Ordering number: EN 5025

Thick Film Hybrid IC

No. 5025

STK730-020

Self-Excitation Type Semi-Regulated Switching Regulator (145W Output)

Overview

The STK730-020 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

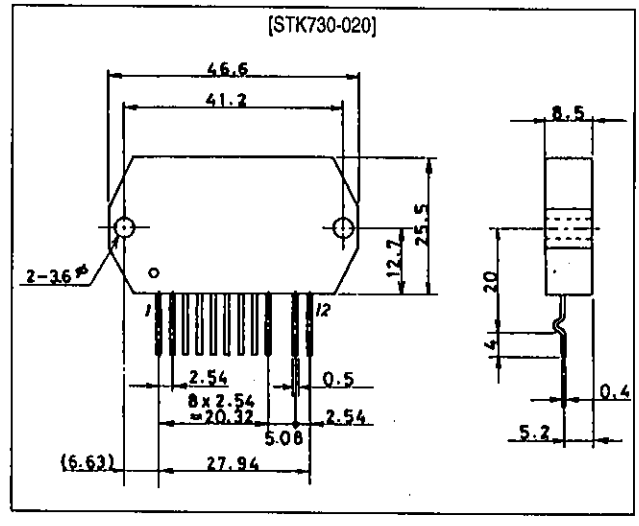
Features

- Power MOSFET devices
- Ideal for semi-regulated control switching supplies
- Error detection circuit on-chip (40.5 ± 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

Package Dimensions

unit: mm

4121



Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Operating substrate temperature	Tc max	Recommended value is 105°C.	115	°C
AC input voltage	V_{AC}	Specified test circuit	140	Vrms
Operating temperature	Topr		–10 to +85	°C
Storage temperature	Tstg		–30 to +115	°C
Maximum output power	Wo max	Specified test circuit, V_O = 135V	150	W
[TR1]				
Drain current	I_D	Refer to ASO characteristics for overcurrent condition.	8	A
Pulse drain current	$I_{D(pulse)}$		30	A
Drain reverse current	I_{DR}		8	A
Gate-source voltage	V_{GSS}		±30	V
Allowable power dissipation	P_D		89.3	W
Chip junction temperature	Tj max		150	°C
Thermal resistance	θj-c		1.4	°C/W
[ZD1]				
Allowable power dissipation	P_{ZD1}		500	mW
Chip junction temperature	$Tj_{(ZD1)}$ max		125	°C
Thermal resistance	$θj\text{-}c_{(ZD1)}$		0.2	°C/mW

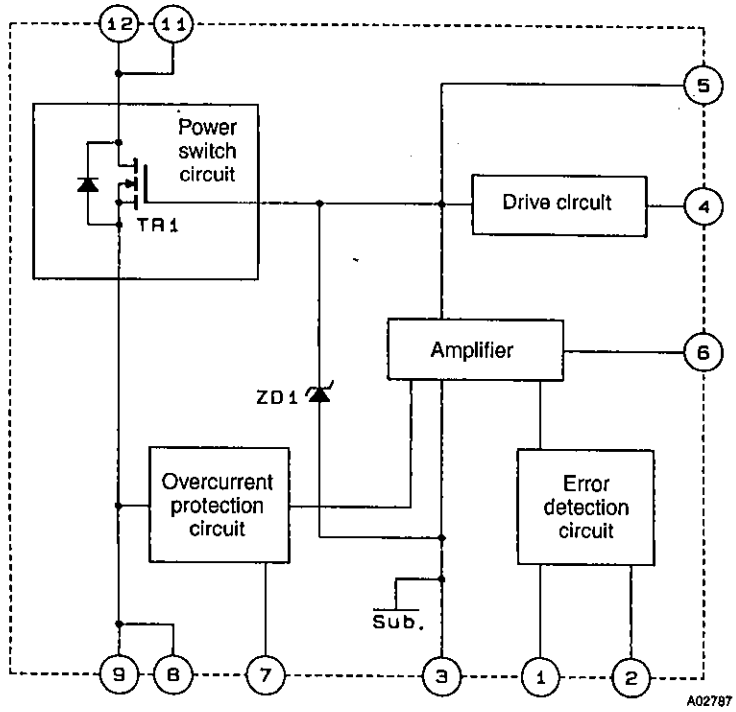
Recommended Operating Conditions at Ta = 25°C

