



## 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

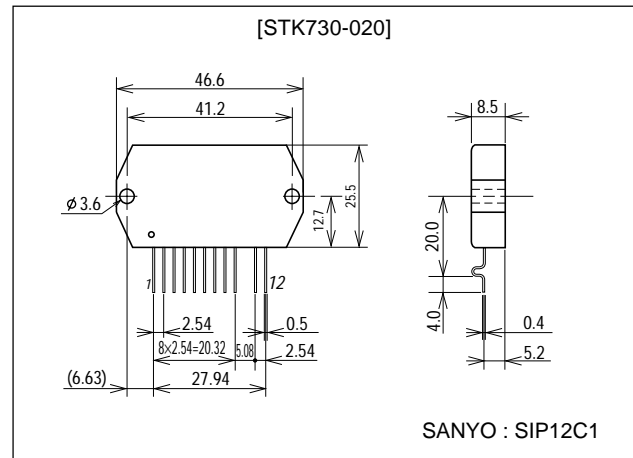
#### Features

- Power MOSFET devices
- Ideal for semi-regulated control switching supplies
- Error detection circuit on-chip ( $40.5 \pm 0.5V$  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

#### Package Dimensions

unit:mm

4121



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## 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 <sub>AC</sub>	Specified test circuit	140	V <sub>rms</sub>
Operating temperature	Topr		-10 to +85	°C
Storage temperature	Tstg		-30 to +115	°C
Maximum output power	Wo max	Specified test circuit, V <sub>O</sub> =135V	150	W
[TR1]				
Drain current	I <sub>D</sub>	Refer to ASO characteristics for overcurrent condition.	8	A
Pulse drain current	I <sub>D(pulse)</sub>		30	A
Drain reverse current	I <sub>DR</sub>		8	A
Gate-source voltage	V <sub>GSS</sub>		±30	V
Allowable power dissipation	P <sub>D</sub>		89.3	W
Chip junction temperature	Tj max		150	°C
Thermal resistance	θj-c		1.4	°C/W
[ZD1]				
Allowable power dissipation	P <sub>ZD1</sub>		500	mW
Chip junction temperature	Tj(ZD1)max		125	°C
Thermal resistance	θj-c(ZD1)		0.2	°C/W

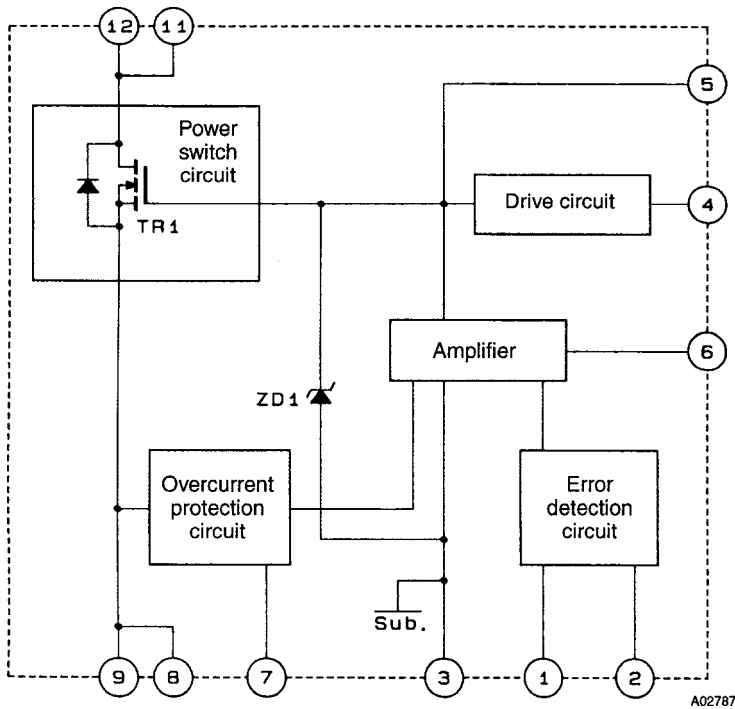
**Recommended Operating Ranges** at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Pin 4 input voltage	V <sub>4</sub>		±8 to ±24	V
Oscillator frequency	f <sub>OSC</sub>		20 to 120	kHz

**Operating Characteristics** at Ta = 25°C, Tc=25°C unless otherwise specified, specified test circuit

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage setting		I <sub>N</sub> =8mA	40.0	40.5	41.0	V
Output voltage temperature coefficient		Tc=0 to 105°C, I <sub>N</sub> =8mA		7		mV/°C
[TR1]						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	I <sub>D</sub> =10mA, V <sub>GS</sub> =0V	500			V
Gate-source cutoff voltage	V <sub>GS(off)</sub>	I <sub>D</sub> =1mA, V <sub>DS</sub> =10V	2.0		3.0	V
ON resistance	R <sub>DS(on)</sub>	I <sub>D</sub> =4.0A, V <sub>GS</sub> =10V		0.8	1.1	Ω
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, f=1MHz		1200		pF
[ZD1]						
Zener voltage	V <sub>Z</sub>	I <sub>Z</sub> =5mA	23.7		26.3	V

