

High Efficiency Fast Response 6A Continuous, 12A Peak, 28V Input Synchronous Step Down Regulator

General Description

The SY8366H develops a high efficiency synchronous step-down DC-DC regulator capable of delivering 6A continuous, 12A peak current. The SY8366H operates over a wide input voltage range from 4V to 28V and integrates main switch and synchronous switch with very low $R_{DS(ON)}$ to minimize the conduction loss.

The SY8366H adopts the instant PWM architecture to achieve fast transient responses for high step down applications and high efficiency at light loads. In addition, it operates at pseudo-constant frequency of 800kHz under continuous conduction mode to minimize the size of inductor and capacitor.

Ordering Information

SY8366□(□□)□
 □ Temperature Code
 □ Package Code
 □ Optional Spec Code

Ordering Number	Package type	Note
SY8366HQQC	QFN3x3-12	--

Features

- Low $R_{DS(ON)}$ for internal switches (top/bottom): 40/20 mΩ
- Wide input voltage range: 4-28V
- Instant PWM architecture to achieve fast transient responses
- Internal 600us softstart limits the inrush current
- Pseudo-constant frequency: 800kHz.
- 6A continuous/12A peak output current capability
- $\pm 1.5\%$ 0.6V reference
- Programmable peak current limit
- Power good indicator
- Output discharge function
- Hic-cup mode output short circuit protection
- Input UVLO
- Over temperature protection
- RoHS Compliant and Halogen Free
- Compact package: QFN3x3-12

Applications

- LCD-TV/Net-TV/3DTV
- Set Top Box
- Notebook
- High Power AP

Typical Applications

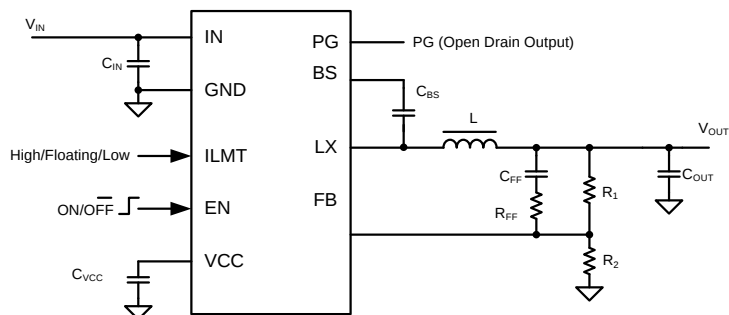


Figure 1 Schematic

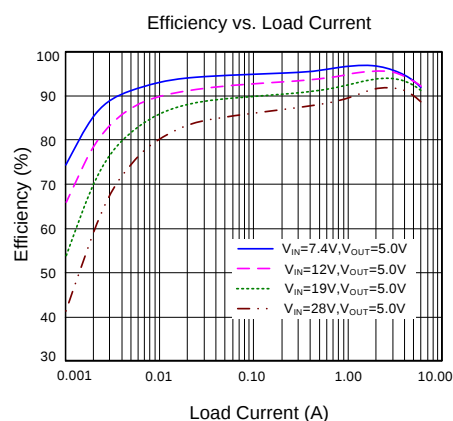
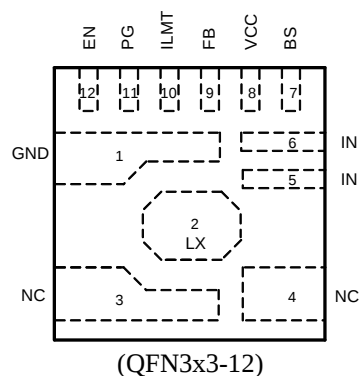


Figure 2. Efficiency

Pinout (top view)



Top Mark: BAF_{xyz}, (Device code: BAF, x=*year code*, y=*week code*, z= *lot number code*)

