



STK730-010

Self-Excitation Type Semi-Regulated Switching Regulator (110W Output)

Overview

The STK730-010 incorporates on-chip all the power switching, amplifier, error detection and overcurrent protection circuits required in a self-excitation type semi-regulated off-line switching regulator. As a result, it can be used in the design of switching power supplies with minimal number of external components. Furthermore, the adoption of MOSFET power switching elements supports a higher oscillator frequency than that possible with bipolar transistors. This allows smaller pulse transformers and capacitors to be used, making it possible to construct miniature power supply systems.

Applications

- CRT/CTV power supplies
- Office automation equipment power supplies

Features

- Power MOSFET devices
- Ideal for semi-regulated control switching supplies
- Error detection circuit on-chip ($40.5 \pm 0.5V$ set reference voltage)
- Overcurrent protection circuit on-chip
- Pin compatible with all other devices in the same series of devices with 110 to 280W power ratings
- Higher oscillator frequency allows the use of smaller pulse transformers
- IMST substrate acts as an electromagnetic shield, making low-noise designs possible

Specifications

Maximum Ratings at $T_a = 25^\circ C$, $T_c = 25^\circ C$ unless otherwise specified

Parameter	Symbol	Conditions	Ratings	Unit
Operating substrate temperature	$T_c \text{ max}$	Recommended value is $105^\circ C$	115	$^\circ C$
AC input voltage	V_{AC}	Specified test circuit	140	Vrms
Operating temperature	T_{opr}		-10 to $+85$	$^\circ C$
Storage temperature	T_{stg}		-30 to $+115$	$^\circ C$
Maximum output power	$W_o \text{ max}$	Specified test circuit, $V_O = 135V$	110	W

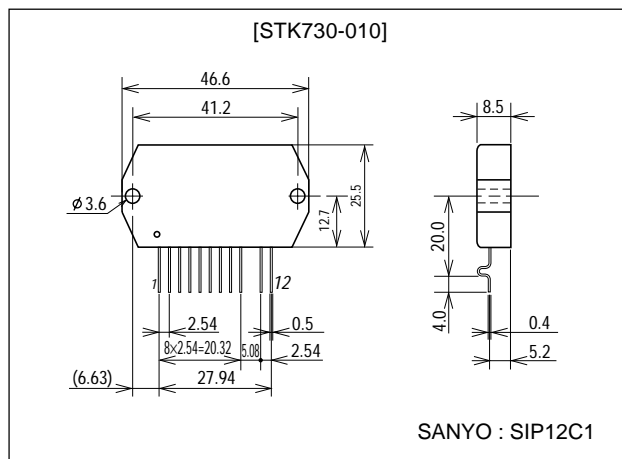
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Package Dimensions

unit:mm

4121



STK730-010

Parameter	Symbol	Conditions	Ratings	Unit
[TR1]				
Drain current	I_D	Refer to ASO characteristics for overcurrent condition.	6	A
Pulse drain current	$I_{D(pulse)}$		20	A
Drain reverse current	I_{DR}		6	A
Gate-source voltage	V_{GSS}		± 30	V
Allowable power dissipation	P_D		78.1	W
Chip junction temperature	$T_J \text{ max}$		150	$^{\circ}\text{C}$
Thermal resistance	θ_{j-c}		1.6	$^{\circ}\text{C/W}$
[ZD1]				
Allowable power dissipation	P_{ZD1}		500	mW
Chip junction temperature	$T_J(ZD1) \text{ max}$		125	$^{\circ}\text{C}$
Thermal resistance	$\theta_{j-c}(ZD1)$		0.2	$^{\circ}\text{C/W}$

