



SY5011

Single Stage Flyback And PFC Controller With CV/CC Control For Adapters and Chargers

Preliminary Specification

General Description

SY5011 is a single stage Flyback and PFC controller with several features to enhance performance of Flyback converters. Both current and voltage regulation are achieved by primary side control technology for low cost application. To achieve higher efficiency and better EMI performance, SY5011 drives Flyback converters in the Quasi-Resonant mode.

Ordering Information

SY5011

└─ Temperature Code
└─ Package Code
└─ Optional Spec Code

Temperature Range: -40°C to 85°C

Ordering Number	Package type	Note
SY5011FAC	SO8	----

Features

- Primary side CV/CC control eliminates the opto-coupler.
- Valley turn-on of the primary MOSFET to achieve low switching losses
- Internal high current MOSFET driver: 1A sourcing and 2A sinking
- Power factor >0.90 with single-stage conversion
- Low start up current: 15μA typical
- Maximum switching frequency limitation 200kHz
- Compact package: SO8

Applications

- AC/DC adapters
- Battery Chargers

Typical Applications

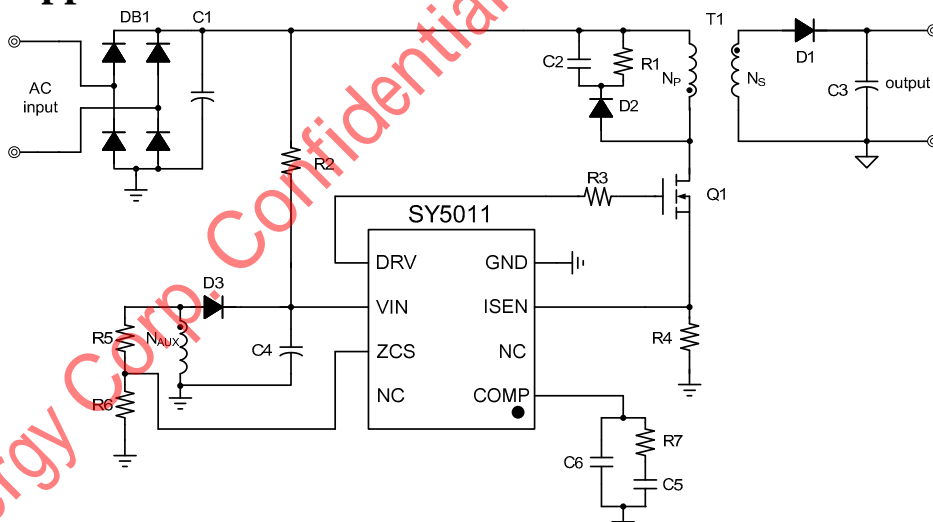
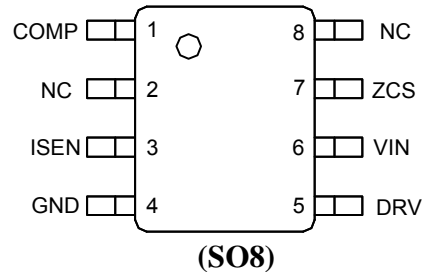


Figure 1. Schematic Diagram

Pinout (top view)



Top Mark: AJExyz for SY5011FAC (device code: AJE, x=*year code*, y=*week code*, z=*lot number code*)

Pin	Name	Description
1	COMP	Loop compensation pin. Connect a RC network across this pin and ground to stabilize the control loop.
3	ISEN	Current sense pin. Connect this pin to the source of the primary switch.
4	GND	Ground pin.
5	DRV	Gate driver pin. Connect this pin to the gate of primary MOSFET.
6	VIN	Power supply pin.
7	ZCS	Inductor current zero-crossing detection pin. This pin receives the auxiliary winding voltage by a resistor divider and detects the inductor current zero crossing point.

