

## 20V, 14.0A Fully-Integrated Synchronous Boost Converter with Load Disconnect Control

PRELIMINARY DATASHEET

### DESCRIPTION

The FH47119A/B is a high-power density, fully integrated synchronous boost converter with a 16.0m power switch and a 16.0mΩ rectifier switch to provide a high efficiency and small size solution in portable systems.

The FH47117A/B has wide input voltage range from 2.7V to 20.0V to support applications with single cell, two-cell Lithium batteries and 12.0V lead-acid batteries.

The device has 14.0A switch current capability and can provide an output voltage up to 20.0V.

The FH47117A/B uses adaptive constant off-time peak current control topology to regulate the output voltage. In moderate to heavy load condition, it works in the PWM mode. In light load condition, the device has two operation modes selected by the MODE pin. One is PFM mode to improve the efficiency and another one is the forced PWM mode to avoid application problems caused by low switching frequency. The switching frequency in the PWM mode is adjustable ranging from 200kHz to 1.4/1.0MHz by an external resistor.

FH47119A/B could isolate the output from input side when shut down by a gate drive output disconnecting external FET, so that the load current consumption could be limited.

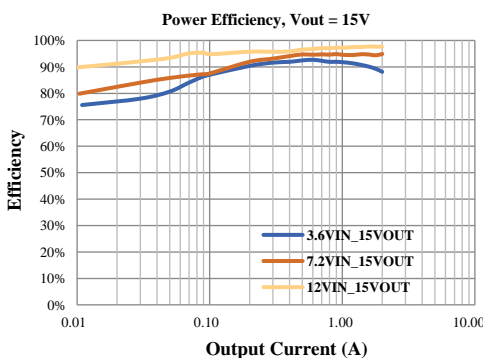
The FH47119A/B also implements a programmable soft-start function and an adjustable switching peak current limit function.

In addition, the device provides 22V output overvoltage protection, cycle-by-cycle over current protection, and thermal shutdown protection.

Device Information <sup>(1)</sup>

PART NUMBER	PACKAGE	BODY SIZE (NOM)
FH47119A/B	QFN (20L)	3.50mm × 4.50mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

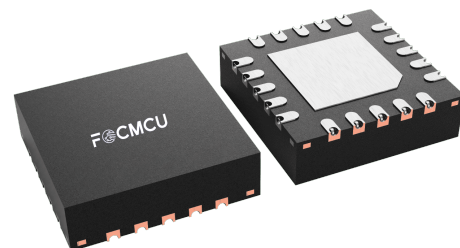


### KEY FEATURES

- Input voltage range  $V_{PIN}$ : 2.7V to 20.0V
- Output voltage range  $V_{OUT}$ : 4.5V to 20.0V
- Programmable switch peak current limit:  
FH47119A up to 14.0A, FH47119B up to 15.0A
- High Efficiency:
  - 95% ( $V_{PIN} = 7.2V$ ,  $V_{OUT} = 16.0V$ ,  $I_{OUT} = 3.0A$ )
  - 94% ( $V_{PIN} = 12V$ ,  $V_{OUT} = 18.0V$ ,  $I_{OUT} = 4.0A$ )
  - 90% ( $V_{PIN} = 3.3$ ,  $V_{OUT} = 9.0V$ ,  $I_{OUT} = 3.0A$ )
- 2 modulation mode available:  
FH47119A PFM or PWM mode at light load  
FH47119B PFM or FPWM mode at light load
- Integrated gate driver for load disconnect and output short protection
- 1.0uA current consumption during shutdown
- Two modes of with fast or slow tr/ff for EMI solution (for FH47117B)
- Adjustable switching frequency:  
FH47119A 200k to 1.4MHz  
FH47119B 200k to 1.0MHz
- Programmable soft start
- Output over voltage protection (at 22.0V), cycle-by-cycle over current protection, thermal shutdown protection
- Pb-free Packages, QFN3.5 x 4.5-20L