**Block Diagram**



**Pin Functions**

Pin No.	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
9	
11	TR1 drain
12	

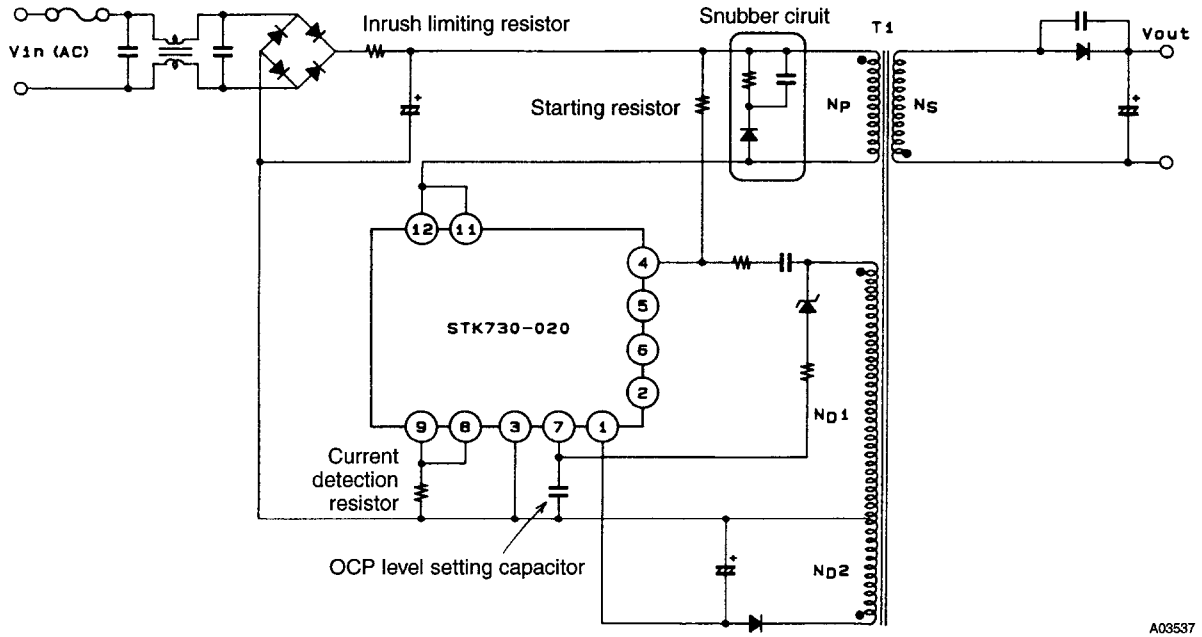
The back surface of the IC is not an insulator, and is effectively at pin 3 potential.

**Series Organization**

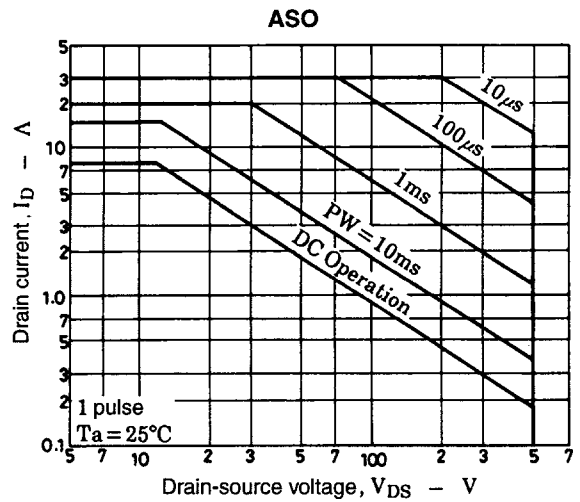
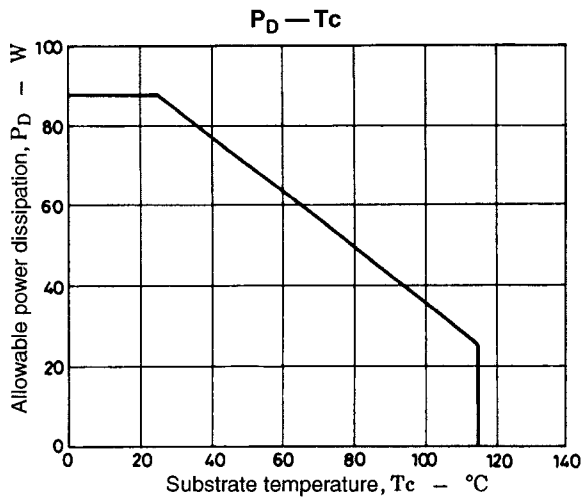
The devices form a series with varying output power ratings.