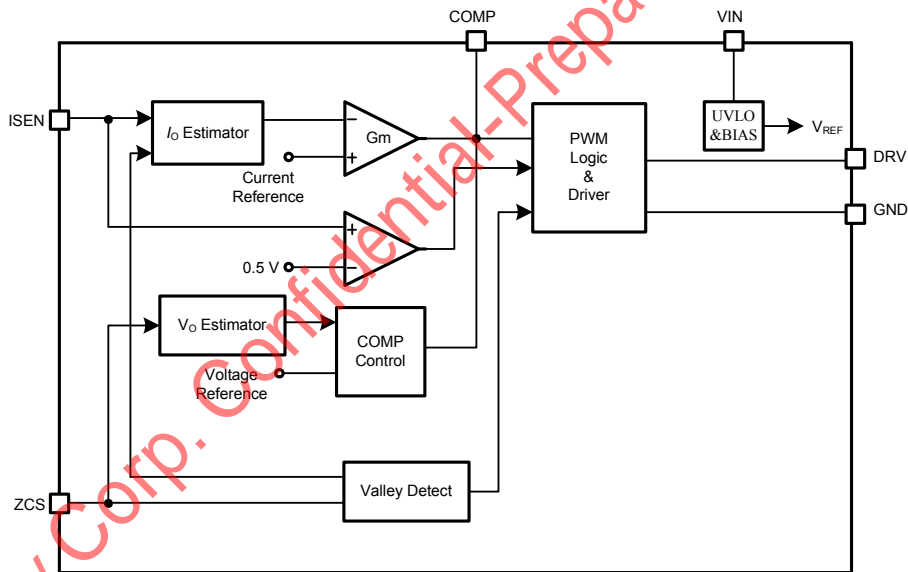
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Absolute Maximum Ratings (Note 1)

VIN, DRV	-----	-0.3V to 19V
Supply current I _{VIN}	-----	-----30mA
ZCS	-----	-0.3V to V _{IN} +0.3V
ISEN, COMP	-----	3.6V
Power Dissipation, @ T _A = 25°C SO8	-----	1.1W
Package Thermal Resistance (Note 2)		
SO8, θ _{JA}	-----	88°C/W
SO8, θ _{JC}	-----	45°C/W
Temperature Range	-----	-40°C to 150°C
Lead Temperature (Soldering, 10 sec.)	-----	260°C
Storage Temperature Range	-----	-65°C to 150°C

Recommended Operating Conditions (Note 3)

VIN, DRV	-----	8V~15.4V
Junction Temperature Range	-----	-40°C to 125°C
Ambient Temperature Range	-----	-40°C to 85°C

Block Diagram


Electrical Characteristics

($V_{IN} = 12V$ (Note 3), $T_A = 25^\circ C$ unless otherwise specified)

