Ordering number : ENA0295

SANYO Semiconductors
DATA SHEET

Thick-Film Hybrid IC

STK755-030 — 12V/7A Single Output MOS Chopper Regulator

Overview

The STK755-030 is a step-down chopper-type dedicated 12V single output regulator that uses a power MOSFET as its switching element. In 3-pin regulators and other dropper systems, this device can accommodate wide range of input voltages that has been difficult to support. Using only input and output capacitors and choke coils as its external components, the device enables chopper regulators with a high current (7A) to be configured as though they were 3-pin regulators.

The STK755-030 can offer broad-based support for power supply circuits in many different fields as a secondary side regulator in switching power supplies or as an output regulator after AC transformer rectification to standardize or rationalize power supply circuit design.

Applications

- Power supply for game and amusement machines
- Power supply for equipment relating to office automation and factory automation
- Secondary side regulator in switching power supplies

Features

- Input from single power supply supported
- Typical efficiency of 88% at DC 30V input, 12V/5A output
- Built-in reverse going linear overload characteristics curve overcurrent protection circuit
- 125kHz (typ.) operating frequency
- Power MOSFET used
- Built-in cut-off function to enable ON/OFF control of the output using an external signal

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Specifications

Maximum Ratings at Ta = 25°C, Tc = 25°C unless otherwise specified

Parameter	Symbol	Conditions	Ratings	Unit
Operating IC substrate temperature	Tc max		+105	°C
Operating ambient temperature	Topr		-10 to +85	°C
Storage ambient temperature	Tstg		-30 to +105	°C
DC input voltage	V_{IN} max		60	V
Output current	I_O max		7	A

Recommended Operating Conditions

Parameter	Symbol	Conditions	Ratings	Unit
Operating IC substrate temperature	Tc		to +85	°C
DC input voltage	V_{IN}		20 to 40	V
Load current	I_O		0 to 7	A

Electrical Characteristics at Ta=25°C, V_{DD}, in the specified circuit, V_{IN}=30V unless otherwise specifide

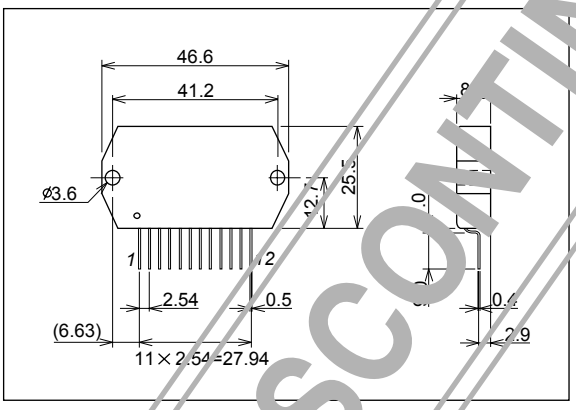
Parameter	Symbol	Conditions	Ratings			Unit
			min	Typ (*1)	max	
Output voltage	V_O	V_{IN}=24V, I_O=1A	11.8	12.0	12.2	V
Ripple voltage	Vrp	I_O=7A		50	100	mVp-p
Total regulation	Reg	V_{IN}=20 to 40V I_O=1 to 7A Tc=+25 to +35°C	11.7		12.3	V
Overcurrent protection start current	Iocp		7		11	A
Efficiency	η	I_O=5A		88		%
Operating frequency	fosc	I_O=1A		125		kHz

*1: The figures in this column represent design targets and are not guaranteed values.

