Ordering number: EN 4935

Thick Film Hybrid IC

No. 4935

STK73907

Self-Excitation Type Feedback Control (World Spec.) Switching Regulator (180W Output)

Overview

The STK73907 incorporates on-chip all the power switching, amplifier, overcurrent protection and driver circuits required in a self-excitation type feedback control 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

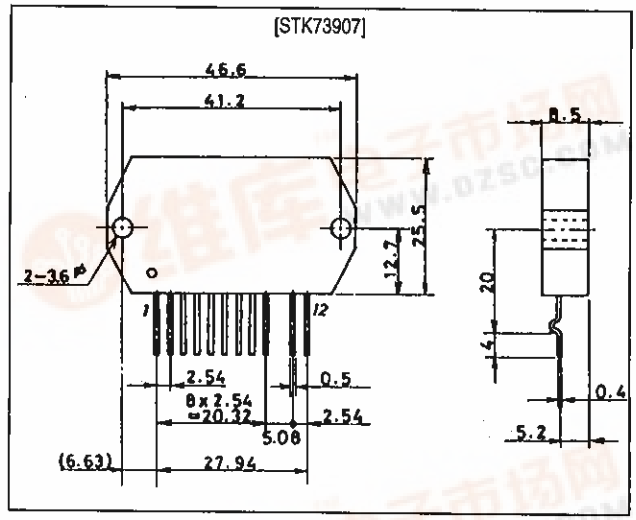
Features

- Power MOSFET devices
- Feedback control for high output voltage precision
- Driver circuit on-chip
- 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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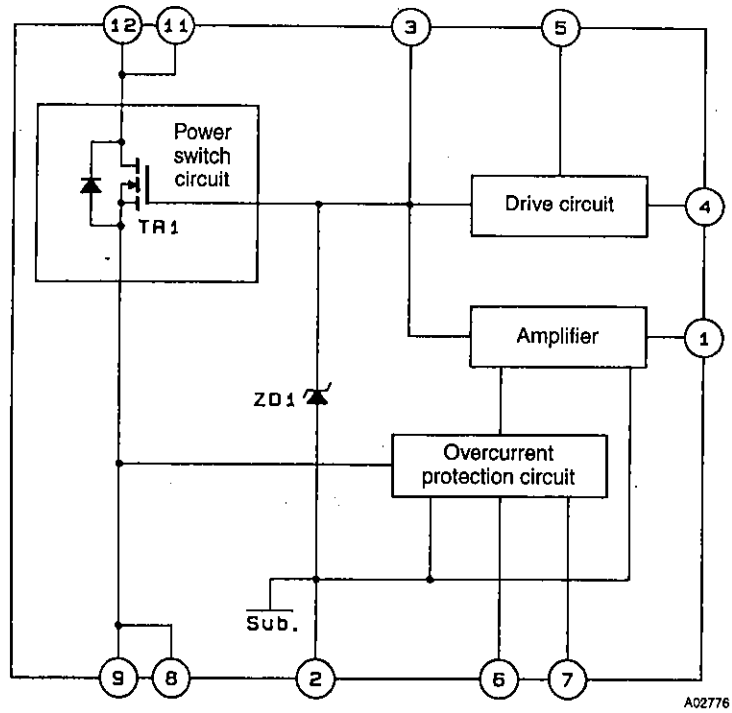
Block Diagram



The back surface of the IC is not an insulator, and is effectively at pin 2 potential.

Pin Functions

Number	Function
1	Amplifier circuit control
2	Ground
3	TR1 gate
4	Drive voltage input
5	Starting voltage input
6	OCP setting level input
7	OCP input-voltage dependency detection input
8	TR1 source
9	
11	TR1 drain
12	

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	280	Vrms
Operating temperature	Topg		−10 to +85	°C
Storage temperature	Tstg		−30 to +115	°C
Maximum output power	Wo max	Specified test circuit, V_O = 115V	180	W

Parameter	Symbol	Conditions	Ratings	Unit
[TR1]				
Drain current	I_D	Refer to ASO characteristics for overcurrent condition.	5	A
Pulse drain current	$I_{D(pulse)}$		12	A
Drain reverse current	I_{DR}		5	A
Gate-source voltage	V_{GSS}		±30	V
Allowable power dissipation	P_D		89.3	W
Chip junction temperature	Tj max		150	°C
[ZD1]				
Allowable power dissipation	P_{ZD1}		500	mW
Chip junction temperature	Tj(ZD1) max		125	°C