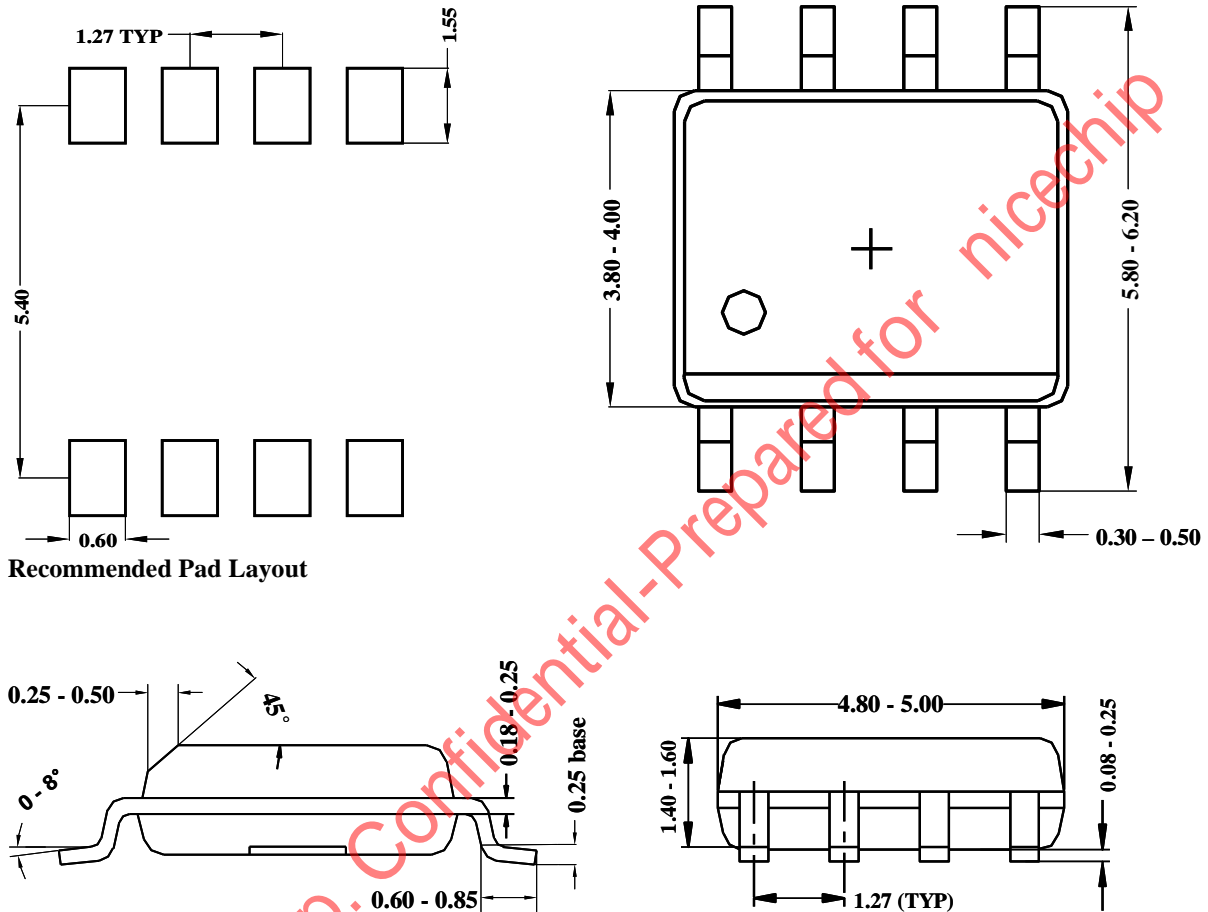
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Power Supply Section						
Input voltage range	V_{VIN}		8		15.4	V
VIN turn-on threshold	$V_{VIN,ON}$				17.6	V
VIN turn-off threshold	$V_{VIN,OFF}$		6.0		7.9	V
VIN OVP voltage	$V_{VIN,OVP}$			$V_{VIN,ON}+0.85$		V
Start up Current	I_{ST}	$V_{VIN} < V_{VIN,OFF}$		15		μA
Operating Current	I_{VIN}	$C_L=100pF, f=15kHz$		1		mA
Shunt current in OVP mode	$I_{VIN,OVP}$	$V_{VIN} > V_{VIN,OVP}$	1.6	2	2.5	mA
Error Amplifier Section						
Sleep mode ON threshold on COMP	$V_{COMP,ON}$			0.15		V
Sleep mode OFF threshold on COMP	$V_{COMP,OFF}$			0.21		V
Current Sense Section						
Current limit reference voltage	$V_{ISEN,MAX}$			0.5		V
ZCS pin Section						
ZCS pin OVP voltage threshold	$V_{ZCS,OVP}$			$V_{ZCS,REF} \times (1+6\%)$		V
ZCS pin voltage reference	$V_{ZCS,REF}$		1.225	1.25	1.275	V
Gate Driver Section						
Gate driver voltage	V_{Gate}			V_{VIN}		V
Maximum source current	I_{SOURCE}			1		A
Minimum sink current	I_{SINK}			2		A
Max ON Time	$T_{ON,MAX}$	$V_{COMP}=1.5V$		24		μs
Min ON Time	$T_{ON,MIN}$			400		ns
Max OFF Time	$T_{OFF,MAX}$			39		μs
Min OFF Time	$T_{OFF,MIN}$			1		μs
Maximum switching frequency	f_{MAX}			200		kHz
Thermal Section						
Thermal Shutdown Temperature	T_{SD}			150		$^\circ C$

Note 1: Stresses beyond the “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Note 2: θ_{JA} is measured in the natural convection at $T_A = 25^\circ C$ on a low effective single layer thermal conductivity test board of JEDEC 51-3 thermal measurement standard. Test condition: Device mounted on 2” x 2” FR-4 substrate PCB, 2oz copper, with minimum recommended pad on top layer and thermal vias to bottom layer ground plane.

Note 3: Increase VIN pin voltage gradually higher than $V_{VIN,ON}$ voltage then turn down to 12V.

SO8 Package Outline & PCB Layout Design



**Notes: All dimensions are in millimeters.
All dimensions don't include mold flash & metal burr.**