Pin Name	Pin Number	Pin Description
GND	1	Ground pin
LX	2	Inductor pin. Connect this pin to the switching node of inductor
IN	5, 6	Input pin. Decouple this pin to GND pin with at least 10uF ceramic cap
BS	7	Boot-Strap Pin. Supply high side gate driver. Decouple this pin to LX pin with 0.1uF ceramic cap.
VCC	8	Internal 3.3V LDO output. Power supply for internal analog circuits and driving circuit. Decouple this pin to GND with a 2.2uF MLCC.
FB	9	Output Feedback Pin. Connect this pin to the center point of the output resistor divider (as shown in Figure 1) to program the output voltage: $V_{out}=0.6*(1+R1/R2)$
ILMT	10	Current limit setting pin. The current limit is set to 6A, 9A or 12A when this pin is pull low, floating or pull high respectively.
PG	11	Power good Indicator. Open drain output when the output voltage is within 90% to 120% of regulation point.
EN	12	Enable control. Pull this pin high to turn on the IC. Do not leave this pin floating.

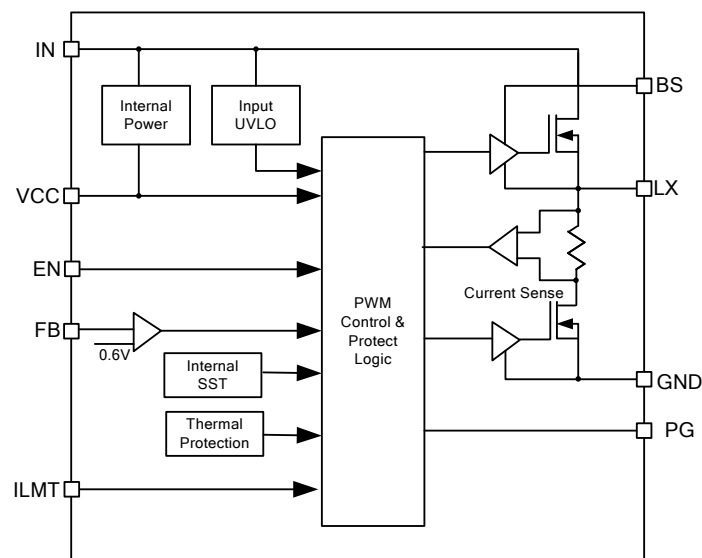
Absolute Maximum Ratings (Note 1)

IN, LX, PG, EN	30V
BS-LX, FB, ILMT, VCC	4V
Power Dissipation, PD @ T _A = 25 °C QFN3x3-12	3.3W
Package Thermal Resistance (Note 2)	
θ_{JA}	30 °C/W
θ_{JC}	4 °C/W
Junction Temperature Range	150 °C
Lead Temperature (Soldering, 10 sec.)	260 °C
Storage Temperature Range	-65 °C to 150 °C
Dynamic LX voltage in 10ns duration	IN+3V to GND-5V

Recommended Operating Conditions (Note 3)

Supply Input Voltage	4V to 28V
Junction Temperature Range	-40 °C to 125 °C
Ambient Temperature Range	-40 °C to 85 °C

Block Diagram



Electrical Characteristics

($V_{IN} = 12V$, $V_{OUT} = 5V$, $C_{OUT} = 100\mu F$, $T_A = 25^\circ C$, $I_{OUT} = 2A$ unless otherwise specified)