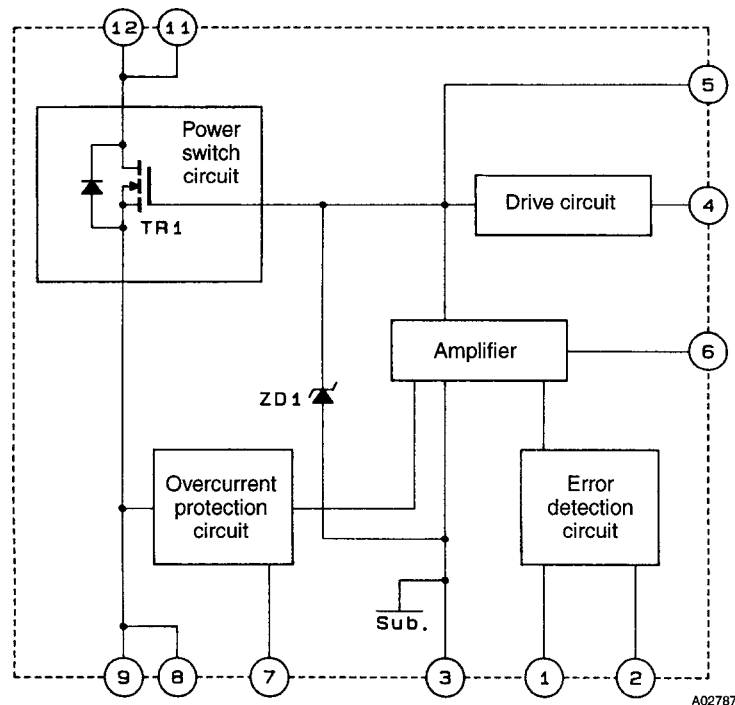
Allowable Operating Ranges at $T_a = 25^{\circ}\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Pin 4 input voltage	V_4		± 8 to ± 24	V
Oscillator frequency	f_{OSC}		20 to 120	kHz

Operating Characteristics at $T_a = 25^{\circ}\text{C}$, $T_c = 25^{\circ}\text{C}$ unless otherwise specified, specified test circuit

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage setting		$I_{IN} = 8\text{mA}$	40.0	40.5	41.0	V
Output voltage temperature coefficient		$T_c = 0$ to 105°C , $I_{IN} = 8\text{mA}$		7		$\text{mV}/^{\circ}\text{C}$
[TR1]						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D = 10\text{mA}$, $V_{GS} = 0\text{V}$	500			V
Gate-source cutoff voltage	$V_{GS(off)}$	$I_D = 1\text{mA}$, $V_{DS} = 10\text{V}$	2.0		3.0	V
ON resistance	$R_{DS(on)}$	$I_D = 2.5\text{A}$, $V_{GS} = 10\text{V}$		1.4	1.8	Ω
Input capacitance	C_{iss}	$V_{DS} = 10\text{V}$, $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$		800		pF
[ZD1]						
Zener voltage	V_Z	$I_Z = 5\text{mA}$	23.7		26.3	V