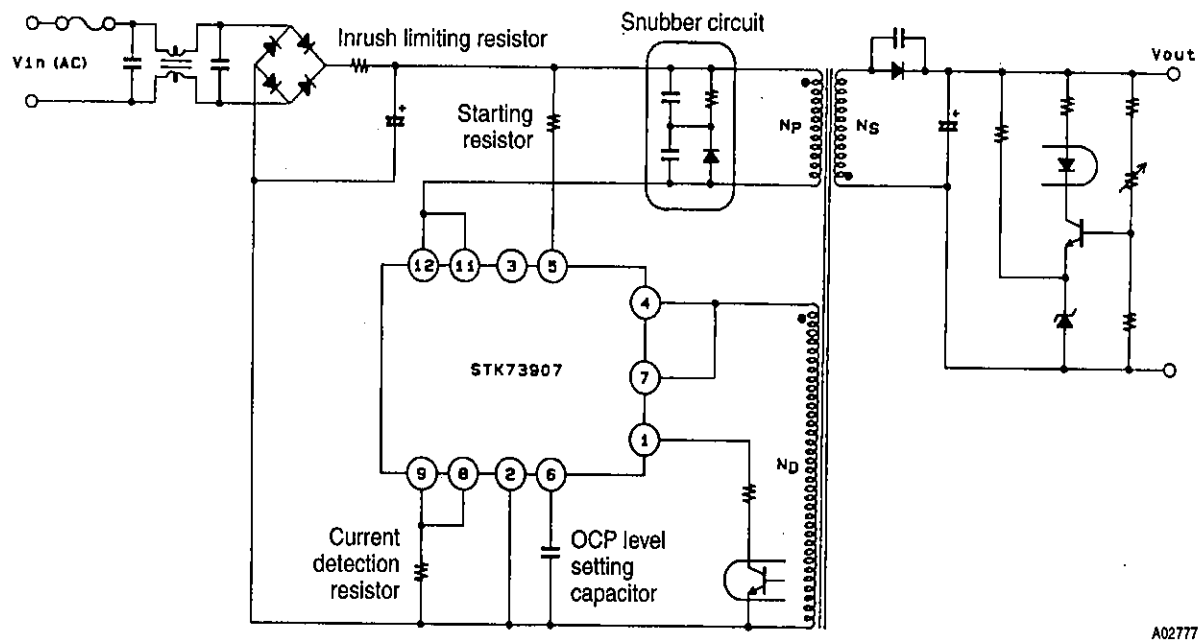
Allowable Operating Ranges at Ta = 25°C

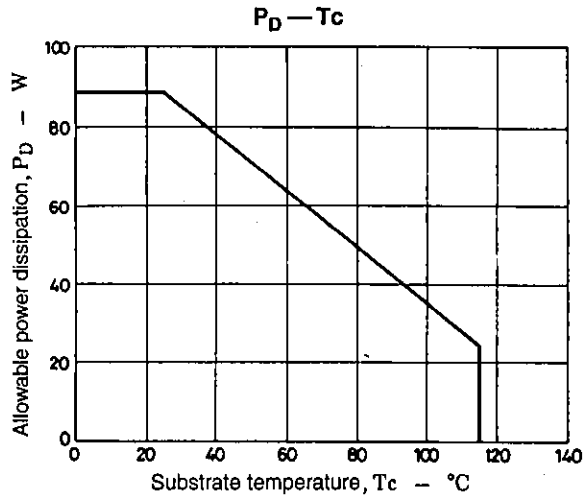
Parameter	Symbol	Conditions	Ratings	Unit
Pin 4 input voltage	V_4		±8 to ±24	V
Oscillator frequency	f_{OSC}		20 to 100	kHz

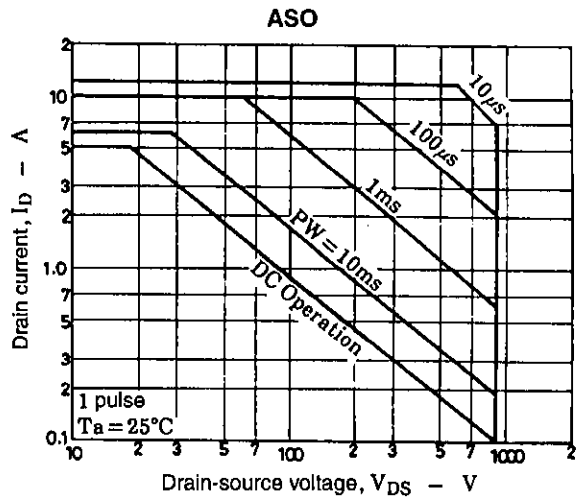
Operating Characteristics at Ta = 25°C, Tc = 25°C unless otherwise specified, specified test circuit

