

# SI-8511NVS Surface-Mount, Synchronous Rectifier Step-down Switching Mode Control ICs

## ■ Features

- Surface-mount package (TSSOP24)
- High efficiency due to synchronous rectification: 92% (at  $V_{IN} = 5V$ ,  $I_o = 1A$ ,  $V_o = 2.5V$ )
- Capable of downsize a choke-coil due to IC's high switching frequency (400kHz typ, On Time Control). (Compared with conventional Sanken devices)
- Low reference voltage ( $V_{ref}$ ) of 1.1V. The output voltage is variable from 1.1V to 6V.
- High-speed response to a load
- Compatible with low ESR capacitors
- Soft start and output ON/OFF available
- Built-in overcurrent and output-overvoltage protection circuits
- PWRGD function to indicate the output voltage status
- High precision reference voltage:  $1.1V \pm 1.2\%$

## ■ Absolute Maximum Ratings

(Ta=25°C)

Parameter	Symbol	Ratings	Unit
Control-System DC Input Voltage	$V_{CC}$	7	V
DC Input Voltage	$V_{IN}$	25	V
Boost Block Input Voltage	$V_H$	30	V
EN Terminal Input Voltage	$V_{EN}$	$V_{CC}$	V
PWRGD Terminal Applied Voltage	$V_{PWRGD}$	7	V
Junction Temperature	$T_j$	+150	°C
Storage Temperature	$T_{sig}$	-40 to +150	°C

## ■ Applications

- Power supplies for notebook PCs and mobile devices
- Onboard local power supplies
- OA equipment
- For stabilization of the secondary-side output voltage of switching power supplies

## ■ Recommended Operating Conditions

Parameter	Symbol	Ratings	Unit
Control System Input Voltage Range	$V_{CC}$	4.5 to 5.5	V
Input Voltage Range	$V_{IN}$	3 to 18	V
Output Voltage Range	$V_o$	1.1 to 6	V
Operating Temperature Range	$T_{op}$	-20 to +85	°C

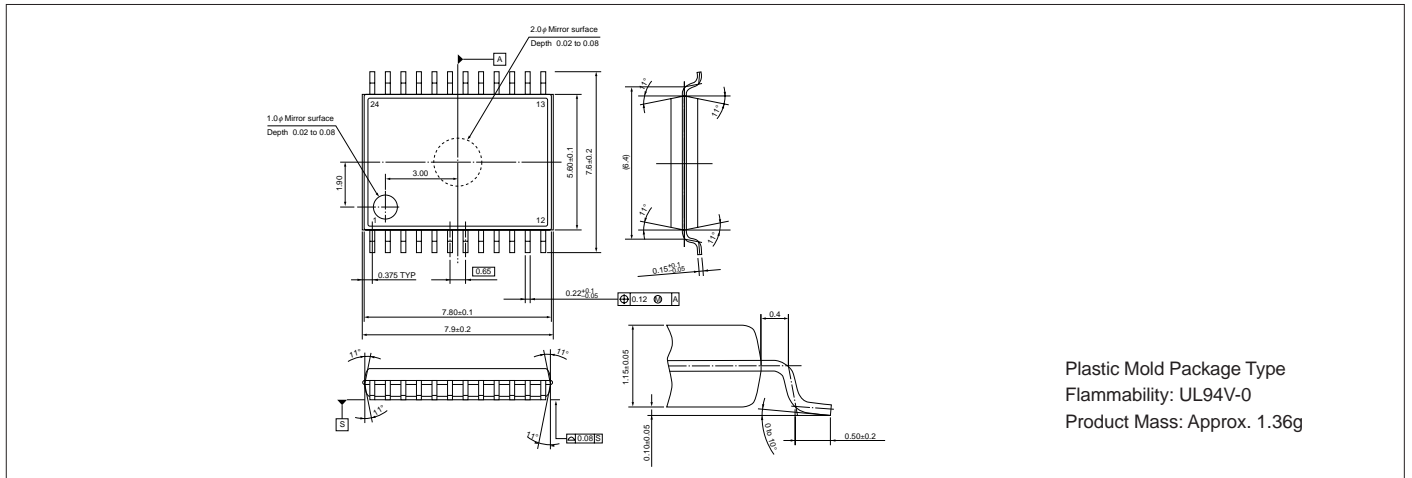
## ■ Electrical Characteristics

(Ta=25°C unless otherwise specified)

