



# SY7120

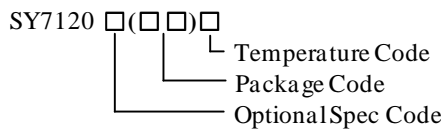
## High Efficiency, 16V, 10A Synchronous Step Up Regulator Advanced Design Specification

### General Description

SY7120 develops 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.

SY7120 provides selectable PFM/PWM light load operation mode. The device features cycle by cycle peak current limit. Low output voltage ripple and small external inductor and capacitor size are achieved with 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

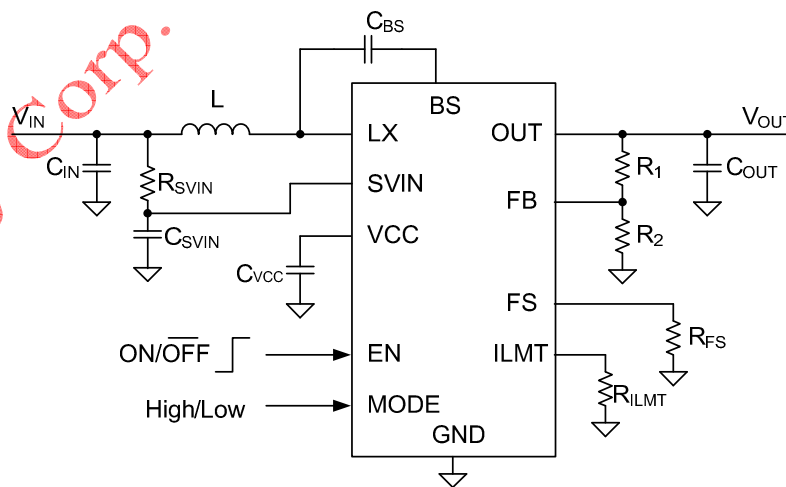
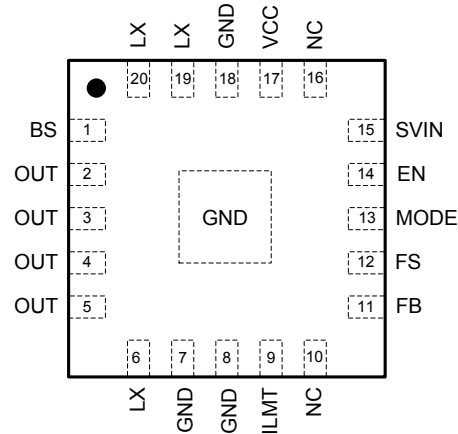


Figure 1. Schematic Diagram

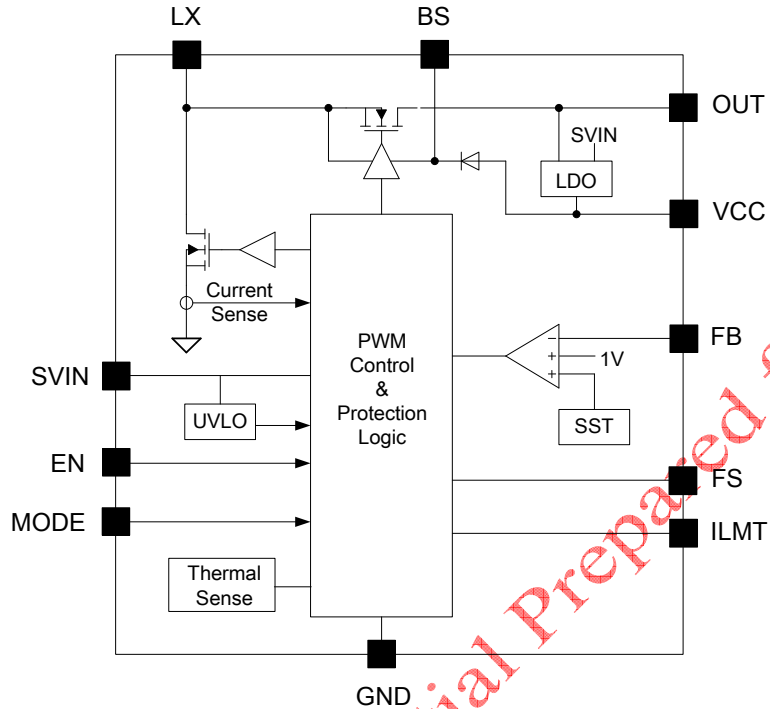
**Pinout (top view)**


(QFN3x3-20)

