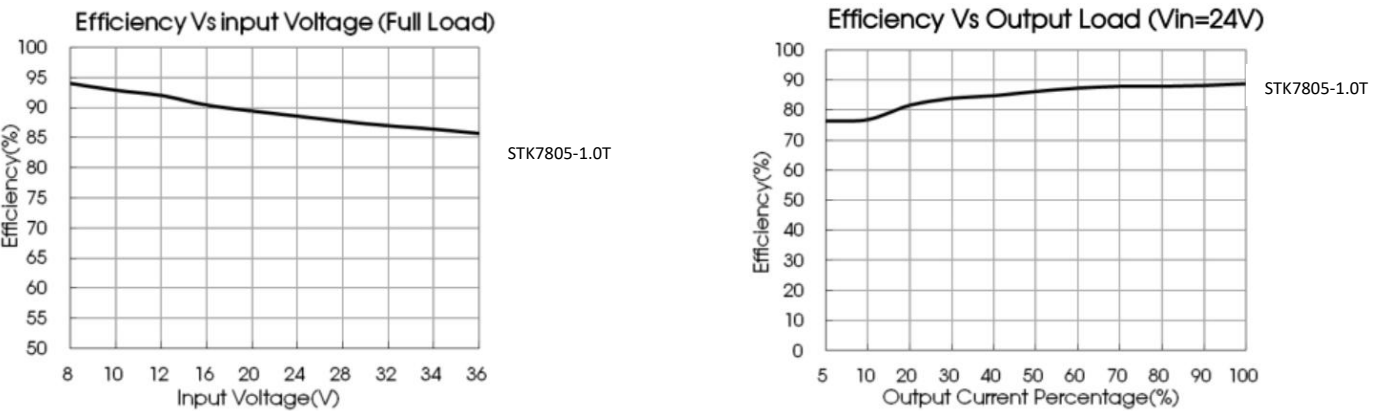


Fig. 1



Design Reference

1. Typical application

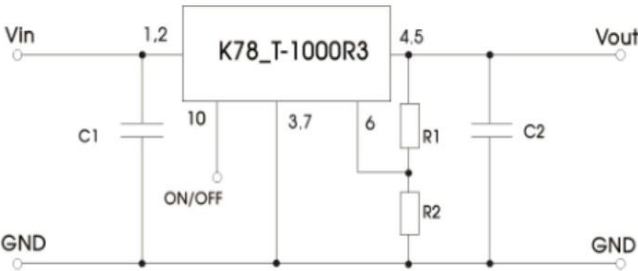


Fig. 2 Typical application circuit

Part No.	C1 (ceramic capacitor)	C2 (ceramic capacitor)	R1/R2 (Vadj resistance)
STK7801-1.0M	10μF/50V	22μF/10V	Refer to Vadj resistance calculation
STK78X2-1.0M		22μF/10V	
STK7802-1.0M		22μF/10V	
STK7803-1.0M		22μF/10V	
STK7805-1.0M		22μF/16V	
STK78X6-1.0M		22μF/16V	
STK7809-1.0M		22μF/16V	
STK7812-1.0M		22μF/25V	

- Notes:
- 1. The required C1 and C2 capacitors must be connected as close as possible to the terminals of the module.
 - 2. Refer to Table 1 for C1 and C2 capacitor values. For certain applications, increased values and/or tantalum or low ESR electrolytic capacitors may also be used instead.
 - 3. Converter cannot be used for hot swap and with output in parallel.
 - 4. To further reduce the output ripple and noise, we suggested the use of a “LC” filter at the output terminals, with an inductor value (L) of 10μH-47μH.

