

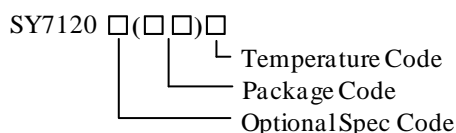
High Efficiency, 16V, 10A Synchronous Step Up Regulator

General Description

The SY7120 is a high efficiency, high power density synchronous Boost regulator. The device adopts adaptive constant off time and current mode control. The integrated low $R_{DS(ON)}$ switches minimize the conduction loss.

The SY7120 provides selectable PFM/PWM light load operation mode. The device features cycle by cycle peak current limit. The low output voltage ripple, the small external inductor and the capacitor size are achieved at programmable pseudo-constant frequency.

Ordering Information



Ordering Number	Package type	Note
SY7120RAC	QFN3×3-20	--

Features

- Input Range: 2.8-16V
- Programmable Pseudo-constant Frequency: 300kHz-2MHz
- Low $R_{DS(ON)}$ for Internal Switch
Main FET: 10mΩ
Rectifier FET: 20mΩ
- PFM/PWM Selectable Light Load Operation Mode
- Internal Loop Compensation
- Programmable Peak Current Limit
- Internal Soft-start Time Limit the Inrush Current
- Input Voltage UVLO
- Over Temperature Protection
- Over Voltage Protection
- RoHS Compliant and Halogen Free
- Compact Package: QFN3×3-20

Applications

- Power Bank
- High Power AP
- E-cigarette
- Bluetooth Speaker

Typical Applications

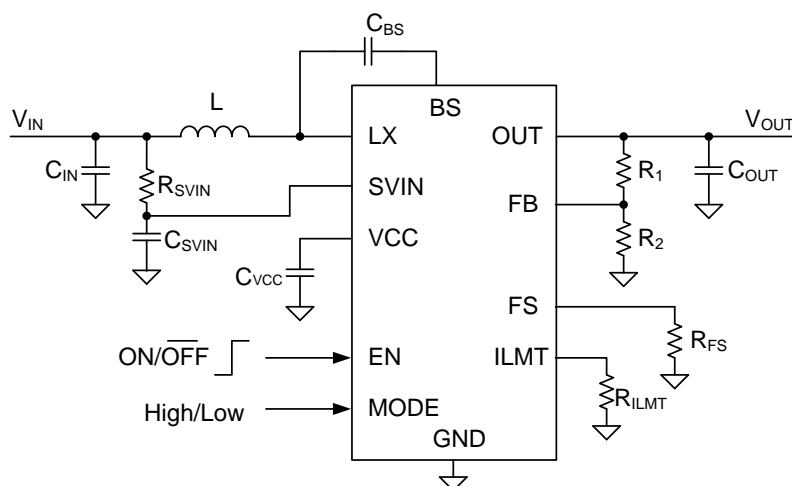
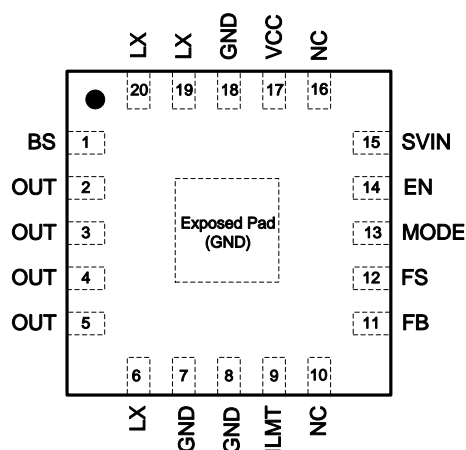


Figure1. Schematic Diagram

Pinout (top view)



(QFN3×3-20)

Top Mark: BMF_{xyz} (device code: BMF, *x*=year code, *y*=week code, *z*=lot number code)

Pin Name	Pin Number	Pin Description
BS	1	Boot-strap pin. Supply rectifier FET's gate driver. Connect a 0.1μF ceramic capacitor between BS and LX pins.
OUT	2,3,4,5	The Boost converter output pin.
LX	6,19,20	Inductor node. Connect an inductor from power input to the LX pin.
GND	7,8,18, EP	Ground pin of the IC.
ILMT	9	Switch peak current limit setting. Connect a resistor from this pin to GND. $I_{LMT}(A) = 1200/R_{ILMT}(k\Omega) - 2$
NC	10,16	Not connected.
FB	11	Feedback pin. Connected to the center of the resistor voltage divider to program the output voltage: $V_{OUT} = 1V \times (R_1/R_2 + 1)$
FS	12	Switching frequency setting pin. Connect a resistor from this pin to ground to program the switching frequency. $f_s(kHz) = 73565/R_{FS}(k\Omega) + 300$
MODE	13	Operating mode selection under light load. Pull this pin low for PFM operation, and pull this pin high for PWM operation. Do not leave it floating.
EN	14	Enable control. Pull high to turn on the IC. Do not leave it floating.
SVIN	15	IC power supply input pin. Decouple this pin to the GND pin with a 1μF ceramic capacitor at least.
VCC	17	Output of the internal LDO regulator. Decouple this pin to the GND pin with a 1μF ceramic capacitor at least.