### APPLICATIONS

- Wireless / Speakers
- Quick Charge Power Bank
- POS Terminal
- Tablet PC / Note Book
- Power Interface (USB Type-C, Thunderbolt)
- E-Cigarette
- Portable Speakers



## TYPICAL APPLICATION

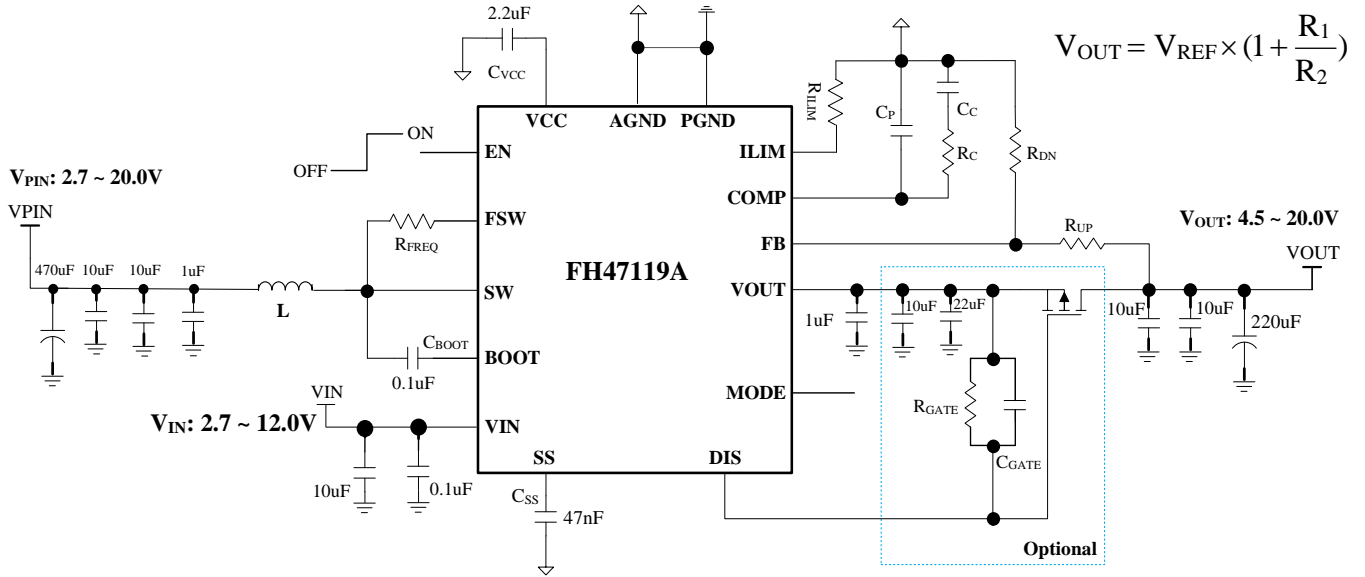


Figure 1. FH47119A Typical application circuit

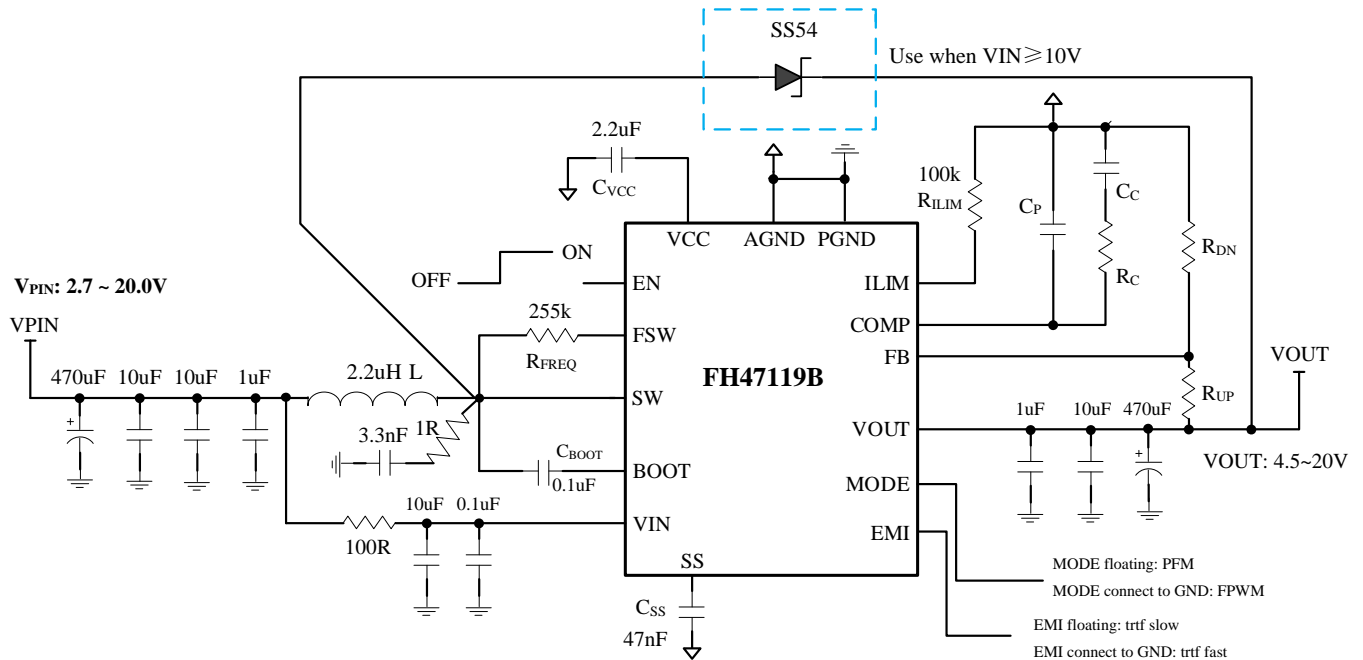


Figure 2. FH47119B Typical application circuit

## 带输出关断的20.0V, 14.0A全集成同步升压转换器

## 器件概述

FH47119 是一款高功率、全集成升压转换器，带有负载关断功能的栅极驱动，集成 16m 功率开关管和 16m 同步整流管，为便携式系统提供高效的小尺寸解决方案。

FH47119 具有2.7V至20.0V宽输入电压范围，可为采用单节或两节锂电池，或12V铅酸电池的应用提供支持。该器件具备14.0A开关电流能力，并且能够提供高达20V的输出电压。