Device	Maximum ratings				Operating characteristics			
	V <sub>DSS</sub> [V]	T <sub>stg</sub> [°C]	T <sub>c max</sub> [°C]	T <sub>j max</sub> [°C]	I <sub>D</sub> [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

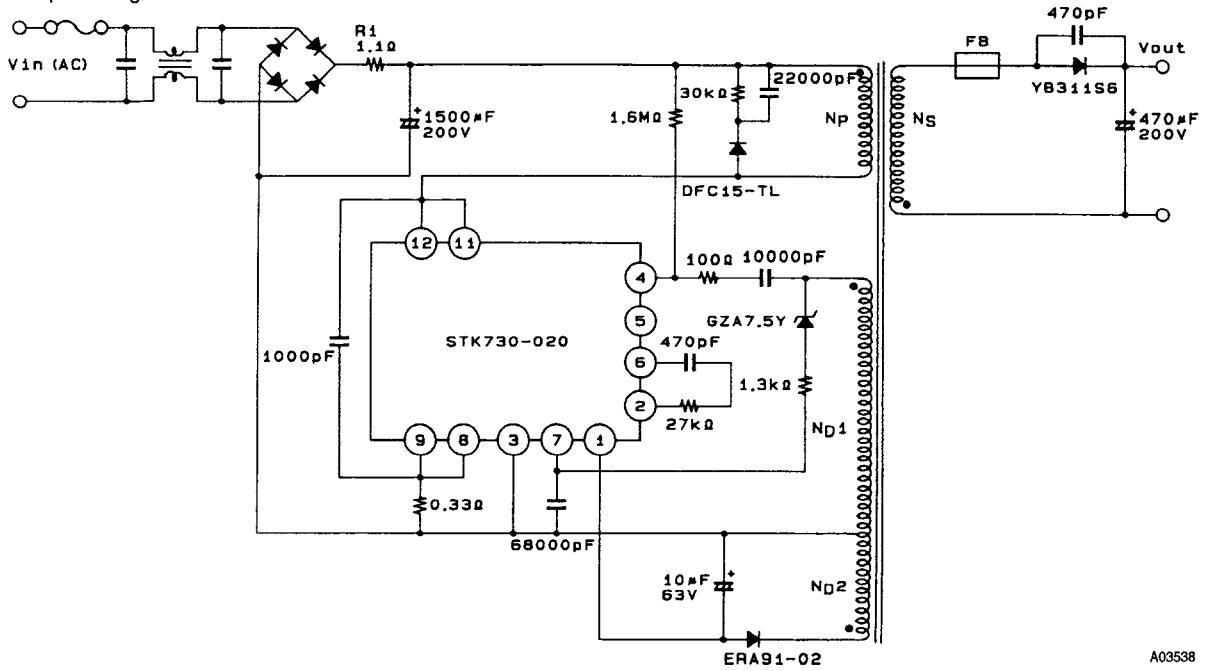


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### Sample Application Circuit

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

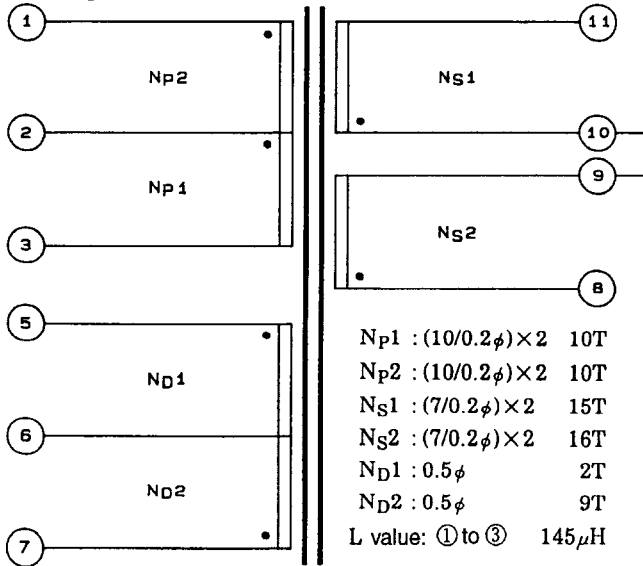


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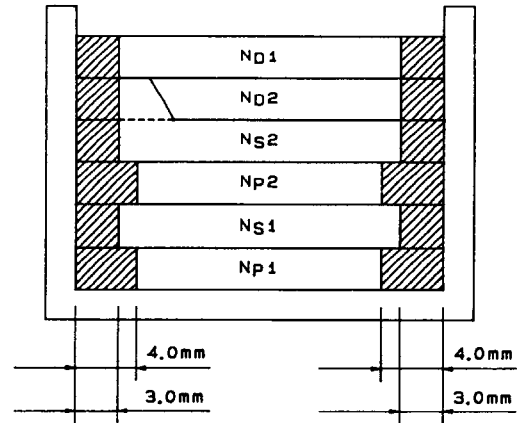
### Pulse Transformer Specifications