Block Diagram

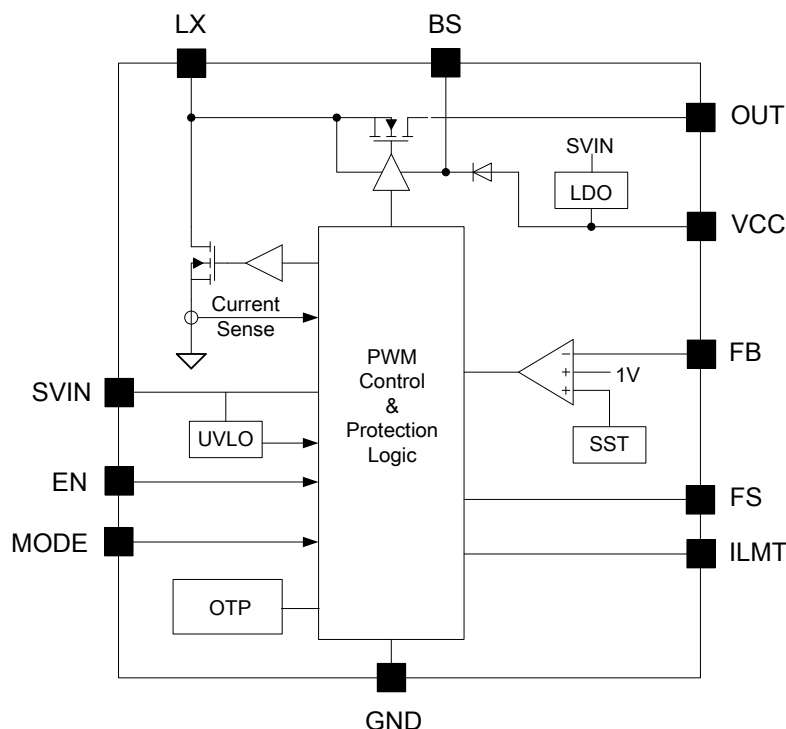


Figure2. Block Diagram

Absolute Maximum Ratings (Note 1)

SVIN, LX, OUT, ILMT, FS, MODE, EN	-0.3V to 18V
FB, VCC	-0.3V to 4V
BS-LX	-0.3V to 4V
Dynamic LX Voltage in 10ns Duration	-3.5V to 22V
Power Dissipation, P_D @ $T_A = 25^\circ\text{C}$ QFN3x3-20	3.1W
Package Thermal Resistance (Note 2)	
θ_{JA}	32°C/W
θ_{JC}	4°C/W
Junction 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)

SVIN	2.8V to 16V
Junction Temperature Range	-40°C to 125°C
Ambient Temperature Range	-40°C to 85°C

Electrical Characteristics

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

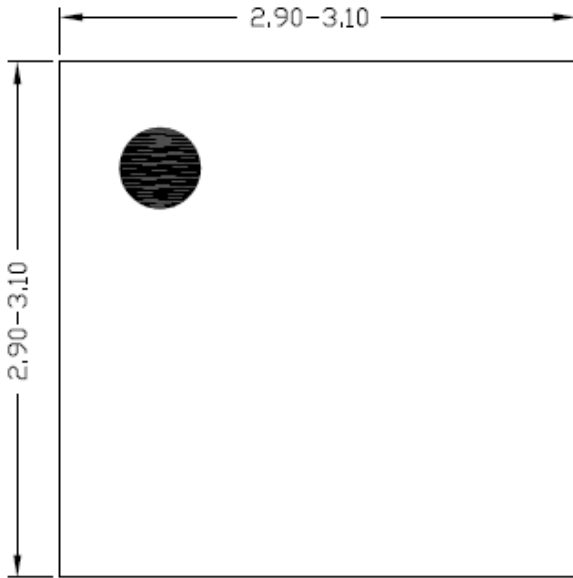
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range	V_{SVIN}		2.8		16	V
Quiescent Current	I_Q	FB=1.1 V		200	250	μA
Shutdown Current	I_{SHDN}	EN=0		1.5	3.5	μA
FB Leakage Current	I_{FB}	$V_{FB}=3.3V$	-50		50	nA
Main N-FET R_{ON}	$R_{DS(ON)_M}$			10		m Ω
Rectifier N-FET R_{ON}	$R_{DS(ON)_R}$			20		m Ω
Feedback Reference Voltage	V_{REF}		0.99	1	1.01	V
SVIN UVLO Rising Threshold	$V_{SVIN,UVLO}$				2.8	V
SVIN UVLO Hysteresis	$V_{SVIN,HYS}$			0.25		V
Output OVP Threshold	$V_{OUT,OVP}$		16	17	18	V
Main N-FET Current Limit	I_{LMT}	$R_{ILMT}=100k\Omega$	8.5	10	11.5	A
Main N-FET Current Limit Program Range	$I_{LMT,RNG}$		2		10	A
ILMT Reference Voltage	V_{ILMT}			0.6		V
EN/MODE Input Voltage High	$V_{EN/MODE,H}$		1.2			V
EN/MODE Input Voltage Low	$V_{EN/MODE,L}$				0.4	V
Switching Frequency Program Range	$f_{SW,RNG}$		300		2000	kHz
Switching Frequency Accuracy	f_{SW}	$R_{FS}=360k\Omega$	400	500	600	kHz
Minimum ON Time	$t_{ON,MIN}$			130		ns
Minimum OFF Time	$t_{OFF,MIN}$			120		ns
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.