FH47119 采用自适应恒定关断时间峰值电流控制拓扑结构来调节输出电压。在中等到重负载条件下，FH47119 工作在PWM模式。在轻负载条件下，该器件可通过MODE引脚选择下列两种工作模式之一。一种是可提高效率的PFM模式；另一种是可避免因开关频率较低而引发应用问题的强制PWM模式。PWM模式下，FH47119 开关频率可通过外部电阻调节，支持200kHz至1.4MHz的范围。

FH47119 还支持可编程的软启动，以及可调节的开关峰值电流限制。另外，FH47119 集成了输出关断功能的栅极驱动，在SD状态，可完全断开输入电源。

此外，该器件还提供有22V输出过压保护、逐周期过流保护和热关断保护。

## 电气特性

输入电压范围  $V_{PIN}$ : 2.7V ~ 20.0V

输出电压范围  $V_{OUT}$ : 4.5V ~ 20.0V

可编程峰值电流: 14.0A

高转换效率:

95% ( $V_{PIN} = 7.2V, V_{OUT} = 16V, I_{OUT} = 3A$ )

94% ( $V_{PIN} = 12V, V_{OUT} = 18V, I_{OUT} = 4A$ )

90% ( $V_{PIN} = 3.3V, V_{OUT} = 9V, I_{OUT} = 3A$ )

轻载条件下两种调制方式:

脉频调制 (PFM)、强制脉宽调制 (PWM)