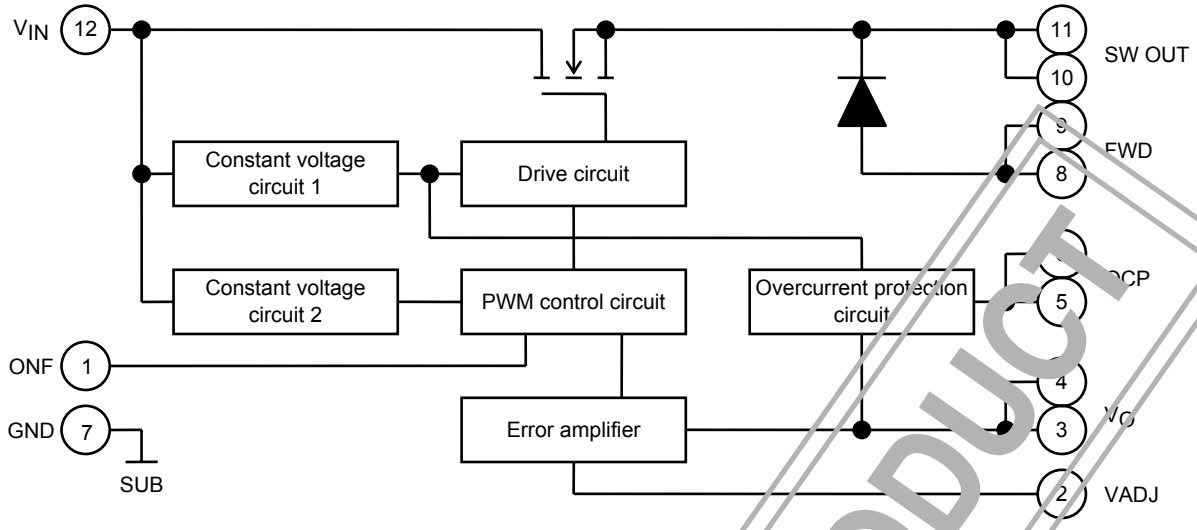
Package Dimensions

unit : mm

4210



Block Diagram

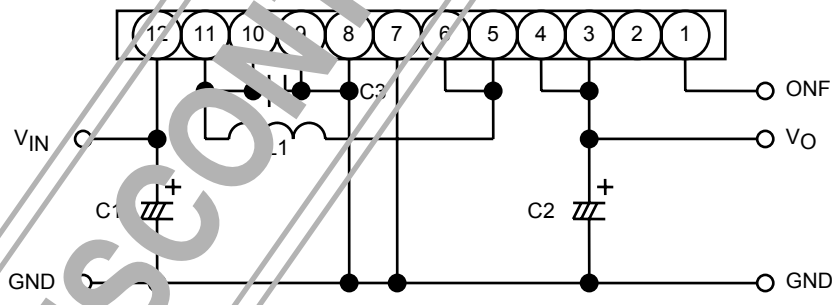


Note: The rear side of this IC is not perfectly insulated. Therefore, its voltage potential may be set to ground level (pin (7)). Bear this in mind at times when mounting a heat sink or the like.

Pin Descriptions

Pin No.	Pin Name	Description
1	ONF	Remote ON/OFF (must be held open when not to be used)
2	VADJ	Output voltage fine adjustment (must be held open when not to be used)
3, 4	V_O	Output voltage sensing
5, 6	OCP	Overcurrent sensing
7	GND	Ground
8, 9	FWD	Flywheel diode anode
10, 11	SW OUT	Output
12	V_{IN}	Input supply voltage

Test Circuit



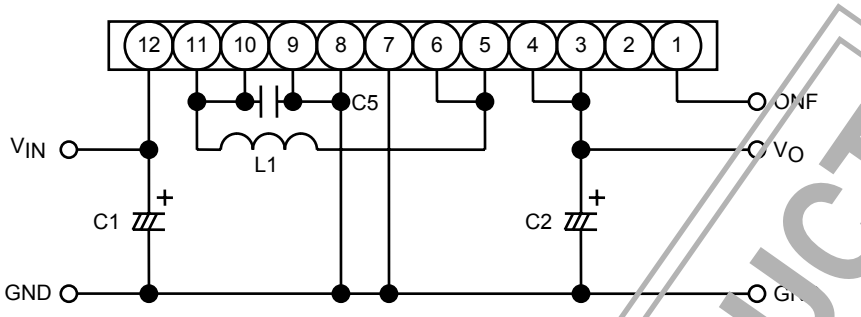
Parts Table

Symbol	Part Name	Requirements
C1	Electrolytic capacitor	3000μF to 3300μF
C2	Electrolytic capacitor	2000μF to 2200μF
C3	Ceramic capacitor	1000pF
L1	Choke coil	90μH

Note: Terminal capacitor for measuring the ripple voltages: 0.1μF/50V film capacitor (TF capacitor)
Since pin (7) is grounded to the IMST substrate, this may have an effect on noise and other factors if the heat sink is connected in the circuitry to the frame ground (FG), a GND line, etc. In cases like this, the heat sink must be floated or an insulating sheet must be used.