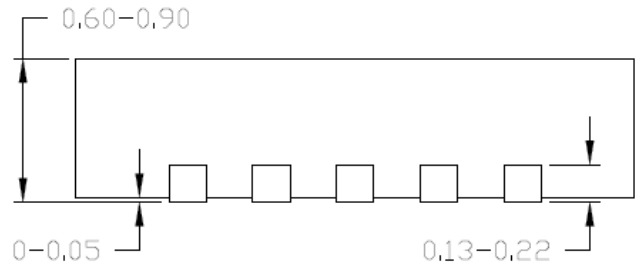
Note 2: Package thermal resistance is measured in the natural convection at $T_A = 25^{\circ}C$ on a four-layer Silergy Evaluation Board.

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

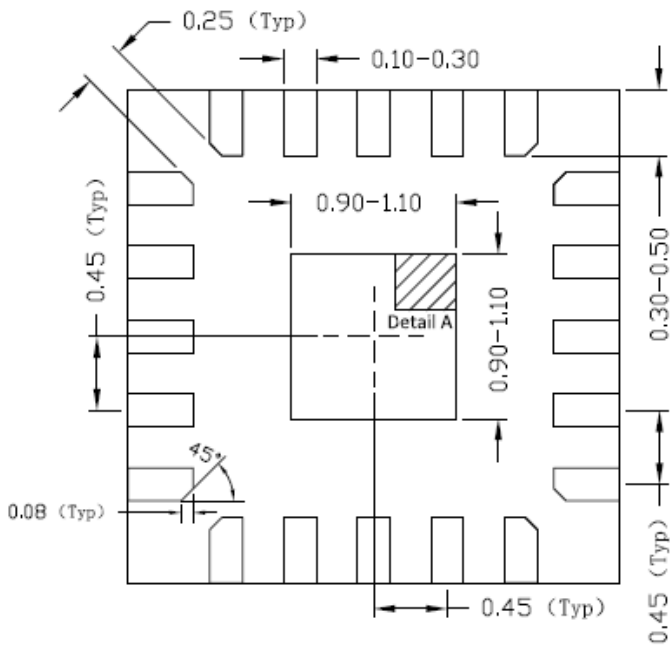
QFN3×3-20 Package Outline



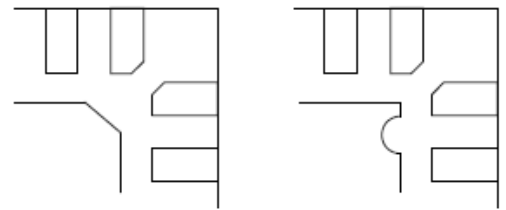
Top view



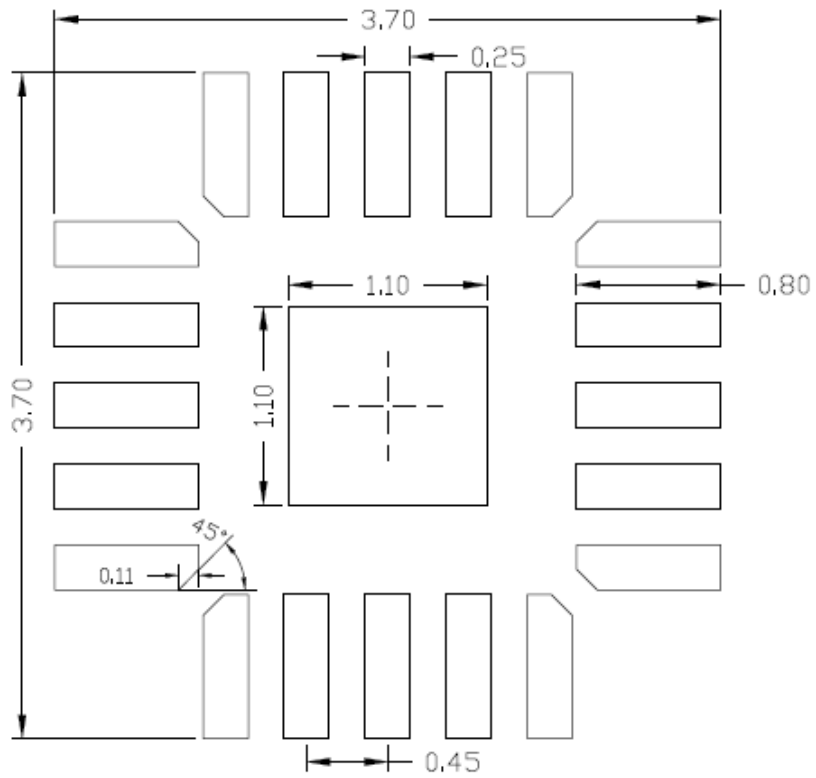
Side view



Bottom view