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 Ta = 25°C, Tc = 25°C unless otherwise specified, specified test circuit

Parameter	Symbol	Conditions	min	typ	max	Unit
Output voltage setting		I_{in} = 8mA	40.0	40.5	41.0	V
Output voltage temperature coefficient		Tc = 0 to 105°C, I_{in} = 8mA	–	7	–	mV/°C
[TR1]						
Drain-source breakdown voltage	$V_{(BR)DSS}$	I_D = 10mA, V_{GS} = 0V	500	–	–	V
Gate-source cutoff voltage	$V_{GS(off)}$	I_D = 1mA, V_{DS} = 10V	2.0	–	3.0	V
ON resistance	$R_{DS(on)}$	I_D = 4.0A, V_{GS} = 10V	–	0.8	1.1	Ω
Input capacitance	Ciss	V_{DS} = 10V, V_{GS} = 0V, f = 1MHz	–	1200	–	pF
[ZD1]						
Zener voltage	V_Z	I_Z = 5mA	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

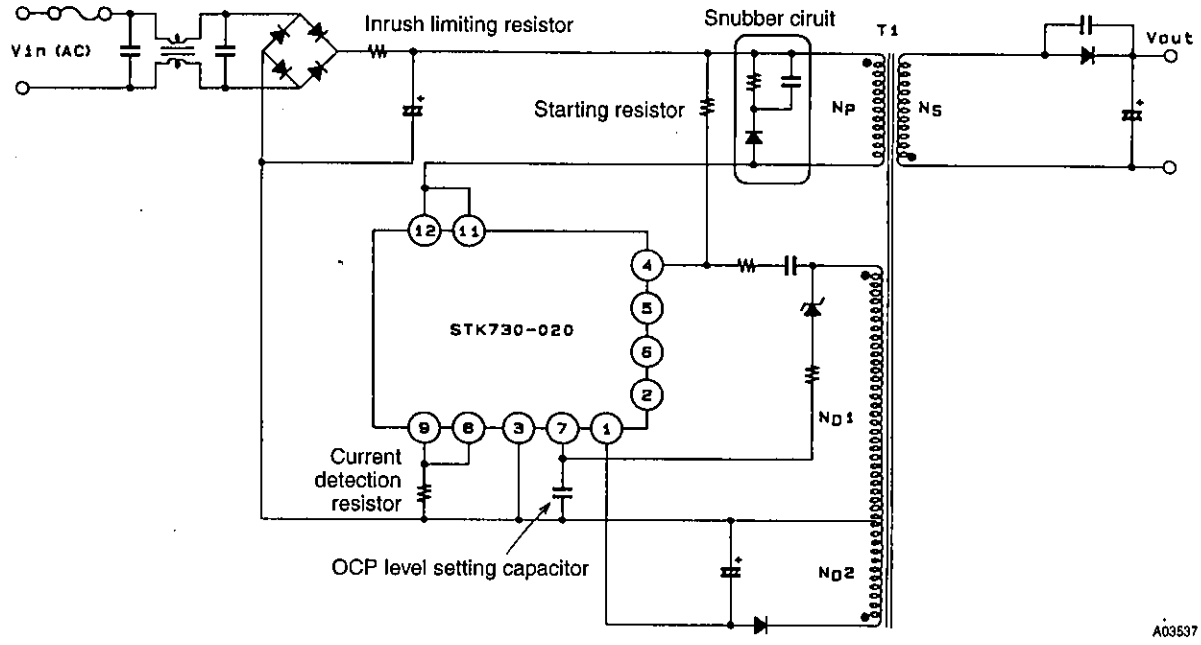
Pin No.	Function
1	V_{ref} (40.5V typ) input
2	Error detection level
3	Ground
4	Drive voltage input
5	TR1 gate
6	Amplifier circuit control
7	OCP setting level input
8	TR1 source
9	
11	TR1 drain
12	