Block Diagram

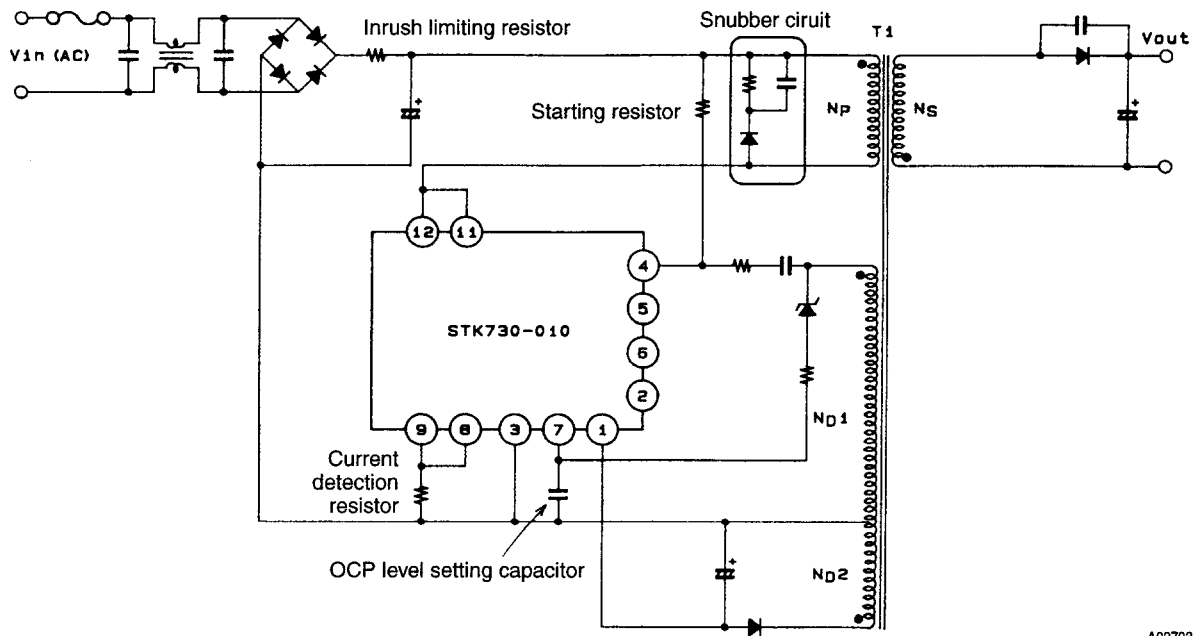


The back surface of the IC is not an insulator, and is effectively at pin 3 potential.

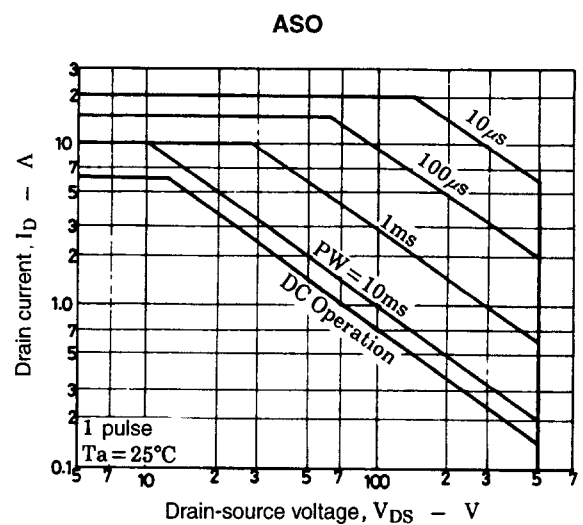
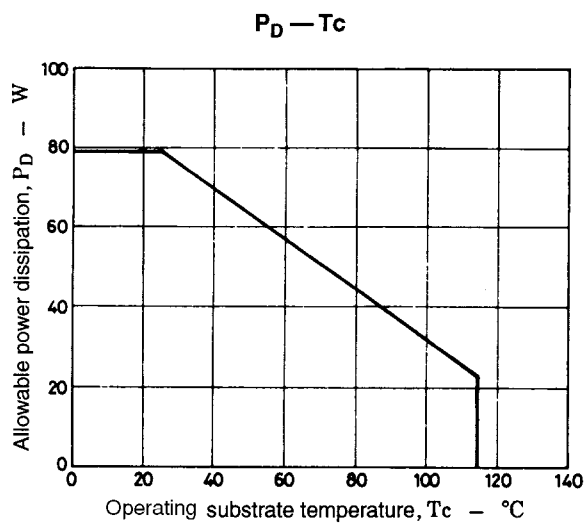
Pin Functions