Detail A
Pin1 Identifier: two options

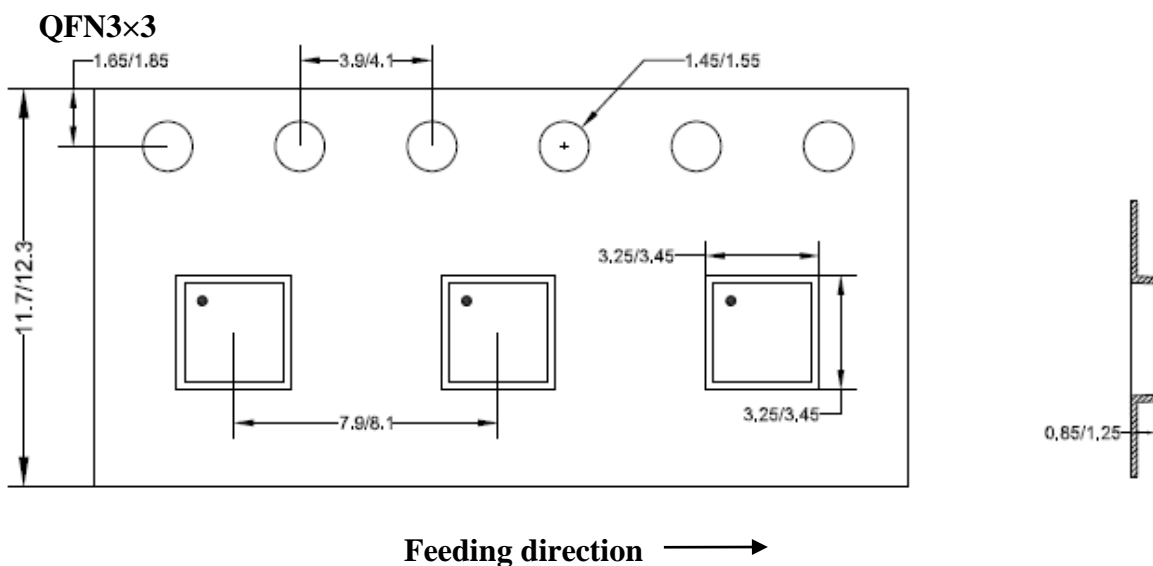


**Recommended PCB layout
(Reference only)**

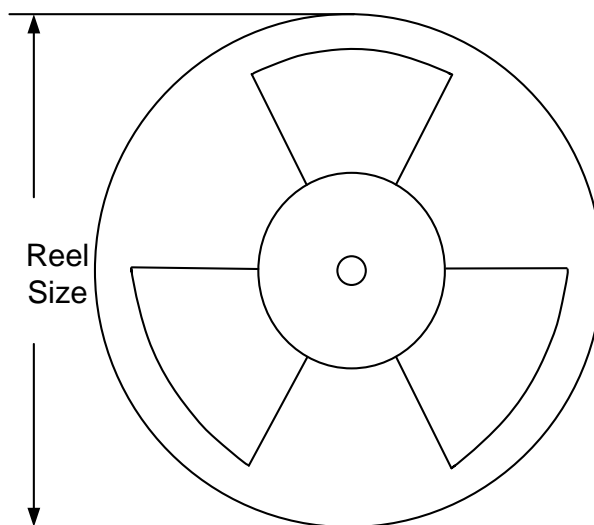
Notes: All dimension in millimeter and exclude mold flash & metal burr.

Taping & Reel Specification

1. Taping orientation



2. Carrier Tape & Reel specification for packages



Package type	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