**Top Mark:** BMF<sub>xyz</sub> for SY7120RAC (device code: BMF, x=year code, y=week code, z=lot number code)

Pin Name	Pin Number	Pin Description
BS	1	Boost-strap pin. Supply Rectifier FET's gate driver. Decouple this pin to the LX pin with a 0.1μF ceramic capacitor
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	Ground pin of the IC.
ILMT	5	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 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 or leave it floating for PWM operation.
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.
VCC	17	Output of the internal regulator. Decouple this pin to the GND pin with a 1μF ceramic capacitor.

**Block Diagram**



**Figure2. Block Diagram**

**Absolute Maximum Ratings** (Note 1)

SVIN, LX, OUT, ILMT, FS, MODE, EN	-----	0.3V to 18V
FB, VCC	-----	4V
BS-LX	-----	4V
Power Dissipation, $P_D$ @ $T_A = 25^\circ\text{C}$ QFN3x3-20	-----	TBD
Package Thermal Resistance (Note 2)		
$\theta_{JA}$	-----	TBD
$\theta_{JC}$	-----	TBD
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)

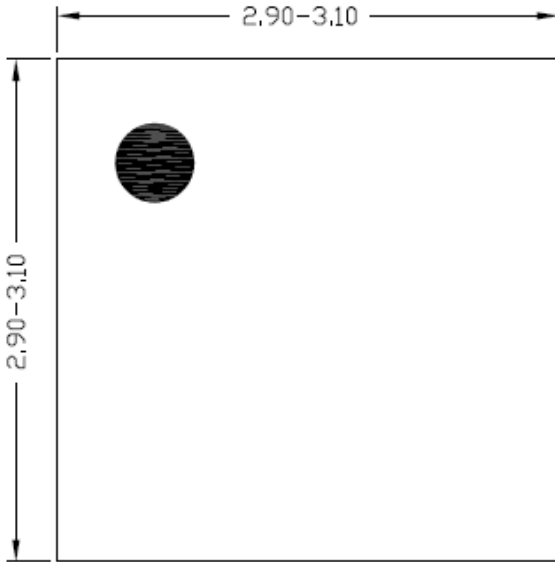
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range	$V_{SVIN}$		2.8		16	V
Quiescent Current	$I_Q$	FB=1.1 V		200		$\mu A$
Shutdown Current	$I_{SHDN}$	EN=0			3.5	$\mu A$
FB Leakage Current	$I_{FB}$	$V_{FB}=3.3V$	-50		50	nA
Main N-FET RON	$R_{DS(ON)_M}$			10		m $\Omega$
Rectifier N-FET RON	$R_{DS(ON)_R}$			20		m $\Omega$
Feedback Reference Voltage	$V_{REF}$		0.99	1	1.01	V
SVIN UVLO Rising Threshold	$V_{SVIN,UVLO}$				2.8	V
SVIN UVLO Hysteresis	$V_{SVIN,HYS}$			0.2		V
Output OVP Threshold	$V_{OUT,OVLP}$		16	17	18	V
Main N-FET Current Limit	$I_{LMT}$	$R_{ILMT}=100k\Omega$	9	10	11	A
Main N-FET Current Limit Program Range	$I_{LMT,RNG}$		2		10	A
ILMT Reference Voltage	$V_{ILMT}$			0.6		V
EN/MODE Rising Threshold	$V_{EN/MODE,H}$				1.2	V
EN/MODE Falling Threshold	$V_{EN/MODE,L}$		0.4			V
Switching Frequency Program Range	$f_{SW,RNG}$		300		2000	kHz
Switching Frequency Accuracy	$f_{SW}$	$R_{FB}=340k\Omega$	400	500	600	kHz
Minimum ON Time	$t_{ON,MIN}$			130		ns
Minimum OFF Time	$t_{OFF,MIN}$			80		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.