Parameter	Symbol	Conditions	min	typ	max	Unit
[TR1]						
Drain-source breakdown voltage	$V_{(BR)DSS}$	I_D = 10mA, V_{GS} = 0V	900	–	–	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 = 3A, V_{GS} = 10V	–	3.0	4.0	Ω
Input capacitance	Ciss	V_{DS} = 10V, V_{GS} = 0V, f = 1MHz	–	800	–	pF
[ZD1]						
Zener voltage	V_Z	I_Z = 5mA	23.7	–	26.3	V

Circuit Function Diagram

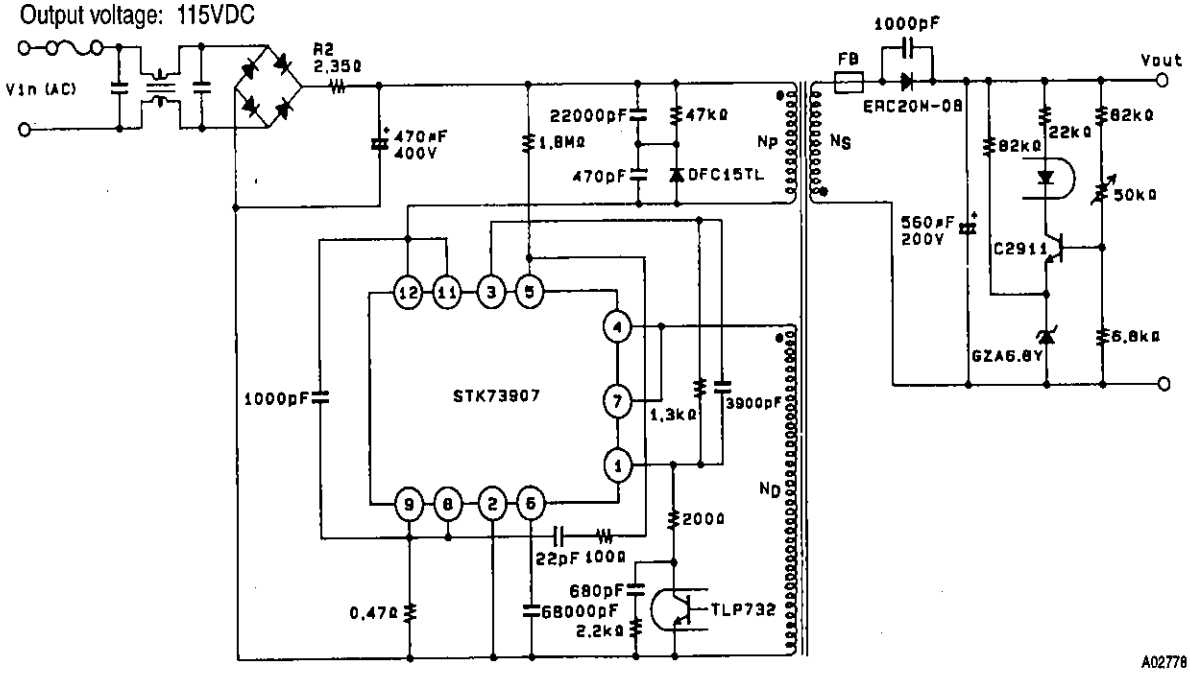




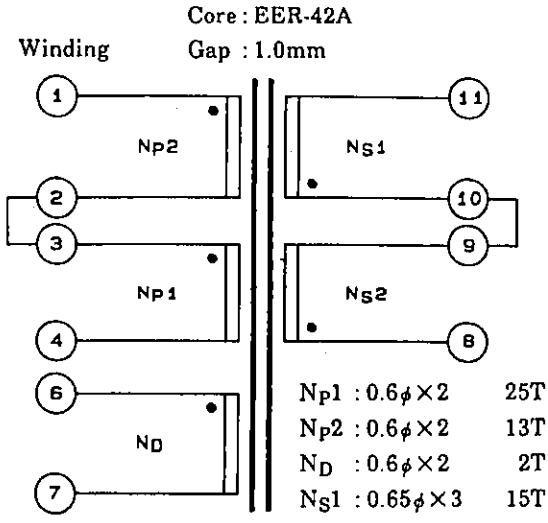


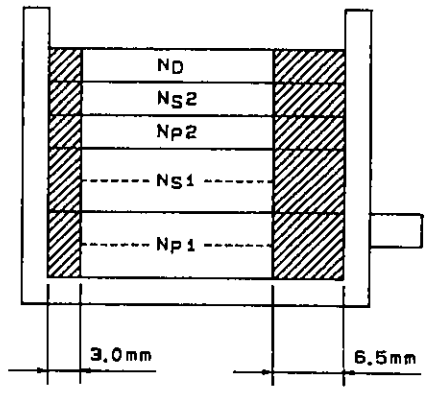
Sample Application Circuit (200V System)

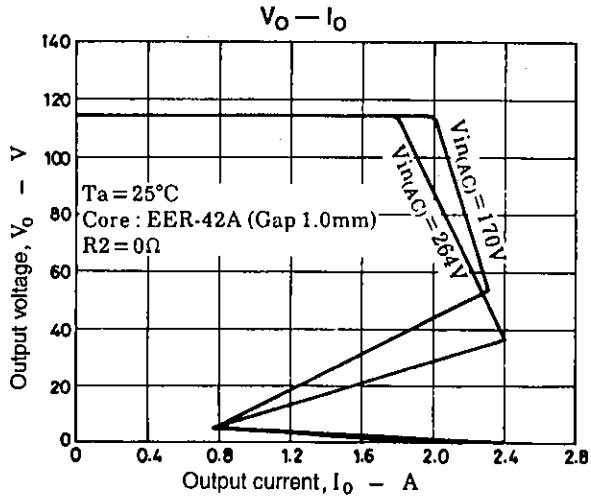
Input voltage: 170 to 264VAC
Output voltage: 115VDC