集成输出关断的栅极驱动

低关断功耗，关断电流 1.0uA

可调节的开关频率: 200kHz ~ 1.4MHz

可编程软启动

输出过压 (22V)、逐周期过流、热关断等保护

QFN3.5\*4.5-20L, 无铅超薄封装

## 应用领域

无线音箱

便携式音箱

快充移动电源

电子烟

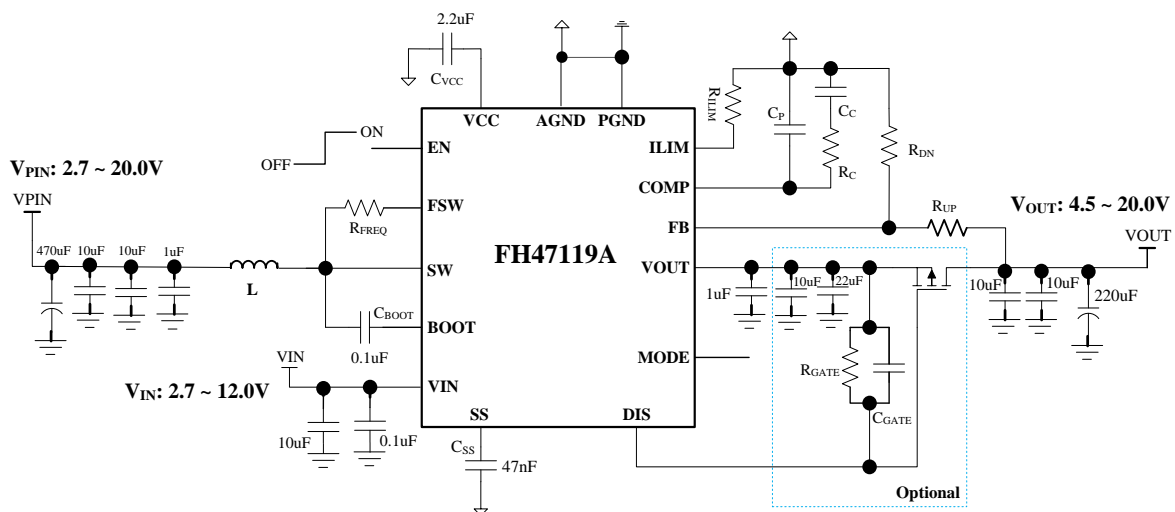
USB TYPE-C 电源传输

拉杆音箱

平板电脑，笔记本电脑

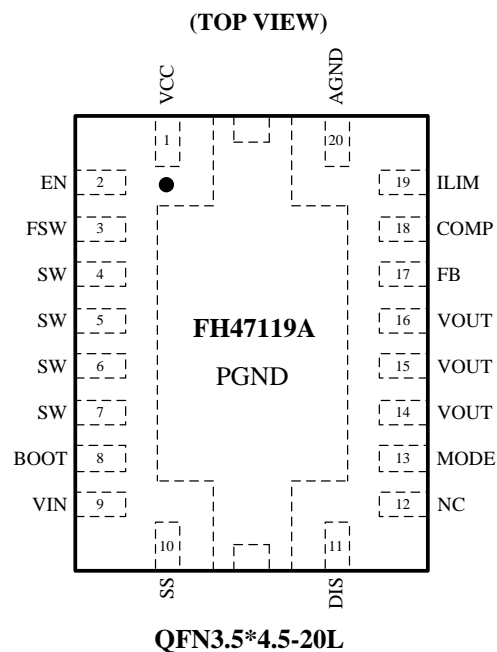
POS 机终端

## 典型应用电路图



图一、FH47119A 典型应用电路图

## PIN CONFIGURATION (FH47119A)



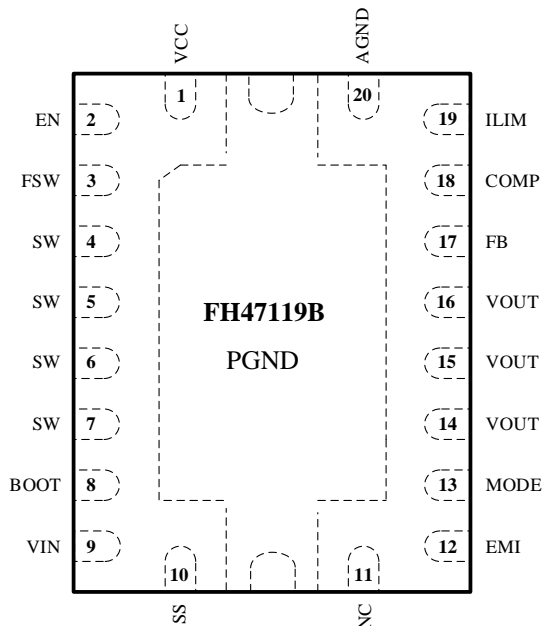
## PIN FUNCTION (FH47119A)

1: I: input O: output PWR: power

Terminal No.	NAME	I/O <sup>*1</sup>	Description
1	VCC	O	Output of the internal regulator. A ceramic capacitor of 2.2uF is required between this pin and ground.
2	EN	I	Enable logic input. Logic high level enables the device. Logic low level disables the device and turns it into shutdown mode.
3	FSW	I	The switching frequency is programmed by a resistor between this pin and the SW pin.
4 / 5 / 6 / 7	SW	PWR	The switching node pin of the converter.
8	BOOT	O	Power supply for high-side MOSTFET gate driver. A ceramic capacitor of 0.1uF must be connected between this pin and the SW pin.
9	VIN	I	IC power supply input.