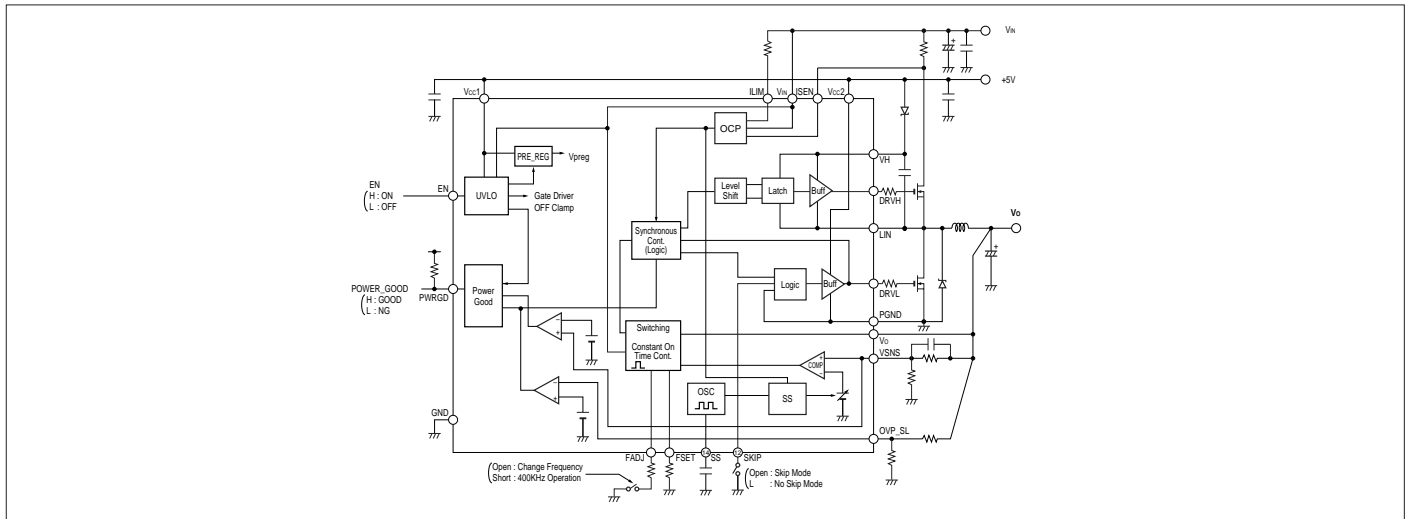
Parameter	Symbol	Ratings			Unit	Conditions	
		min.	typ.	max.			
Dynamic Characteristics	Output Voltage	$V_o$	-1.2%	1.1	+1.2%	V	$V_{IN}=5V$ , $V_{CC}=5V$ , $VSNS$ connected to $VO$ , $I_o=0A$
	Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T$		$\pm 0.03$		mV/°C	$V_{IN}=5V$ , $V_{CC}=5V$ , $VSNS$ connected to $VO$ , $I_o=0A$ , $T_a=0$ to $85^\circ C$
Circuit Current	Circuit Current ( $V_{CC}$ Terminal)	$I_{op}$			6	mA	$V_{CC}=5V$ , $EN=H$ , $FADJ=open$
	Circuit Current ( $V_{IN}$ Terminal)	$I_{op}$			1	mA	$V_{IN}=5V$ , $EN=H$
	Standby Current 1 ( $V_{CC}$ Terminal)	$I_{std1}$			100	$\mu A$	$V_{CC}=5V$ , $EN=L$
	Standby Current 2 ( $V_{IN}$ Terminal)	$I_{std2}$			50	$\mu A$	$V_{IN}=5V$ , $EN=L$
Undervoltage Lockout	UVLO Operating Voltage 1 ( $V_{CC}$ Terminal)	$V_{uvlo1}$	3.7		4.45	V	$V_{IN}=5V$
	UVLO Operating Voltage 2 ( $V_{IN}$ Terminal)	$V_{uvlo2}$	2.5		2.9	V	$V_{CC}=5V$
On Time Control	On Time	$T_{on}$		1.27		$\mu S$	$V_{CC}=5V$ , $V_{IN}=5V$ , $V_o=2.5V$
	Minimum Off Time	$T_{off}$		0.7		$\mu S$	$V_{CC}=5V$
	REF Terminal Voltage	$V_{ref}$	1.1	1.2	1.3	V	$V_{CC}=5V$
	REF Terminal Source Current	$I_{ref}$			100	$\mu A$	$V_{CC}=5V$
High Side Drive	On Resistance (high side)	$R_{onHH}$		5.5		$\Omega$	$V_H-V_{LIN}=5V$
	On Resistance (low side)	$R_{onHL}$		5.5		$\Omega$	$V_H-V_{LIN}=5V$
Low Side Drive	On Resistance (high side)	$R_{onLH}$		5.5		$\Omega$	$V_{CC}=5V$
	On Resistance (low side)	$R_{onLL}$		5.5		$\Omega$	$V_{CC}=5V$
Bootstrap	Bootstrap Voltage	$V_H-V_{LIN}$	4.5	5	5.5	V	
Protection System	Current for Current Limit Detection	$I_{lim}$	90	100	110	$\mu A$	$V_{CC}=5V$ , $V_{IN}=5V$
	Soft Start Terminal Current	$I_{ss}$		$\pm 20$		$\mu A$	$V_{CC}=5V$
	EN Low Level Voltage	$V_{celo}$	0		0.8	V	$V_{CC}=5V$
	EN High Level Voltage	$V_{cehi}$	2.4		$V_{CC}$	V	$V_{CC}=5V$
	EN Bias Level Current	ICE			5	$\mu A$	$V_{CC}=5V$ , $EN=5V$
	PWRGD Good Voltage (high side)	$V_{sens}$		1.32		V	$V_{CC}=5V$
	PWRGD Good Voltage (low side)	$V_{sens}$		0.88		V	$V_{CC}=5V$
	PWRGD Low Output Voltage	$V_{pwrgd}$			0.4	V	$V_{CC}=5V$ , $I_{pwrgd}=120\mu A$
	PWRGD Terminal Current	$I_{pwrgd}$			120	$\mu A$	$V_{CC}=5V$ , $V_{pwrgd}=0.4V$
	PWRGD Leakage Current	$I_{pwrgd}$			5	$\mu A$	$V_{pwrgd}=5V$

External Dimensions (TSSOP24)

(Unit : mm)



Block Diagram (Pin Assignment)



Typical Connection Diagram

