Ordering number:ENN1709C

Thick Film Hybrid IC

STK795

Chopper Type Voltage Regulator

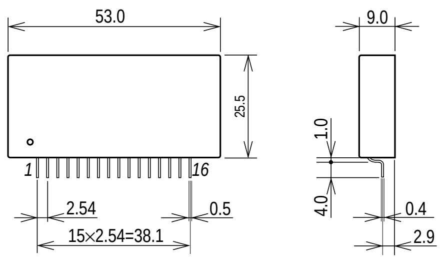
Features

- Self-oscillation type chopper regulator power IC using Sanyo's original IMST (Insulated Metal Substrate Technology) substrate.
- The STK795, being a 5V chopper IC, is more advantageous in the following points as compared with series regulator (dropper type) ICs.
  1. Possible to provide a 5V output power supply circuit with high efficiency.
  2. Since the input voltage range is wide, no more than one rectifying/smoothing circuit is required to provide a multi-output power supply circuit which also delivers 12V or 24V output.
- Functional trimming is used to set 5V output with high accuracy.
- Cutoff function to cut off output voltage by external signal.
- Contains a transistor for overcurrent protector (foldback characteristic) and possibel to set the protection level externally.

Package Dimensions

unit:mm

4063A



Specifications

Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum DC Input Voltage	$V_{in(DC)}$ max		40	V
Maximum Output Current	I_O max		3	A
Operating Substrate Temperature	Tc		105	˚C
Junction Temperature	Tj		150	˚C
Storage temperature	Tstg		–30 to +105	˚C

Operating Characteristics at Ta = 25˚C, See specified Test Circuit.

Parameter	Symbol	Conditions	Ratings min	Ratings typ	Ratings max	Unit
Output Voltage	V_O	V_{IN}=12V, I_O=1.5A	4.9	5.0	5.1	V
Line Regulation		V_{IN}=10 to 15V, I_O=1.5A		70	100	mV
Load Regulation		V_{IN}=12V, I_O=0.5 to 3A		30	60	mV
Efficiency		V_{IN}=12V, I_O=1.5A		72		%
Frequency	f	V_{IN}=12V, I_O=1.5A		35		kHz
Temperature Coefficient		V_{IN}=12V, I_O=1.5A		1		mV/˚C

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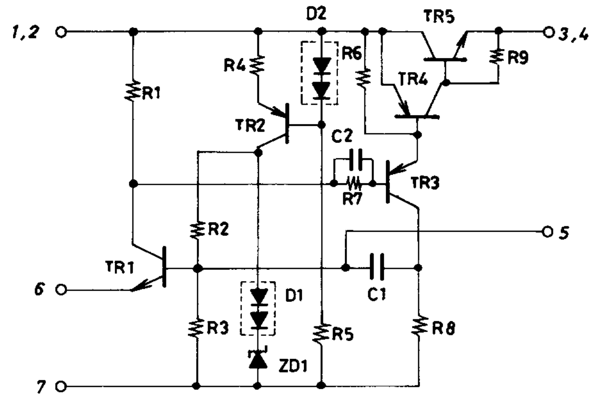
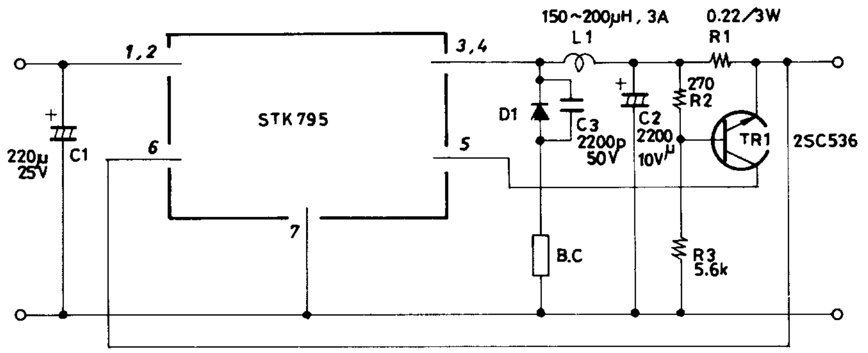
Equivalent Circuit



