Off-Line Quasi-Resonant Switching Regulators

Features and Benefits

- Quasi-resonant topology IC ⇒ Low EMI noise and soft switching
- Bottom-skip mode ⇒ Improved system efficiency over the entire output load by avoiding increase of switching frequency
- Auto-Standby mode ⇒ Lowers input power at very light output load condition
- Avalanche-guaranteed MOSFET ⇒ Improves system-level reliability and does not require V_{DSS} derating
- 800 V_{DSS} / 0.66 Ω $R_{DS(on)}$
- Various protections ⇒ Improved system-level reliability
  - Pulse-by-pulse drain overcurrent limiting
  - Overvoltage Protection (bias winding voltage sensing), with latch
  - Overload Protection with latch
  - Maximum on-time limit

Package: 7-Pin TO-3P

Not to scale

Description

The STR-X6769 is a quasi-resonant topology IC designed for SMPS applications. It shows lower EMI noise characteristics than conventional PWM solutions, especially at greater than 2 MHz. It also provides a soft-switching mode to turn on the internal MOSFET at close to zero voltage (V_{DS} bottom point) by use of the resonant characteristic of primary inductance and a resonant capacitor.

The package is a fully molded TO-3P, which contains the controller chip (MIC) and MOSFET, enabling output power up to 310 W at 230 VAC and 200 W at universal input. The bottom-skip mode skips the first bottom of V_{DS} and turns on the MOSFET at the second bottom point, to minimize an increase of operating frequency at light output load, improving system-level efficiency over the entire load range.

There are two standby functions available to reduce the input power under very light load conditions. The first is Auto-Standby mode, which is internally triggered by periodic sensing, and the other is a manual standby mode, which is executed by clamping the secondary output. In general applications, the manual standby mode reduces the input power further compared to Auto-Standby mode.

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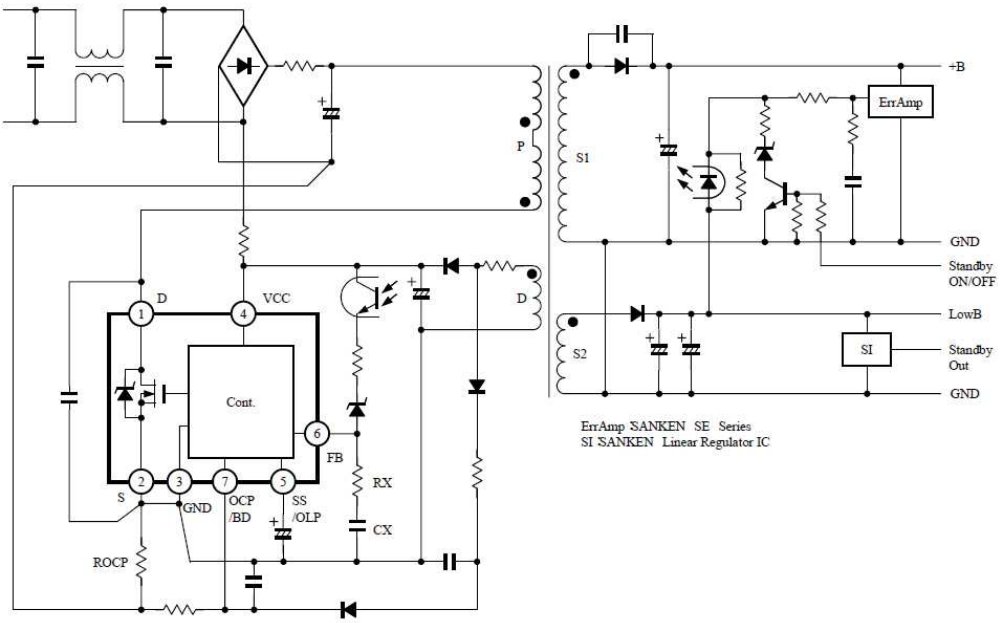
Typical Application



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http://www.sanken-ele.co.jp/en/

Description (continued)

The soft-start mode minimizes surge voltage and reduces power stress to the MOSFET and to the secondary rectifying diodes during the start-up sequence. Various protections such as overvoltage, overload, overcurrent, maximum on-time protections and avalanche-energy-guaranteed MOSFET secure good system-level reliability.

Applications include the following:
- Set Top Box
- LCD PC monitor, LCD TV
- Printer, Scanner
- SMPS power supplies