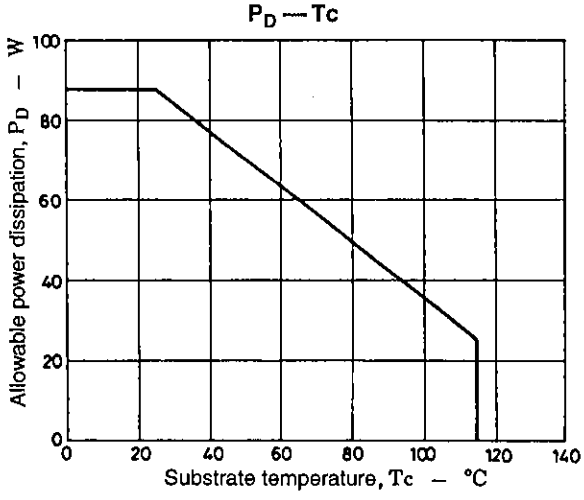
Series Organization

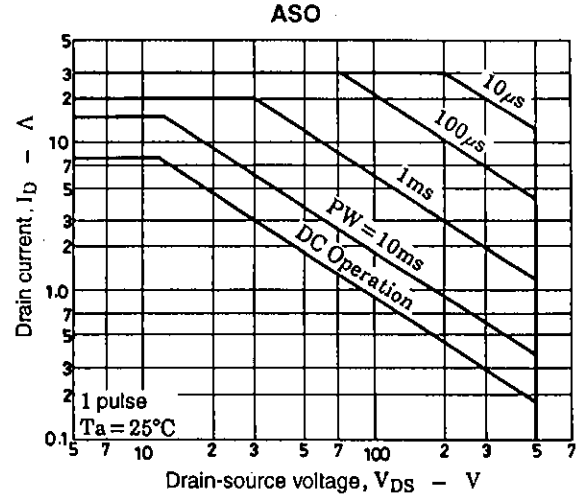
These devices form a series with varying output power ratings.

Type No.	Maximum ratings					Operating characteristics		
	V_{DSS} [V]	Tstg [°C]	Tc max [°C]	Tj 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				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