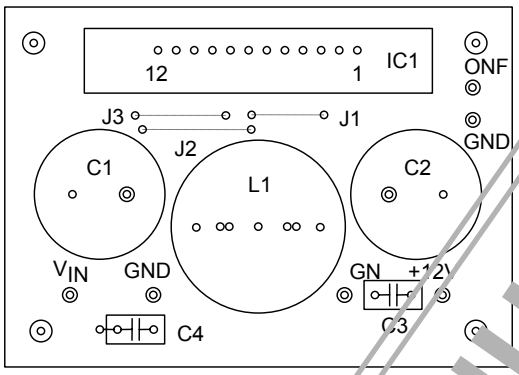
Evaluation Board

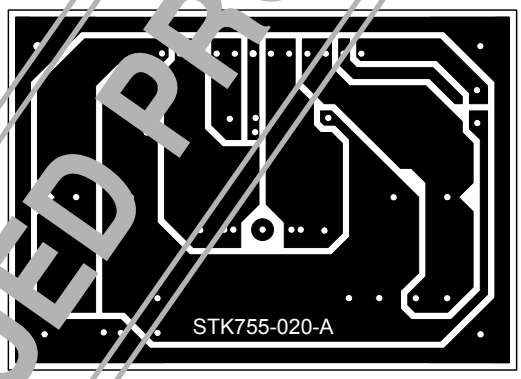
♦Equivalent Circuit



♦PCB Diagram

Silk screen pattern (seen from soldered side)　　Circuit pattern (soldered side)





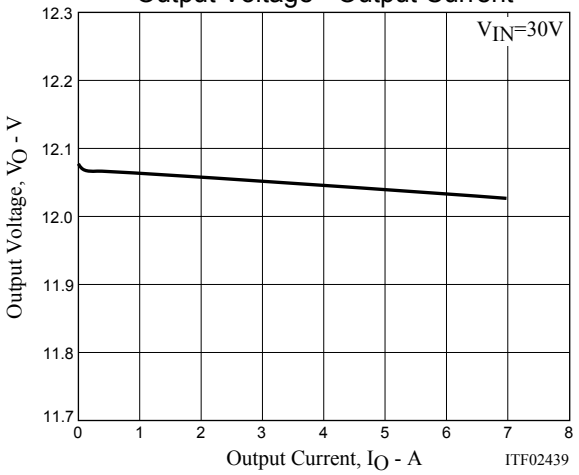
♦Parts Table

Symbol	Part Name	Requirements	Manufacturer	Remarks
C1	Electrolytic capacitor	3300μF/50V	SANYO Electric Co., Ltd.	CZ
C2	Electrolytic capacitor	2200μF/50V	SANYO Electric Co., Ltd.	CZ
C5	Ceramic capacitor	1000pF/50V		Mounted on soldered side
L1	Choke coil	SI-24BS-110-100	Toho Zinc Co., Ltd.	90μH

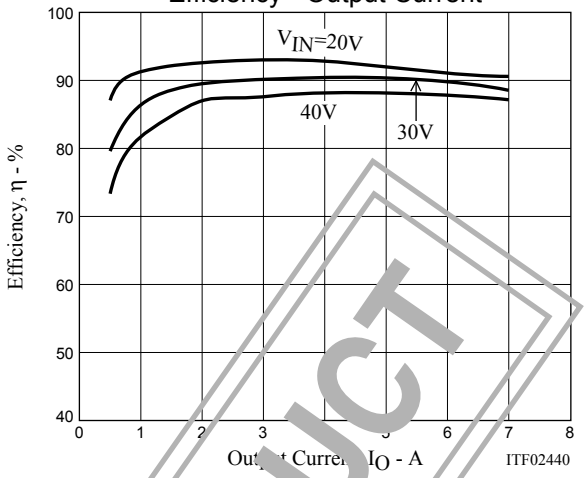
J1: Jumper (10mm), J3: Jumper (15mm)
C3, C4, J2: None