10	SS	O	Soft-start programming pin. An external capacitor connected to ground sets the ramp rate of the internal error amplifier's reference voltage during soft-start.
11	DIS	O	A gate drive output for the external disconnect FET. Connect the DISDRV pin to the gate of the external FET. Leave it floating if not using the load disconnect function.
12	NC	-	No connection inside the device. Connect these two pins to ground plane on the PCB for good thermal dissipation.
13	MODE	I	Operation mode selection pin for the device in light load condition. When this pin is connected to ground, the device works in PWM mode. When this pin is left floating, the device works in PFM mode.
14 / 15 / 16	VOUT	PWR	Boost converter output.
17	FB	I	Voltage feedback.
18	COMP	O	Output of the internal error amplifier, the loop compensation network should be connected between this pin and the AGND pin.
19	ILIM	I	Adjustable switch peak current limit. An external resistor should be connected between this pin and the AGND pin.
20	AGND	-	Signal ground of the IC.
0	PGND	PWR	Power ground of the IC.

## PIN CONFIGURATION (FH47119B)

(TOP VIEW)



QFN3.5\*4.5-20L

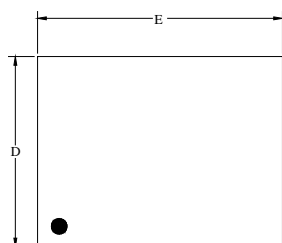
## PIN FUNCTION (FH47119B)