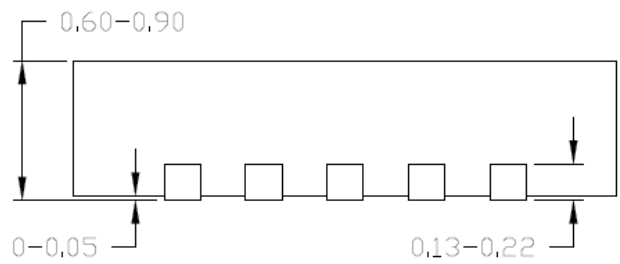
**Note 2:**  $\theta_{JA}$  is measured in the natural convection at  $T_A=25^{\circ}C$  on a low effective single layer thermal conductivity test board of JEDEC 51-3 thermal measurement standard. Paddle of QFN3x3-20 package is the case position for  $\theta_{JC}$  measurement.

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

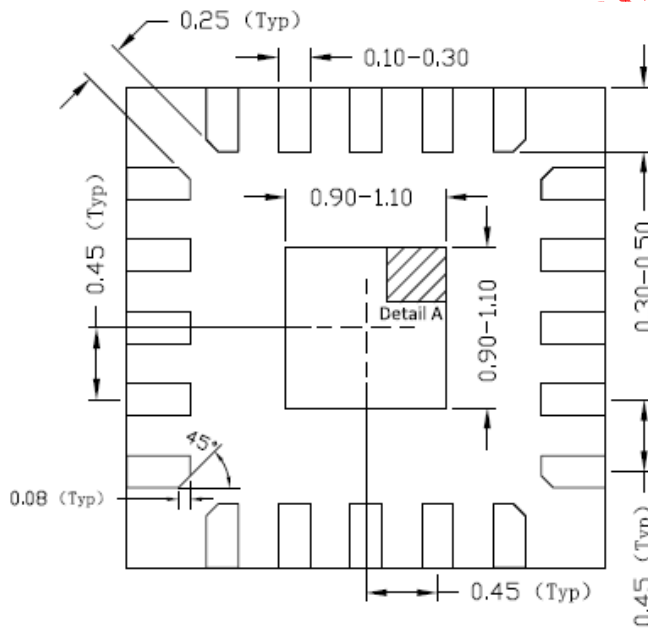
**QFN3x3-20 Package Outline**



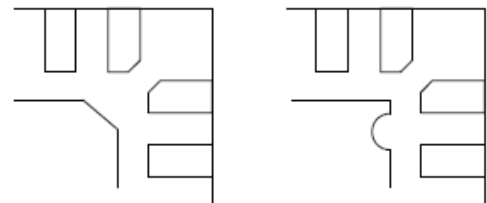