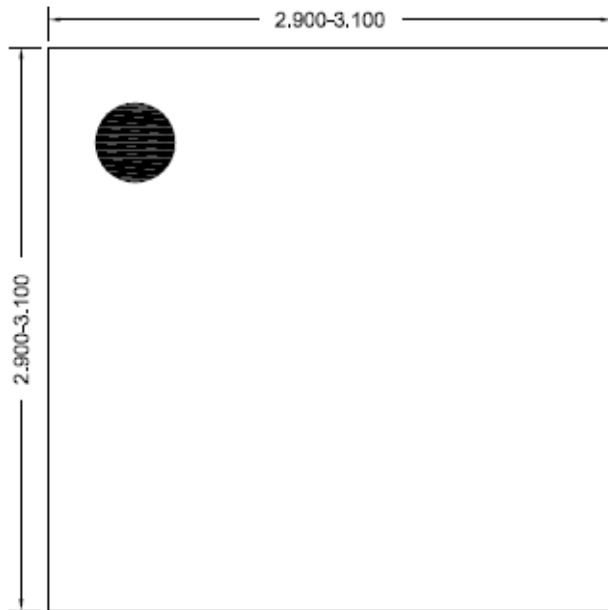
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range	V_{IN}		4.0		28	V
Quiescent Current	I_Q	$I_{OUT}=0$, $V_{FB}=V_{REF}*105\%$		100		μA
Shutdown Current	I_{SHDN}	$EN=0$		3	10	μA
Feedback Reference Voltage	V_{REF}		0.591	0.6	0.609	V
FB Input Current	I_{FB}	$V_{FB}=4V$	-50		50	nA
Top FET RON	$R_{ds(on)1}$			40		m Ω
Bottom FET RON	$R_{ds(on)2}$			20		m Ω
Discharge Current	I_{dis}			100		mA
Bottom FET Current Limit	I_{LIM}	ILMT='0'	6			A
		ILMT=Floating	9			
		ILMT='1'	12			
ILMT Rising Threshold	V_{ILMTH}		$V_{CC}-0.8$		V_{CC}	V
ILMT Falling Threshold	V_{ILMTL}				0.8	V
ILMT Floating Threshold	V_{ILMIF}		1.3		2	V
Soft Start Time	T_{SS}			600		μs
EN Rising Threshold	V_{ENH}		0.8			V
EN Falling Threshold	V_{ENL}				0.4	V
EN Leakage Current	I_{EN}		-1		1	μA
Input UVLO Threshold	V_{UVLO}				3.9	V
UVLO hysteresis	V_{HYS}			0.3		V
Oscillator Frequency	F_{OSC}	$V_O=5V$	0.68	0.8	0.92	MHz
Min ON Time	$T_{ON,MIN}$	$V_{IN}=V_{INMAX}$		50		ns
Min OFF Time	$T_{OFF,MIN}$			180		ns
VCC Output	V_{CC}	$V_{IN}=4V$	3.2	3.3	3.4	V
Output Over Voltage Threshold		V_{FB} Rising	115	120	125	$\%V_{REF}$
Output Over Voltage Hysteresis				2		$\%V_{REF}$
Output Over Voltage Delay Time				20		μs
Power Good Threshold		V_{FB} Rising	88	90	92	$\%V_{REF}$
Power Good Hysteresis				2		$\%V_{REF}$
Power Good Delay Time				10		μs
Thermal Shutdown Temperature	T_{SD}			150		$^\circ C$
Thermal Shutdown hysteresis	T_{HYS}			15		$^\circ C$

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

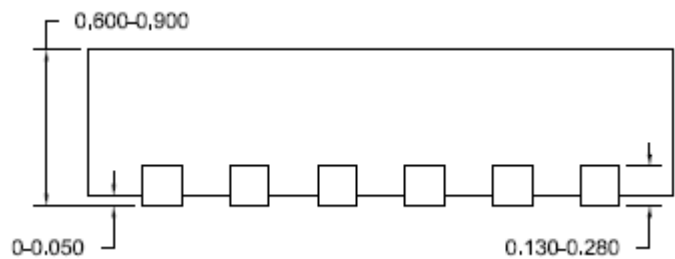
Note 2: θ_{JA} is measured in the natural convection at $T_A = 25^\circ C$ on a four-layer Silergy Evaluation Board..

Note 3: The device is not guaranteed to function outside its operating conditions.