Selection Guide

Part Number	Package
STR-X6769	TO-3P

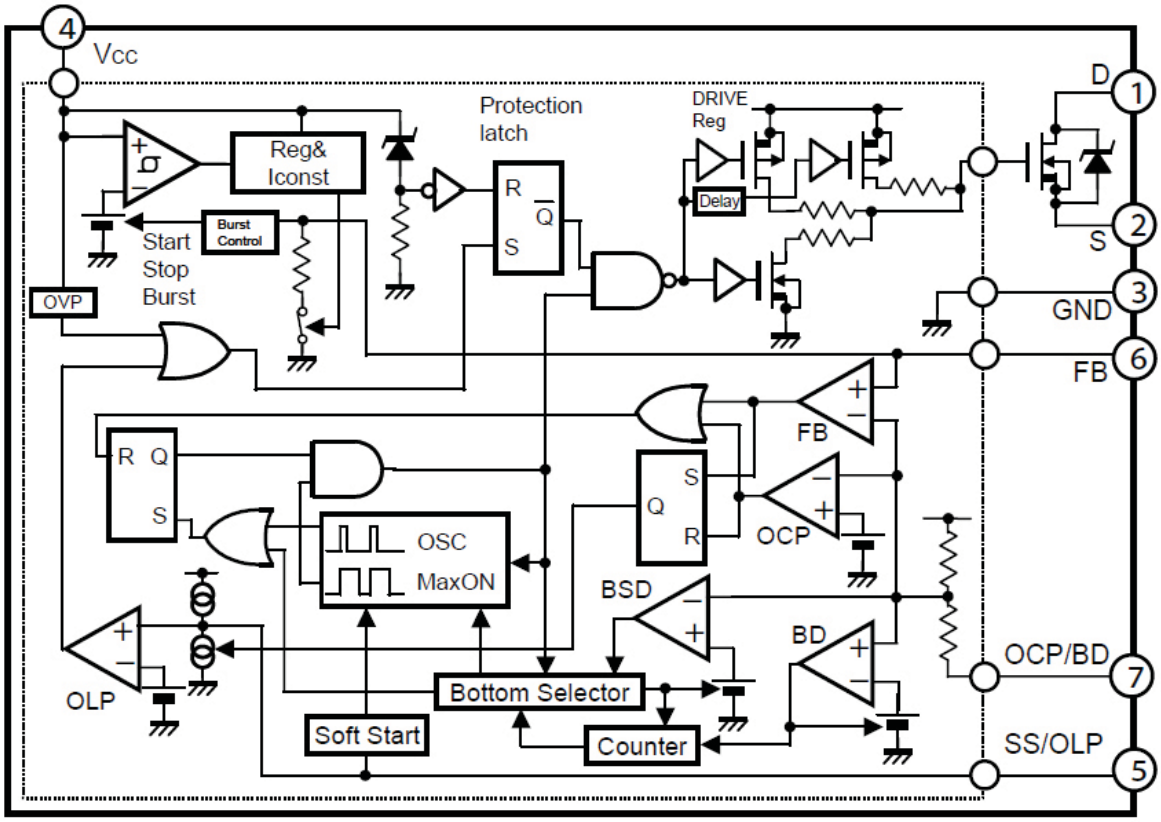
Absolute Maximum Ratings at T_A = 25°C

Parameter	Symbol	Conditions	Rating	Unit
Drain Current[1]	I_{DP}peak	Single pulse	22	A
Maximum Switching Current[2]	I_{Dmax}	T_A = –20°C to 125°C	22	A
Single Pulse Avalanche Energy[3]	E_{AS}	Single pulse, V_{DD} = 30 V, L = 50 mH, I_{Lpeak} = 3.9 A	395	mJ
Input Voltage for Controller (MIC)	V_{CC}		35	V
SS/OLP Terminal Voltage	V_{SSOLP}		–0.5 to 6.0	V
FB Terminal Inflow Current	I_{FB}		10	mA
FB Terminal Voltage	V_{FB}	I_{FB} within the limits of I_{FB}	–0.5 to 9.0	V
OCP/BD Terminal Voltage	V_{OCPBD}		–1.5 to 5.0	V
MOSFET Power Dissipation[4]	P_{D1}	With infinite heatsink	46	W
		Without heatsink	2.8	W
Controller (MIC) Power Dissipation	P_{D2}	V_{CC} × I_{CC}	0.8	W
Operating Internal Leadframe Temperature	T_F	Recommended operation temperature, see cautions	–20 to 125	°C
Operating Ambient Temperature	T_{OP}		–20 to 125	°C
Storage Temperature	T_{stg}		–40 to 125	°C
Channel Temperature	T_{ch}		150	°C

[1]Refer to MOSFET ASO curve
[2]I_{DMAX} is the drain current determined by the drive voltage of the IC and the threshold voltage, V_{th}, of the MOSFET
[3]Refer to Avalanche Energy Derating curve
[4]Refer to MOSFET Ta-PD1 curve

All performance characteristics given are typical values for circuit or system baseline design only and are at the nominal operating voltage and an ambient temperature, T_A, of 25°C, unless otherwise stated.

Functional Block Diagram



Terminal List Table

Number	Name	Description	Functions
1	D	Drain	MOSFET drain
2	S	Source	MOSFET source
3	GND	Ground terminal	Ground
4	VCC	Power supply terminal	Input of power supply for control circuit
5	SS/OLP	Soft Start/Overload Protection terminal	Input to set delay for Overload Protection and Soft Start operation
6	FB	Feedback terminal	Input for Constant Voltage Control and Burst (intermittent) Mode oscillation control signals
7	OCP/BD	Overcurrent Protection/Bottom Detection	Input for Overcurrent Detection and Bottom Detection signals