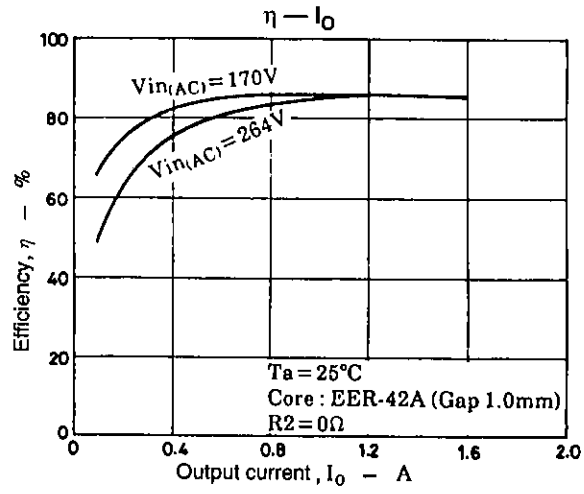


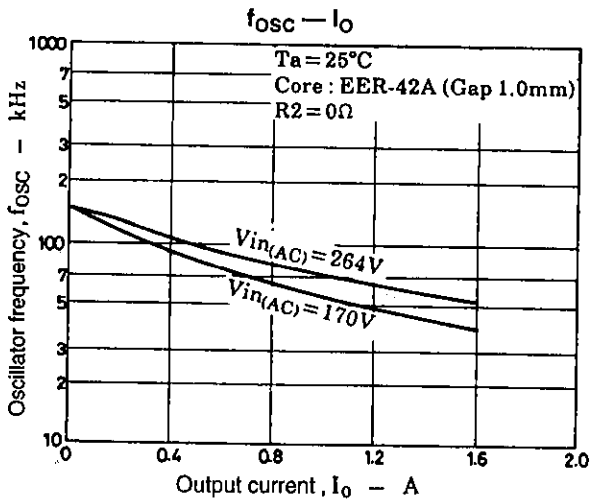
Pulse Transformer Specifications





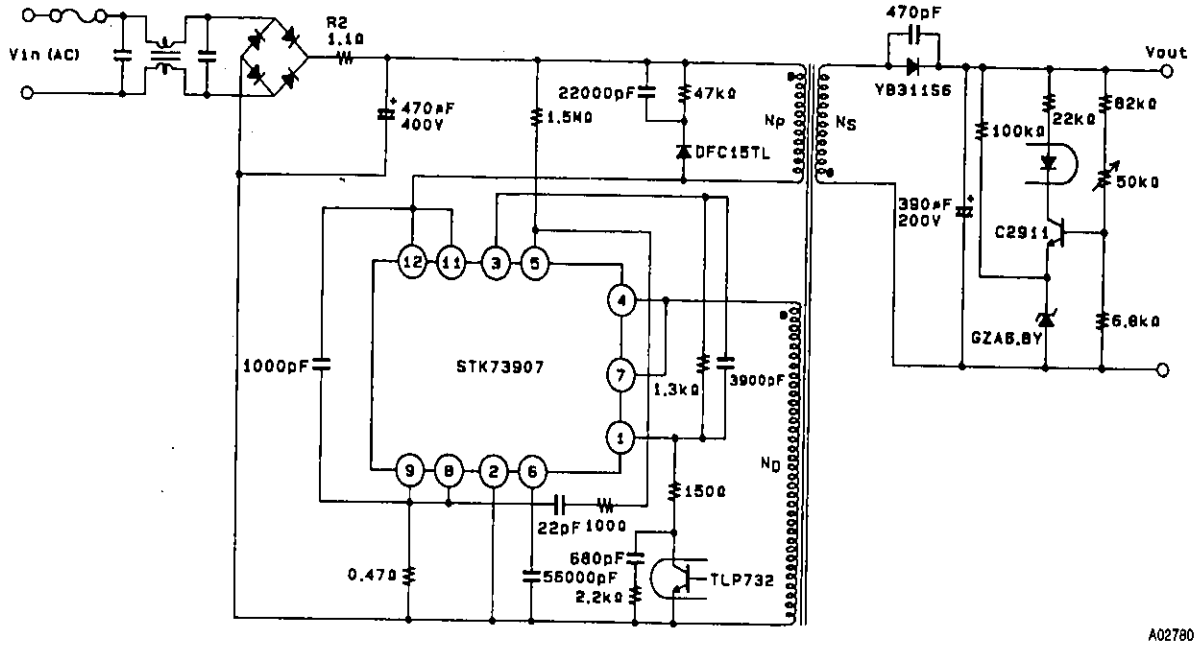






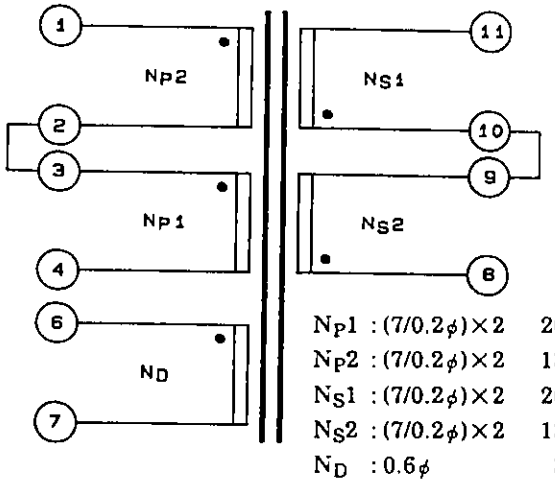
Sample Application Circuit (World Input System)

Input voltage: 85 to 264VAC
Output voltage: 115VDC



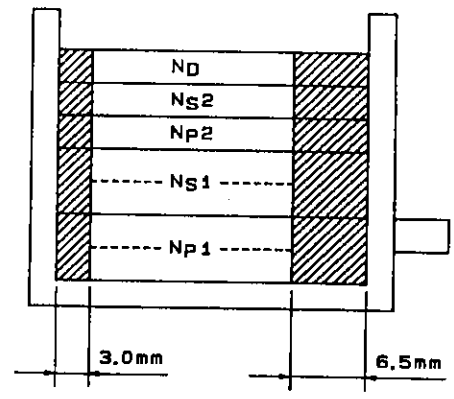
Pulse Transformer Specifications

Core : EER-35L
Winding Gap : 1.00mm



N_{P1}	: (7/0.2φ)×2	26T
N_{P2}	: (7/0.2φ)×2	13T
N_{S1}	: (7/0.2φ)×2	26T
N_{S2}	: (7/0.2φ)×2	13T
N_D	: 0.6φ	3T