Core: EER-42A  
 Gap: 1.00mm

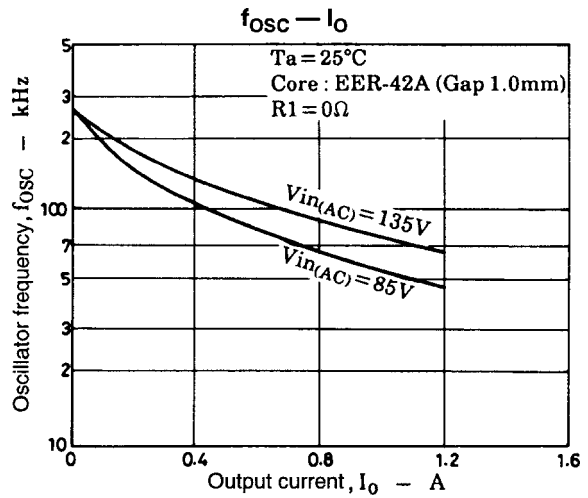
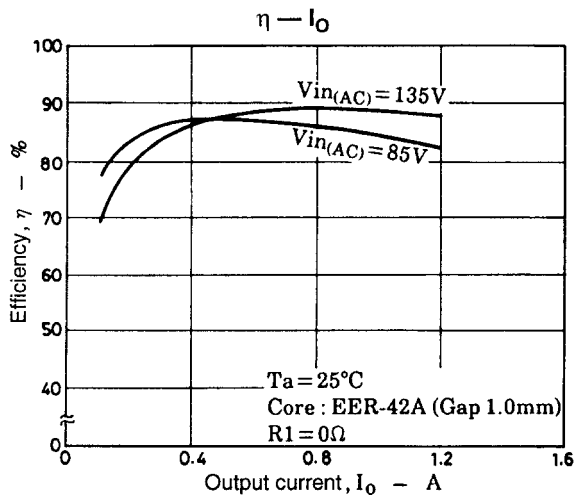
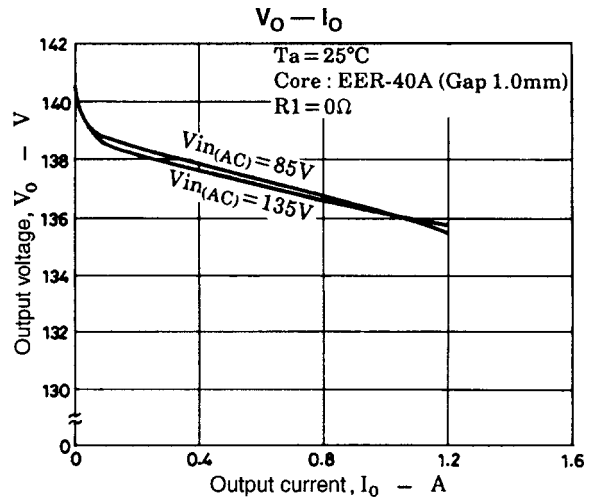
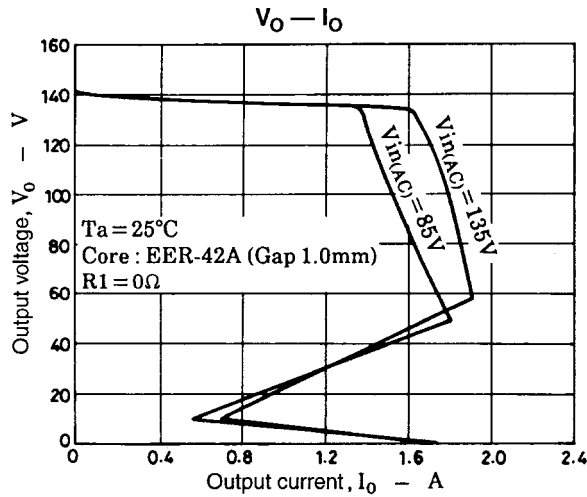
Winding



- Np1 : (10/0.2φ) × 2 10T
- Np2 : (10/0.2φ) × 2 10T
- NS1 : (7/0.2φ) × 2 15T
- NS2 : (7/0.2φ) × 2 16T
- ND1 : 0.5φ 2T
- ND2 : 0.5φ 9T
- L value: ① to ③ 145μH



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