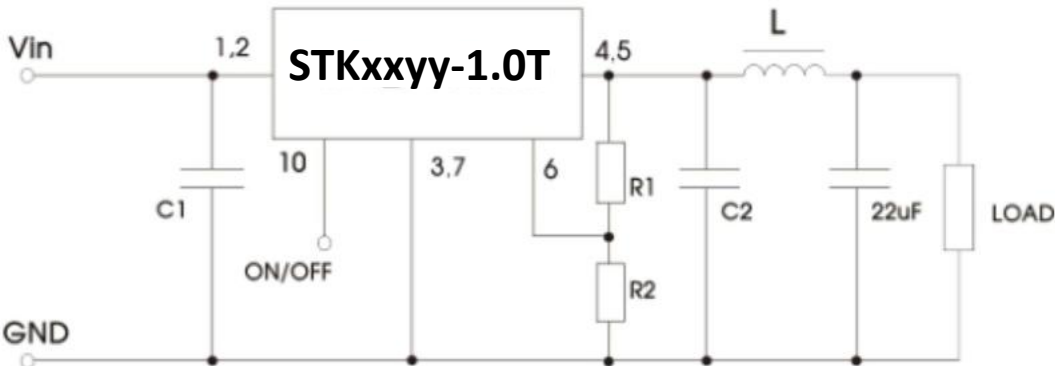


Fig. 3 External “LC” output filter circuit diagram

2. EMC compliance circuit

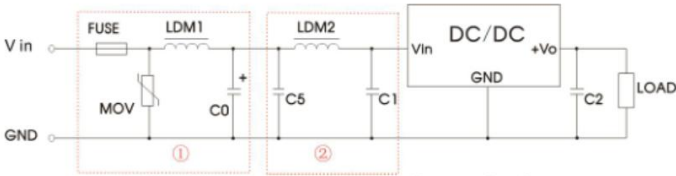


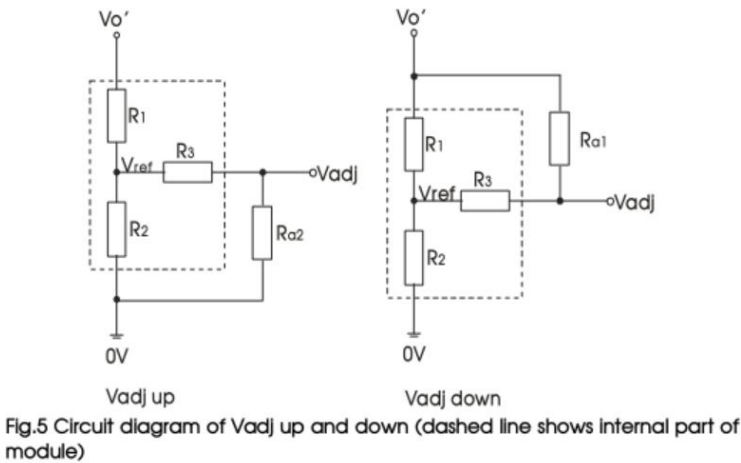
Fig.4 Recommended compliance circuit

FUSE	MOV	LDM1	C0	C2	C1/C5	LDM2
Select fuse value according to actual input current	S20K30	82μH	680μF /50V	Refer to table 1	4.7μF /50V	68μH

Note: Part ① in Fig. 4 shows Immunity compliance filter and part ② filter for Emission compliance; depending on requirement both filters ① and ② can be used in series as shown.

Design Reference

3. Trim Function for Output Voltage Adjustment (open if unused)



Calculating Trim resistor values:

up: $R_{a2} = \frac{aR_2}{R_2 - a} - R_3$ $a = \frac{V_{ref}}{V_{o'} - V_{ref}} \cdot R_1$

down: $R_{a1} = \frac{aR_1}{R_1 - a} - R_3$ $a = \frac{V_{o'} - V_{ref}}{V_{ref}} \cdot R_2$

R_{a1} 、 R_{a2} = Trim Resistor value;
 $V_{o'}$ = desired output voltage;
 a = self-defined parameter.

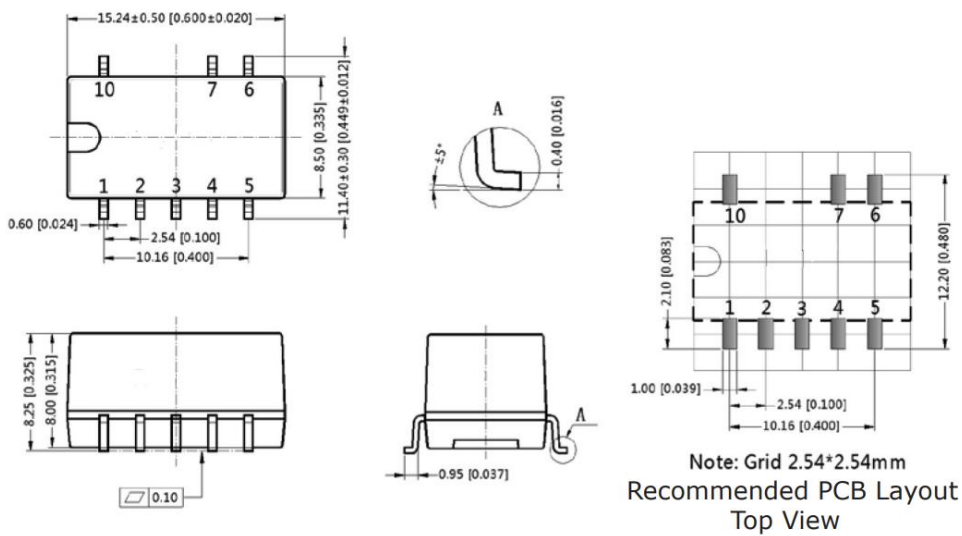
Vout(V)	R1(kΩ)	R2(kΩ)	R3(kΩ)	Vref(V)
1.5	7.5	7.5	15	0.75
1.8	4.7	3.3	6.8	0.75
2.5	9.1	3.9	8.2	0.75
3.3	75	22	75	0.75
5	43	7.5	33	0.75
6.5	43	5.6	22	0.75
9	43	3.9	22	0.75
12	36	2.4	10	0.75

Note: The 1.5V model's output voltage can only be adjusted up (Vadj up) and cannot be adjusted to a lower voltage (Vadj down is not applicable).

Dimensions and Recommended Layout

units: mm [inch]
tolerance: $\pm 0.50[\pm 0.020]$
pin section tolerance: $\pm 0.10[\pm 0.004]$

PIN CONNECTIONS	
PIN	FUNCTION
1	+VIN
2	+VIN
3	GND
4	+VOUT
5	+VOUT
6	V adj
7	GND
10	remote on/off



Note:

1. The max. capacitive load should be tested within the input voltage range and under full load conditions;
2. Unless otherwise specified, data in this datatable should be tested under the conditions of $T_a=25^{\circ}\text{C}$, humidity<75%RH when inputting nominal voltage and outputting rated load;
3. All index testing methods in this datatable are based on our company corporate standards;
4. The performance indexes of the product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact with our technician for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";