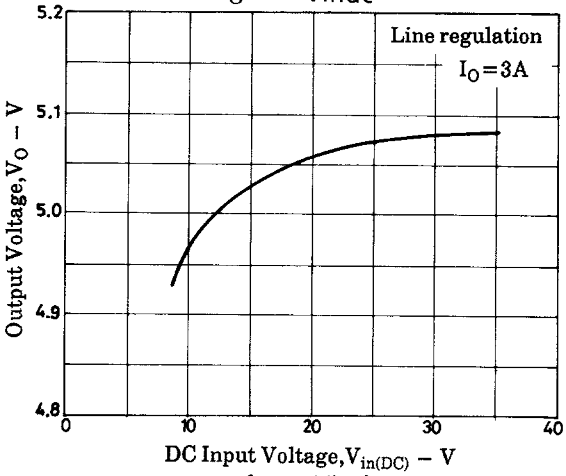
Test Circuit



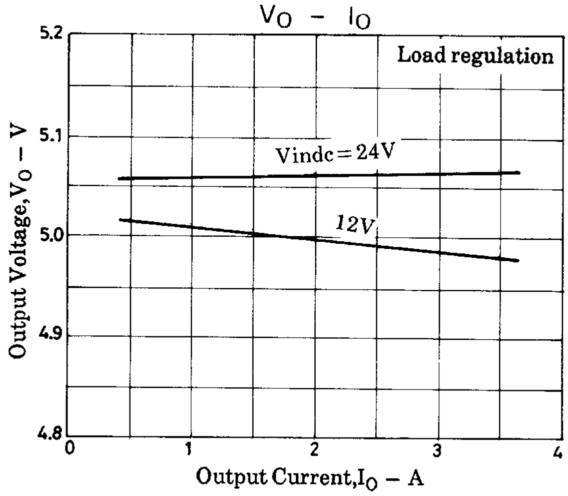
Unit (resistance: Ω, capacitance: F)

Note) · D1 : Schottky barrier diode SB40-05.
· B. C. : Beads core, 2 to 3μH.
· C3, B. C. are used to reduce switching spike noise.
· TR1 is used to provide overcurrent protection.
If no protection is required, remove TR1.
· A current of 0.5A min. must flow in the load.