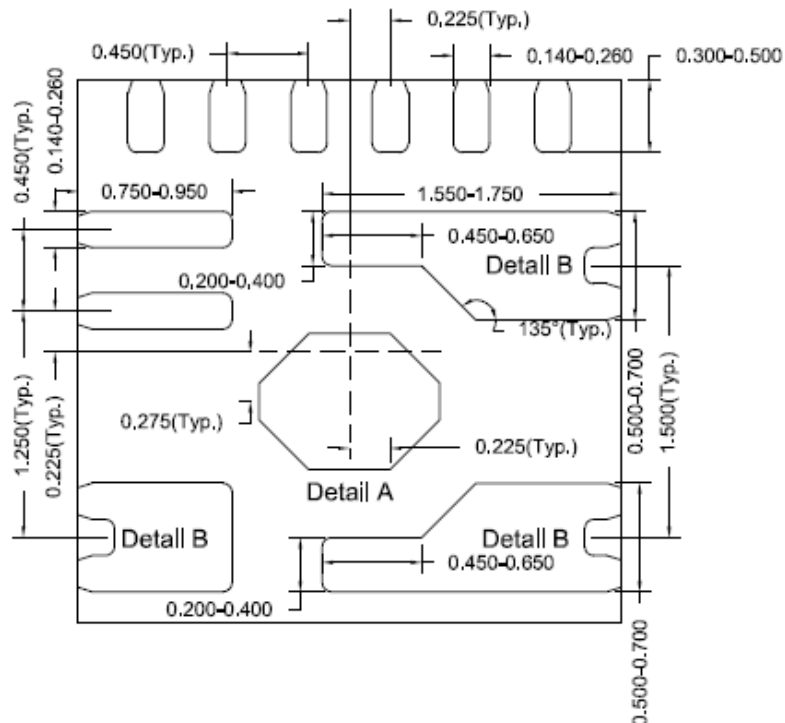
QFN3x3-12 Package Outline Drawing



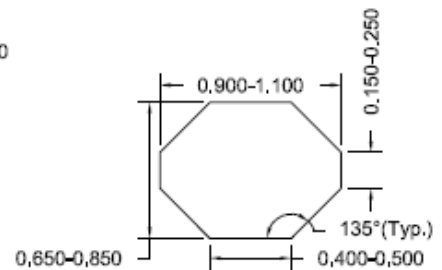
Top View



Side View



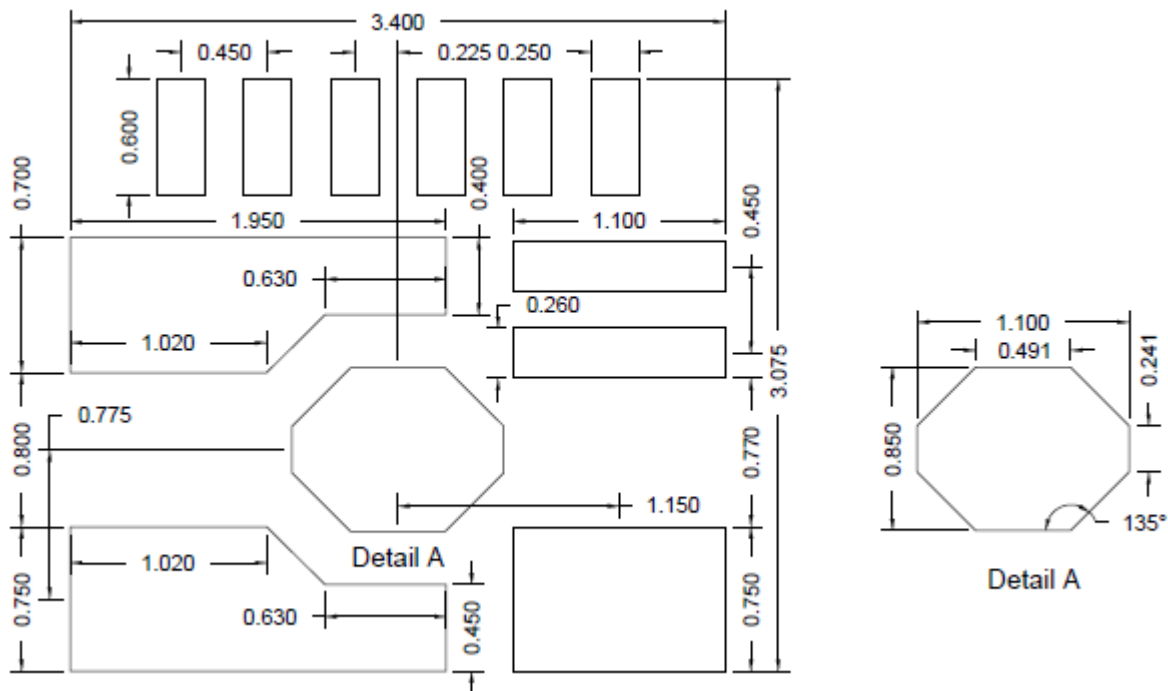
Bottom View



Detail A



Detail B

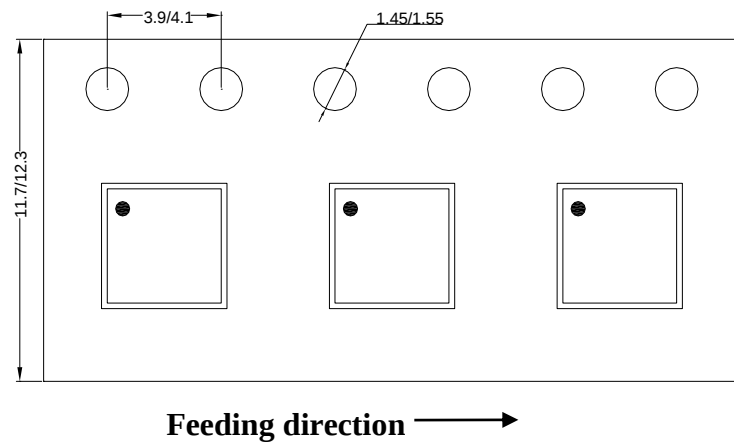


**Recommended PCB layout
(Reference Only)**

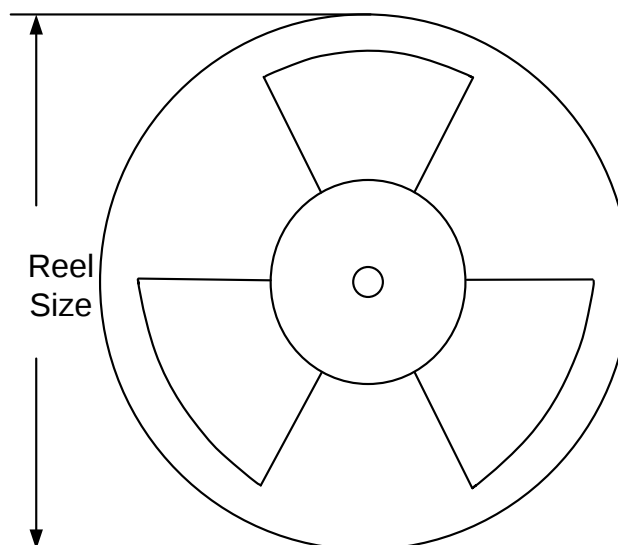
Notes: All dimension in MM and exclude mold flash & metal burr.

Taping & Reel Specification

1. QFN3x3-12 taping orientation



2. Carrier Tape & Reel specification for packages



Package types	Tape width (mm)	Pocket pitch(mm)	Reel size (Inch)	Trailer length(mm)	Leader length (mm)	Qty per reel
QFN3x3	12	8	13"	400	400	5000

3. Others: NA