**Top view**



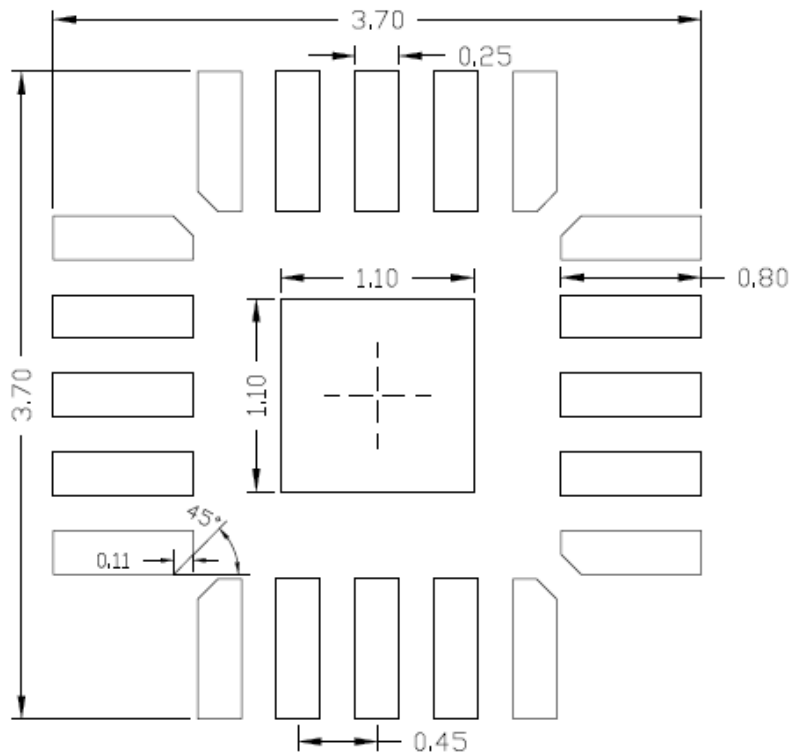
**Side view**



**Bottom view**



**Detail A**  
Pin1 Identifier: two options

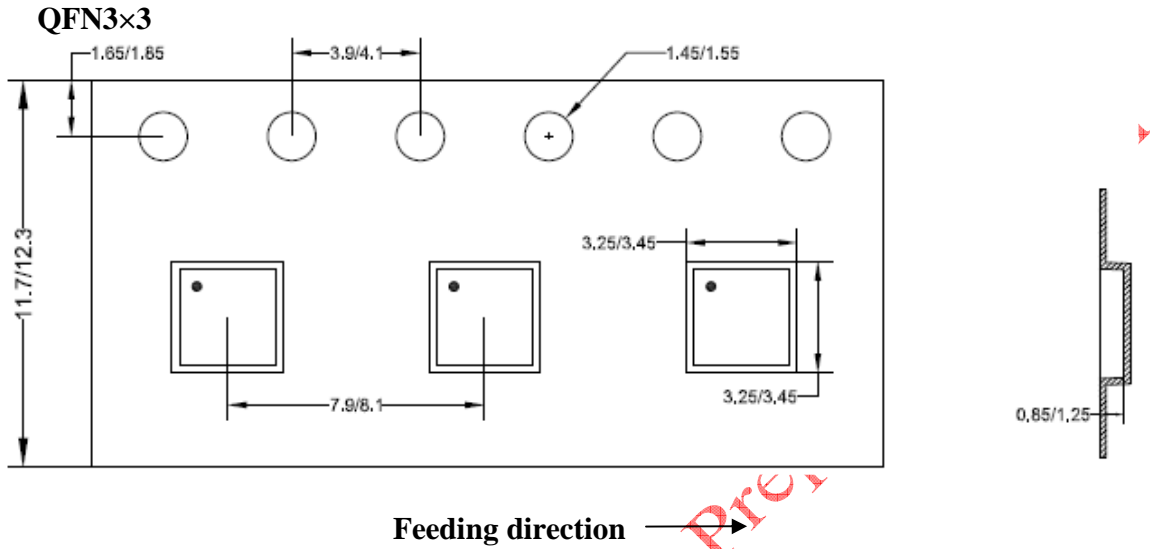


**Recommended PCB layout  
(Reference only)**

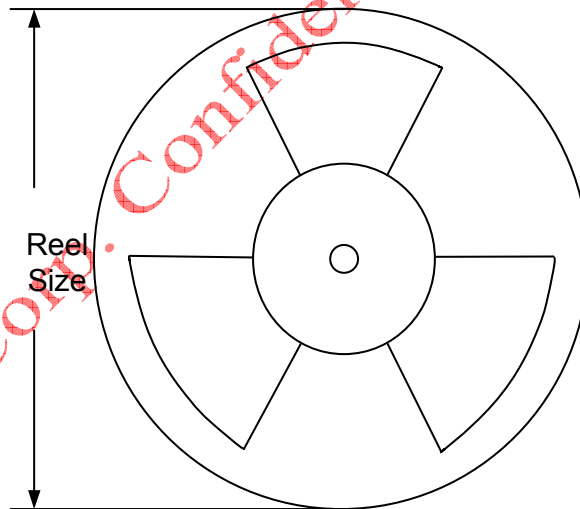
**Notes: All dimension in millimeter and exclude mold flash & metal burr.**

**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**

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