L value: ① to ④ 280μH



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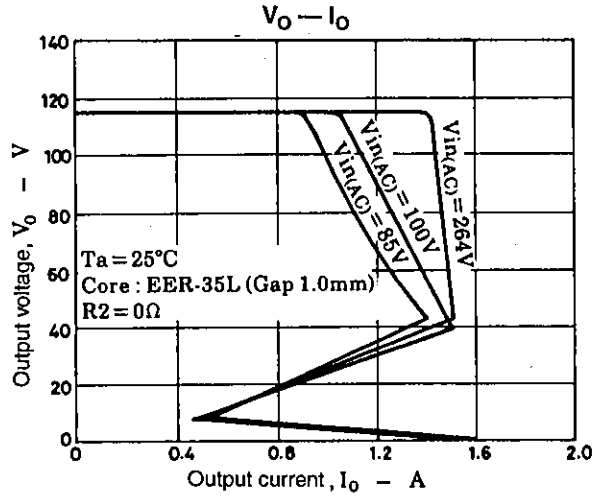

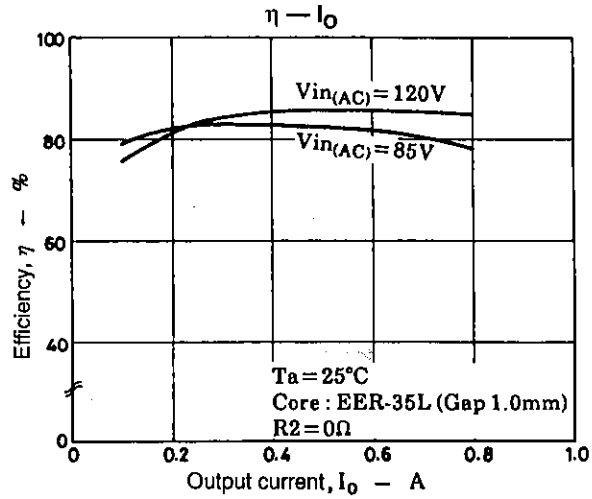

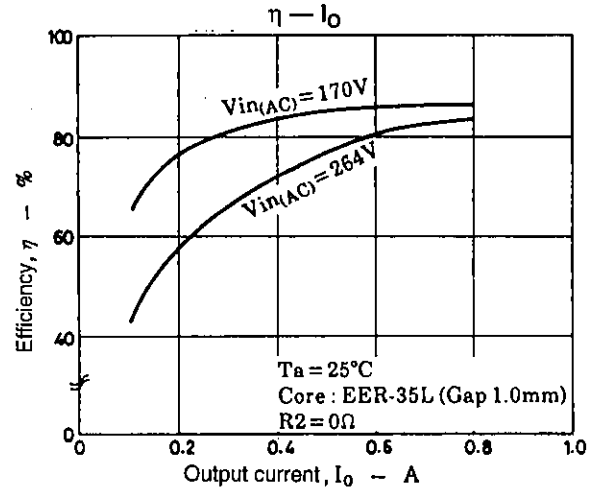

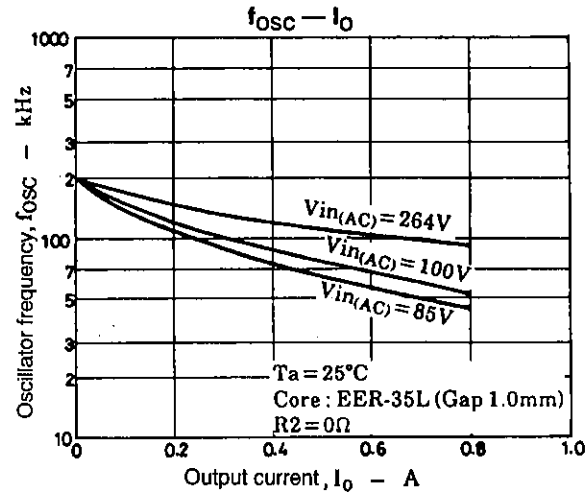

Series Organization

These devices form a series with varying output power ratings.

Device	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]
STK73902	500	−30 to +115	+115	+150	6.0	85 to 132	110	1.4
STK73903					10.0		180	0.6
STK73904					12.0		210	0.55
STK73905					15.0		280	0.3
STK73906	900				3.0	170 to 264	110	5.0
STK73907					5.0		180	3.0
STK73908					6.0		210	2.0
STK73909					8.0		280	1.2