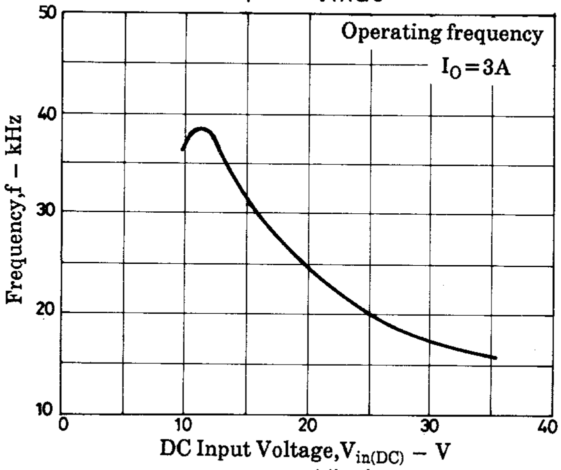
V_O – Vindc



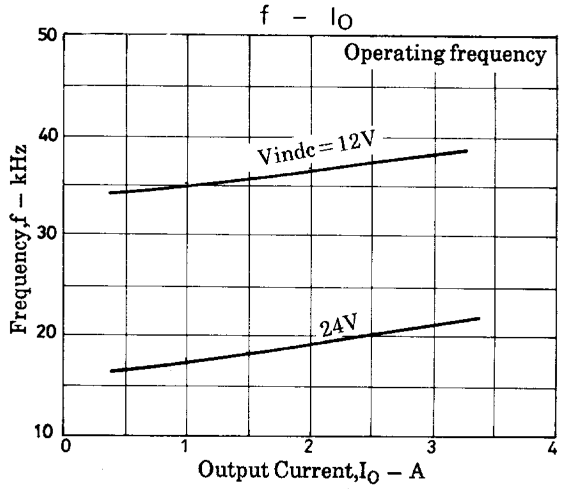
V_O – I_O



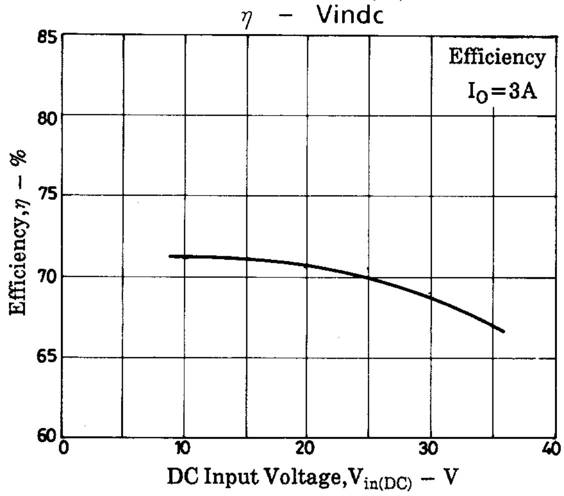
f – Vindc



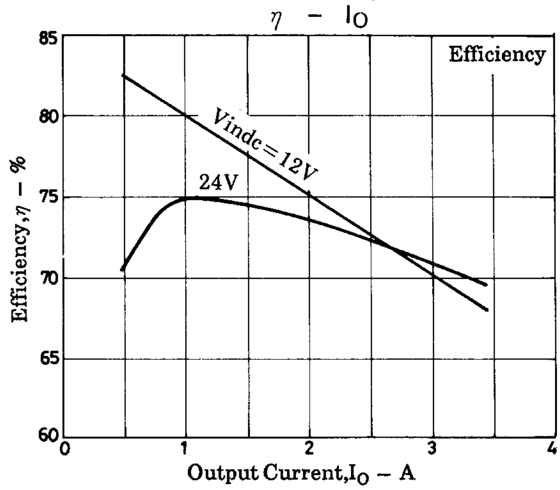
f – I_O



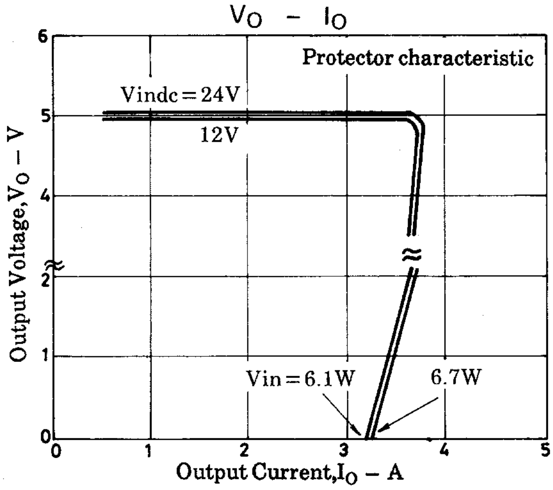
η – Vindc



η – I_O

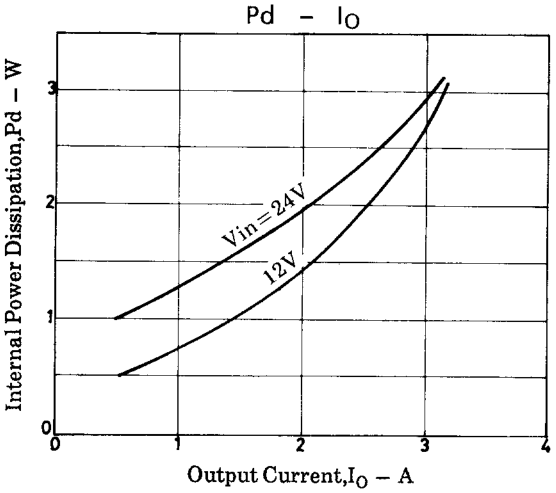


V_O – I_O



Thermal Design

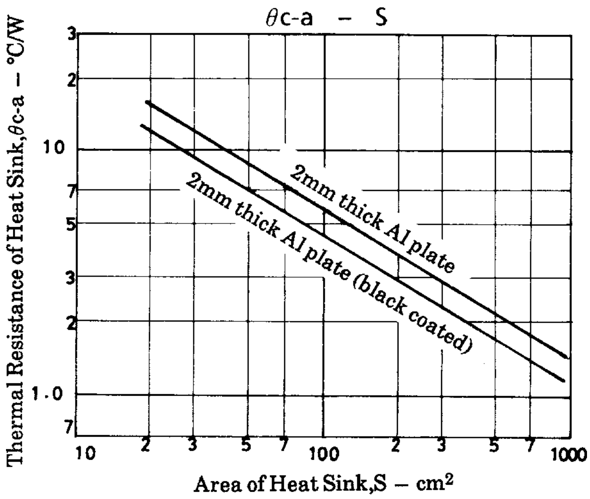
The total internal power dissipation in the IC is related to the output current as shown below. Assuming $V_{in(DC)}$=12V, output current=3A, the total internal power dissipation is 2.7W.



Assuming that the IC case temperature (Al plate) is 85°C (Tc max=105°C) and the temperature inside equipment is 60°C max., the thermal resistance required of the heat sink is as shown below.

$$\theta c\text{-}a = \frac{85°C - 60°C}{2.7W}$$

$$= 9.3°C/W$$



For 2mm thick Al plate (black coated), the area is 30cm^2. (55×55×2t)

Junction temperature Tj of the power transistor which forms a main heat source is calculated as follows :

The thermal resistance of the power transistor is : θj-c=6.2°C/W

Therefore, Tj is calculated using Tj=Pd×θj-c+Tc.

Tj=2.7W×6.2°C/W+85°C=101.7°C

Since the actual thermal resistance of the heat sink greatly depends on various conditions such as the layout of equipment or ventilation, allow an ample margin in thermal design.