Sample Characteristics at Ta = 25°C, in the test circuit

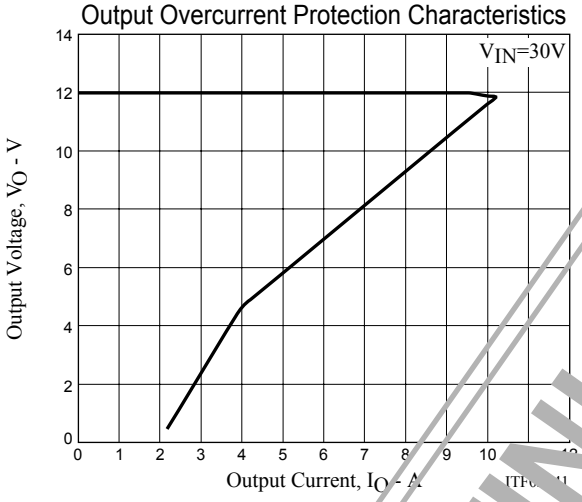
Output Voltage - Output Current



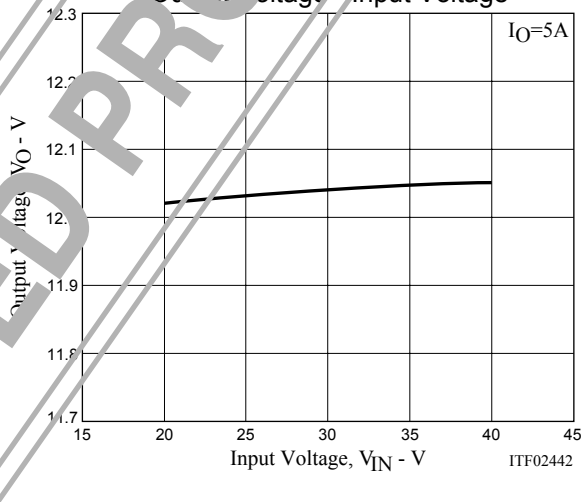
Efficiency - Output Current



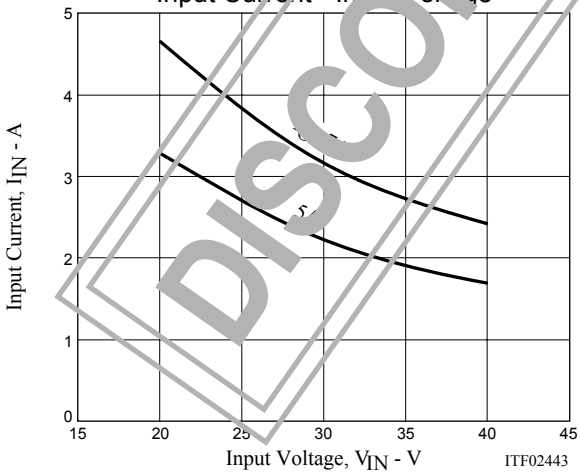
Output Overcurrent Protection Characteristics