Circuit Function Diagram

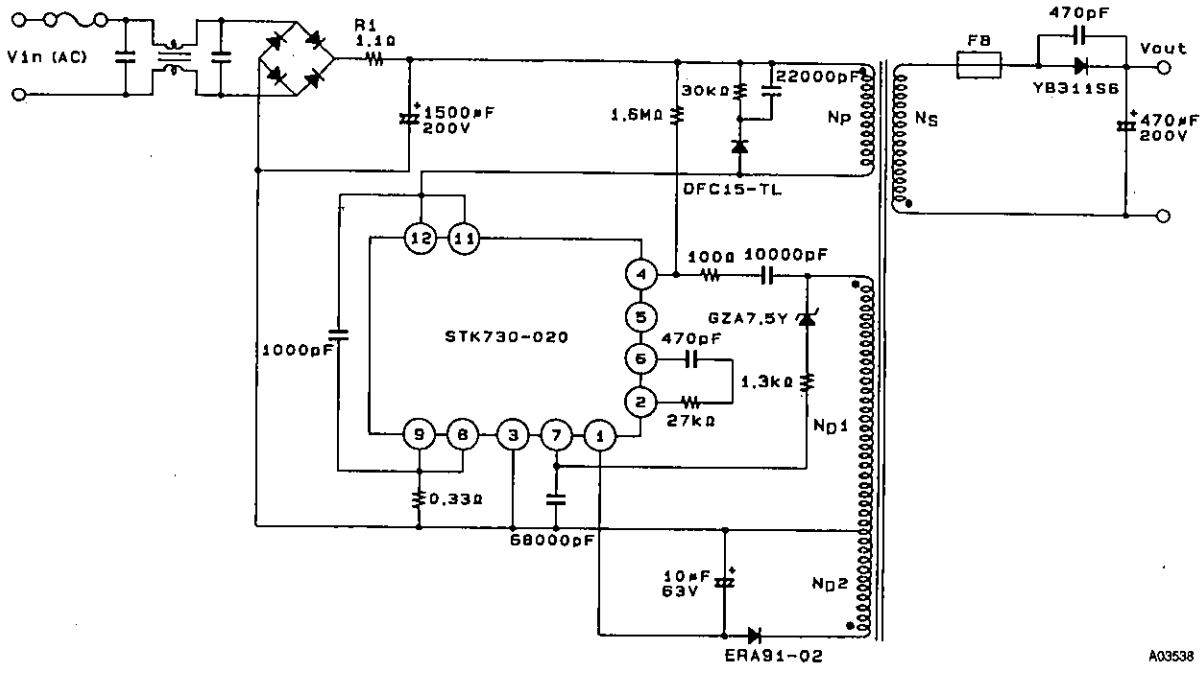






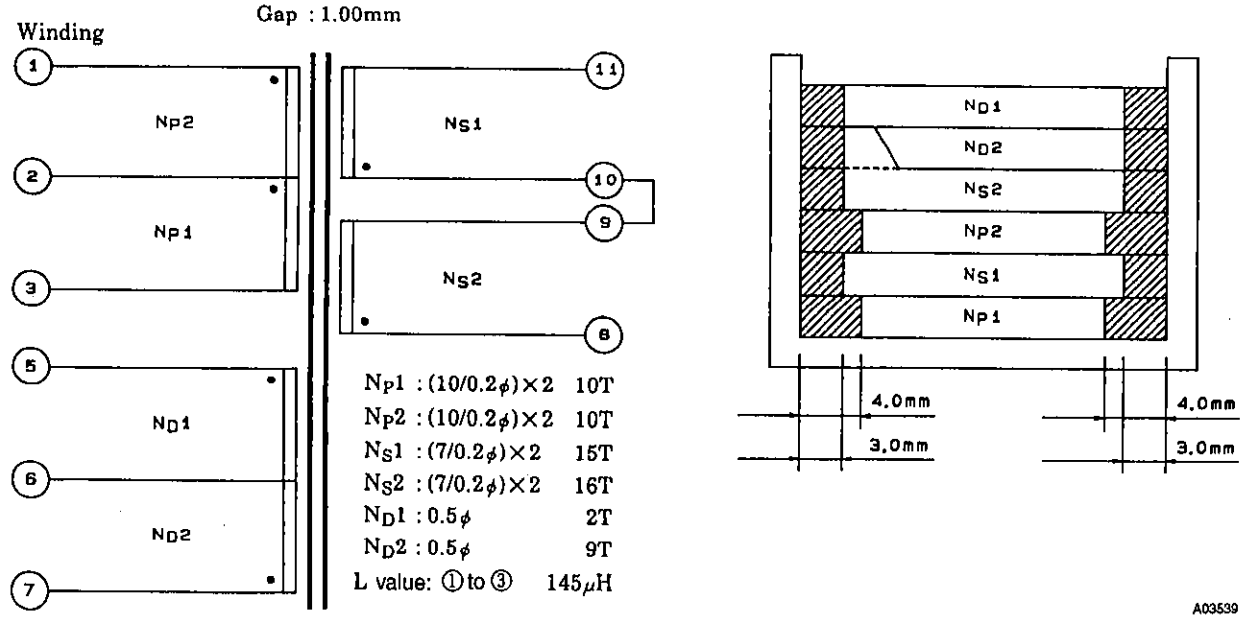
Sample Application Circuit

Input voltage: 85 to 135VAC
Output voltage: 135VDC



Pulse Transformer Specifications

Core : EER-42A
Gap : 1.00mm



N_{P1} : $(10/0.2\phi)\times2$	10T
N_{P2} : $(10/0.2\phi)\times2$	10T
N_{S1} : $(7/0.2\phi)\times2$	15T
N_{S2} : $(7/0.2\phi)\times2$	16T
N_{D1} : 0.5ϕ	2T
N_{D2} : 0.5ϕ	9T
L value: ①to③	145μH