

Off-Line Quasi-Resonant Switching Regulators

Features and Benefits

- Quasi-resonant topology IC \Rightarrow Low EMI noise and soft switching
- Bottom-skip mode \Rightarrow Improved system efficiency over the entire output load by avoiding increase of switching frequency
- Auto-Standby mode \Rightarrow Lowers input power at very light output load condition
- Avalanche-guaranteed MOSFET \Rightarrow Improves system-level reliability and does not require V_{DSS} derating
- 500 V_{DSS} / 0.36 Ω $R_{DS(on)}$
- Various protections \Rightarrow 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

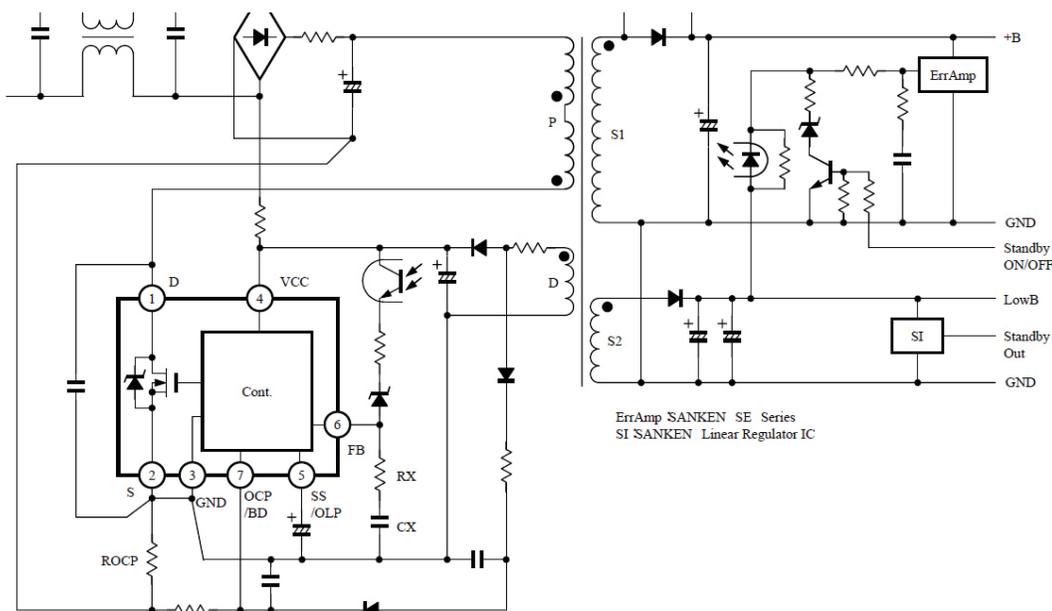
The STR-X6737 is a quasi-resonant topology IC designed for SMPS applications. It shows lower EMI noise characteristics than conventional PWM solutions, especially at greater than 2 MHz. It also provides a soft-switching mode to turn on the internal MOSFET at close to zero voltage (V_{DS} bottom point) 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 280 W at 120 VAC 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 modes 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



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-X6737	TO-3P

Absolute Maximum Ratings at $T_A = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Rating	Unit
Drain Current ¹	I_{Dpeak}	Single pulse	22	A
Maximum Switching Current ²	I_{Dmax}	$T_A = -20^\circ\text{C}$ to 125°C	22	A
Single Pulse Avalanche Energy ³	E_{AS}	Single pulse, $V_{DD} = 30\text{ V}$, $L = 50\text{ mH}$, $I_{Lpeak} = 3.0\text{ A}$	239	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	44	W
		Without heatsink	2.8	W
Controller (MIC) Power Dissipation	P_{D2}	$V_{CC} \times I_{CC}$	0.8	W
Operating Internal Leadframe Temperature	T_F	Recommended operation temperature, see cautions	-20 to 125	$^\circ\text{C}$
Operating Ambient Temperature	T_{OP}		-20 to 125	$^\circ\text{C}$
Storage Temperature	T_{stg}		-40 to 125	$^\circ\text{C}$
Channel Temperature	T_{ch}		150	$^\circ\text{C}$

¹Refer to MOSFET ASO curve

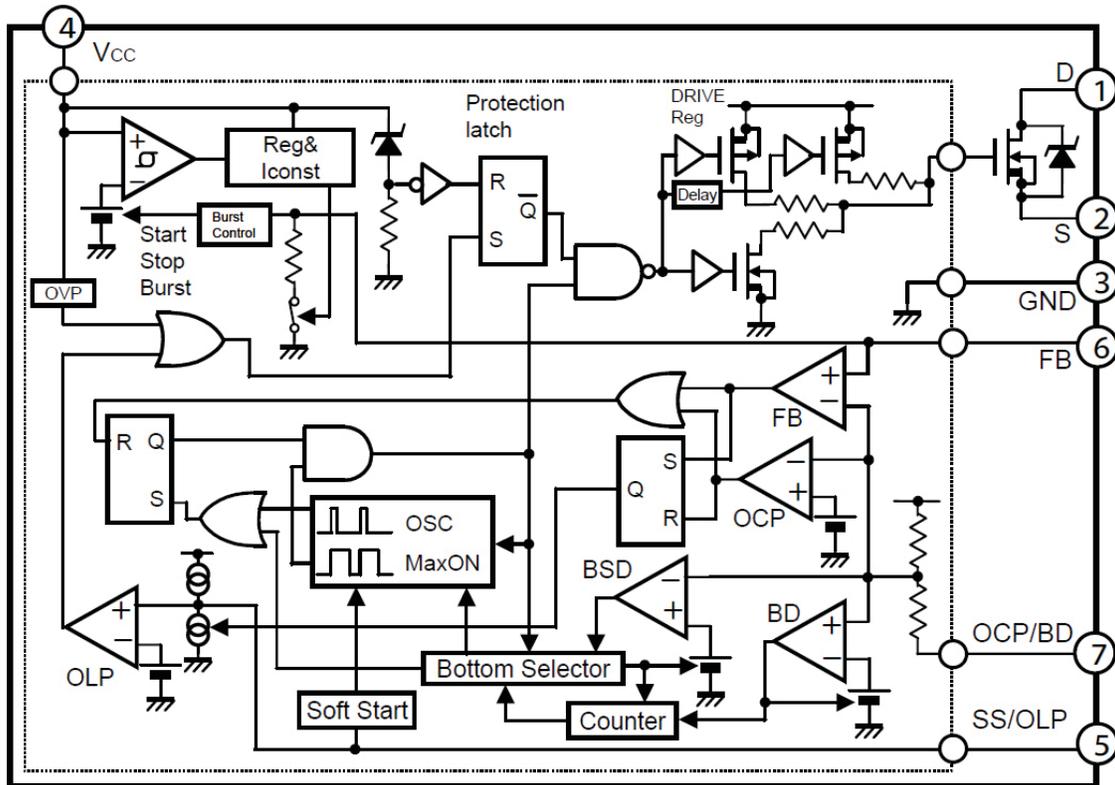
² I_{DMAX} is the drain current determined by the drive voltage of the IC and the threshold voltage, V_{th} , of the MOSFET

³Refer to Avalanche Energy Derating curve

⁴Refer 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