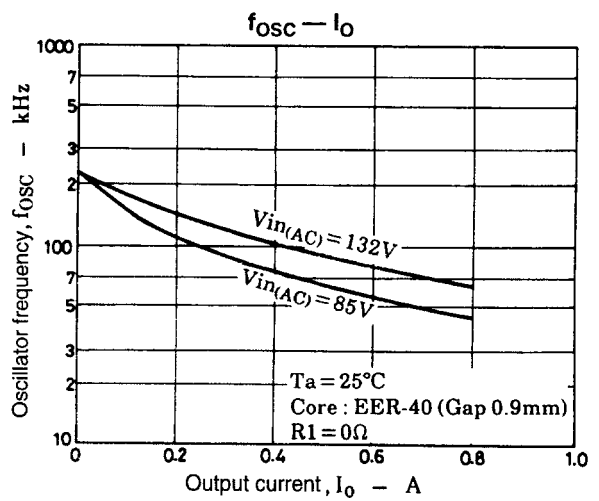
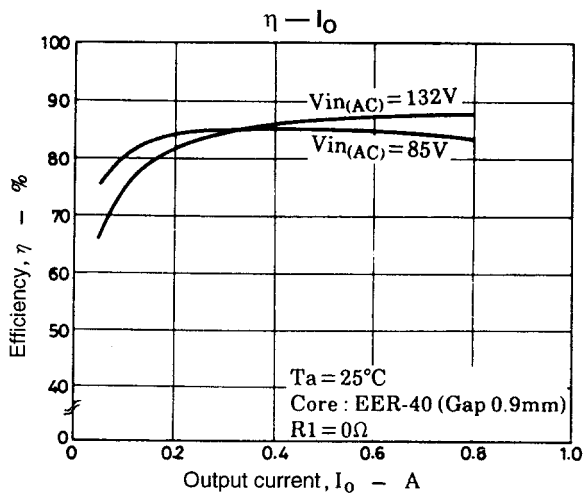
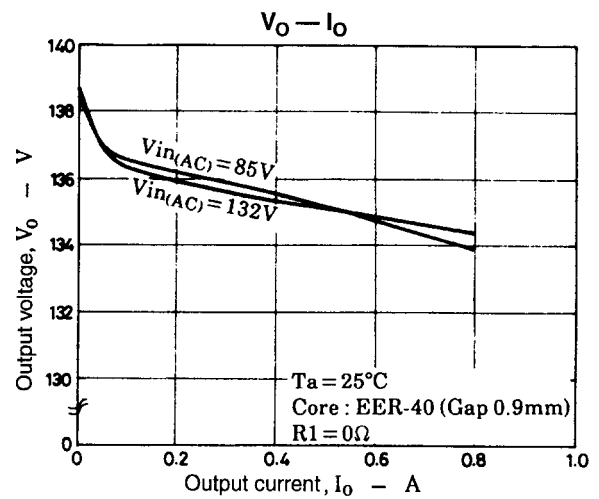
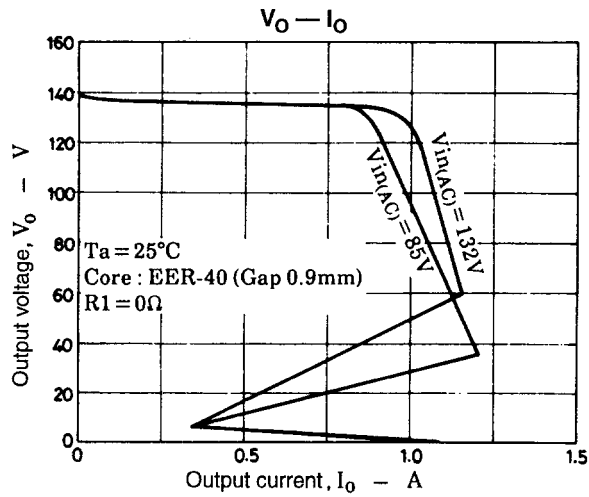
Number	Function
1	Vref (40.5V typ) input
2	Error detection level
3	Ground
4	Drive voltage input
5	TR1 gate
6	Amplifier circuit control
7	OCP setting level input
8	TR1 source
11	TR1 drain
12	

Circuit Function Diagram



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Series Organization

The devices form a series with varying output power ratings.

Device	Maximum ratings					Operating characteristics		
	V_{DSS} [V]	T_{stg} [°C]	$T_c \text{ max}$ [°C]	$T_j \text{ max}$ [°C]	I_D [A]	Input voltage [V]	Output power [W]	ON resistance [Ω]
STK730-010	500	-30 to +115	+115	+150	6.0	85 to 132	110	1.4
STK730-020					8.0		145	0.8
STK730-030					10.0		180	0.7
STK730-040					12.0		210	0.55
STK730-050					15.0		280	0.3
STK730-060	900	-30 to +115	+115	+150	3.0	170 to 264	110	5.0
STK730-070					5.0		180	3.0
STK730-080					6.0		210	2.0
STK730-090					8.0		280	1.2

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