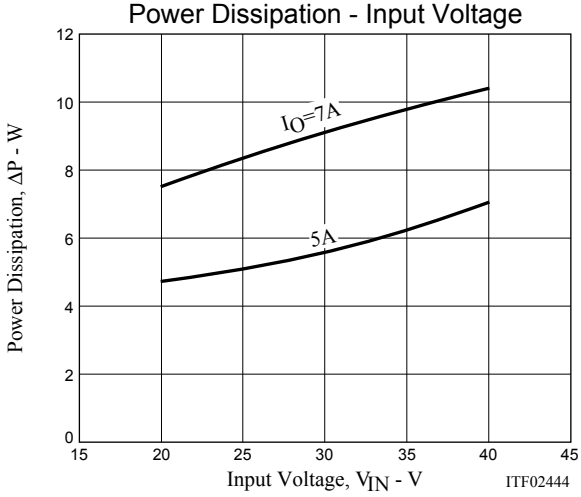
Output Voltage - Input Voltage



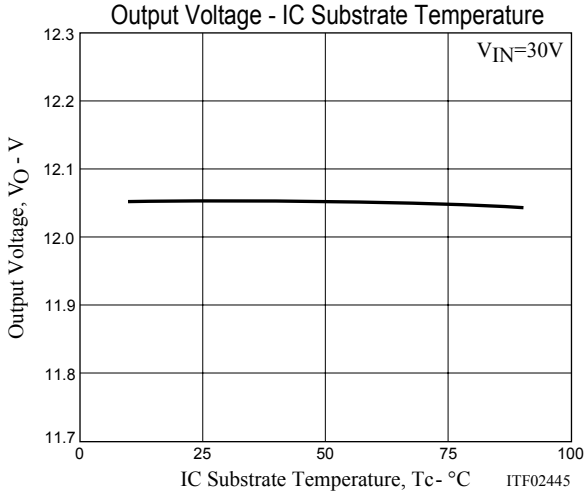
Input Current - Input Voltage



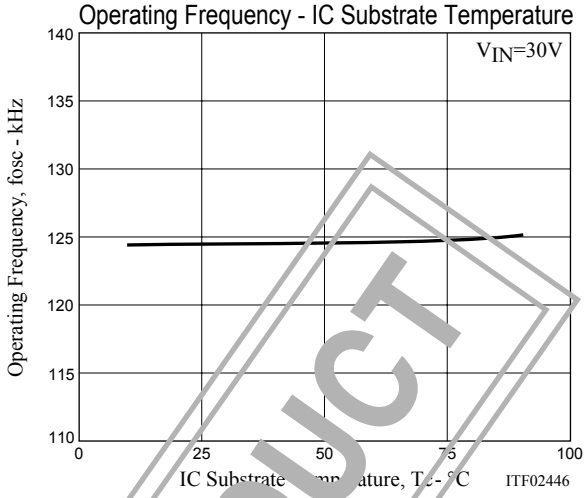
Power Dissipation - Input Voltage



Temperature Characteristics:
Output Voltage - IC Substrate Temperature



Temperature Characteristics:
Operating Frequency - IC Substrate Temperature

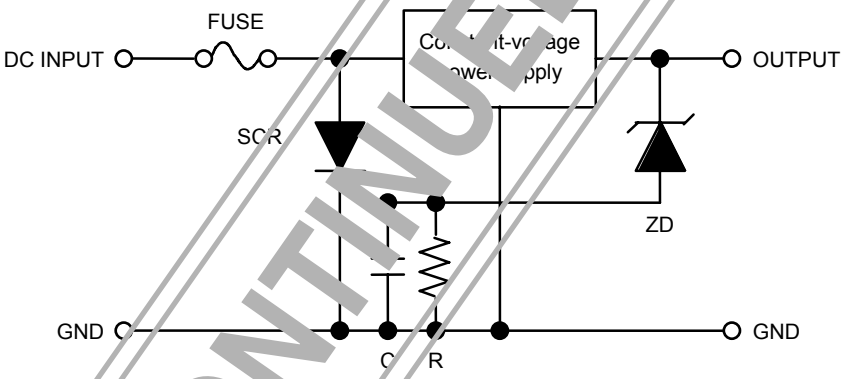


Use of an Overvoltage Protection Circuit Recommended

Generally, when constant-voltage power supply circuits have failed or are subject to defective soldering on PC boards, an overvoltage (which corresponds to the input voltage) may occur; that is to say, a voltage higher than the predetermined level is output.

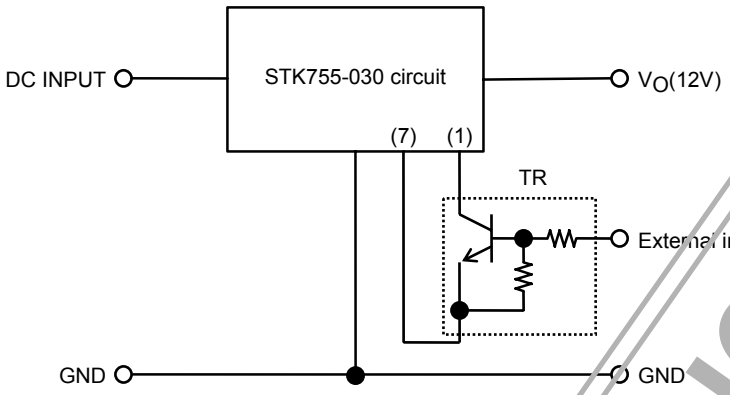
To minimize the damage and harm that an overvoltage can cause, the provision of an overvoltage protection circuit is therefore recommended.

Overvoltage Protection Circuit Example



Cut-off Function: ON/OFF control exercised over 12V output using an external signal

ON/OFF Control Circuit Example



When pin (1) is set to a low voltage, the 12V output is turned off. TR ON→ 12V output OFF
Be absolutely sure to conduct the following checks at the design stage for products in which the STK755-030 will actually be used.

1) Check the operation and effects of the output ON/OFF control.
2) Check that the changes in the ambient temperatures of the devices, external noise and other factors do not cause errors or trouble in operation.

Points to Factor into the Pattern Design

1) Connect the FWD pins (pins (8) and (9)) to the input capacitor (-).
2) Ensure that the FWD pins (pins (8) and (9)) and the GND pin (pin (7)) line are separate from one another.
3) Connect the GND pin (pin (7)) to the input capacitor (-) or output capacitor (-). Normally, it is connected to the output capacitor (-).
4) Make the line between the input capacitor (-) and output capacitor (-) as short as possible. See the PCB diagram in the Evaluation Board for a concrete example.