2. I: Input; O: Output; G: Ground; P: Power; BST: BOOT Strap; OD: Open drain

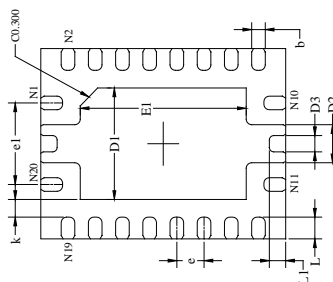
Terminal No.	Name	I/O <sup>2</sup>	Description
1	VCC	O	Output of the internal regulator. A ceramic capacitor of 2.2uF is required between this pin and ground. (接2.2uF到地)
2	EN	I	Enable logic input. Logic high level enables the device. Logic low level disables the device and turns it into shutdown mode. (使能输入, 接高电平使能, 低电平关断)
3	FSW	I	The switching frequency is programmed by a resistor between this pin and the SW pin. (接电阻到SW脚, 调节PWM开关频率)
4 / 5 / 6 / 7	SW	P	The switching node pin of the converter. (升压开关节点)
8	BOOT	O	Power supply for high-side MOSFET gate driver. A ceramic capacitor of 0.1uF must be connected between this pin and the SW pin. (接0.1uF电容到SW)
9	VIN	P	IC power supply input. (电源输入脚)
10	SS	O	Soft-start programming pin. An external capacitor connected to ground sets the ramp rate of the internal error amplifier's reference voltage during soft-start. (接电容到地, 设置软启动时间)
11	NC	I	No connection, connect to GND or floating. (无连接, 接地或悬空)
12	EMI	O	Selection for fast or slow tr/ff. (Tr/ff 模式选择)
13	MODE	I	Operation mode selection pin for the device in light load condition. When this pin is connected to ground, the device works in PWM mode. When this pin is left floating, the device works in PFM mode. (接地选择强制PWM模式, 悬空选择PFM模式)
14 / 15 / 16	VOUT	P	Boost converter output. (升压输出)
17	FB	I	Voltage feedback. (电压反馈)
18	COMP	O	Output of the internal error amplifier, the loop compensation network should be connected between this pin and the AGND pin. (接电阻补偿网络到地)
19	ILIM	O	Adjustable switch peak current limit. An external resistor should be connected between this pin and the AGND pin. (接电阻到地, 调节开关峰值限制电流)
20	AGND	G	Signal ground of the IC. (器件信号地)
EP	PGND	G	Provides both electrical and thermal connection from the device to the board. A matching ground pad must be provided on the PCB and the device connected to it via solder. For proper electrical operation, this ground pad must be connected to the system ground. (既是地, 又是散热PAD)

## PACKAGE OUTLINE DIMENSIONS

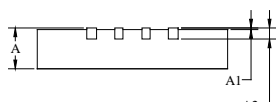
- QFN3.5\*4.5-20L



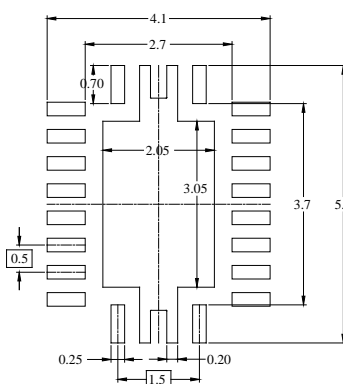
TOP VIEW



BOTTOM VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	3.400	3.600	0.134	0.142
D1	1.950	2.150	0.077	0.085
D2	0.650	0.850	0.026	0.033
D3	0.250	0.450	0.010	0.018
E	4.400	4.600	0.173	0.181
E1	2.950	3.150	0.116	0.124
k	0.325 REF		0.013 REF	
b	0.200	0.300	0.008	0.012
L	0.300	0.500	0.012	0.020
L1	0.224	0.376	0.009	0.015
e	0.500 BSC		0.020 BSC	
e1	1.500 BSC		0.060 BSC	

NOTE: This drawing is subject to change without notice.

## ORDERING INFORMATION

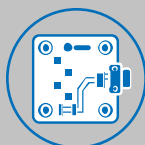
Part Number	Input Voltage	Features	Operating Temperature	Package Type	Top Mark	SPQ
FH47119AD20	2.7V ~ 20.0V	<ul style="list-style-type: none"> <li>• DC-DC synchronous boost</li> <li>• PFM or PWM Mode</li> <li>• Vout: 4.5V ~ 20V (Adjustable)</li> <li>• Switch frequency: <a href="#">200kHz ~ 1.4MHz (Adjustable)</a></li> <li>• Current limit: 14.0A</li> <li>• Output disconnect</li> </ul>	-40°C to +85°C	QFN3.5*4.5-20L	FH47119A <u>YY WW LL</u>	5000EA/Reel
FH47119BD20	2.7V ~ 20.0V	<ul style="list-style-type: none"> <li>• DC-DC synchronous boost</li> <li>• PFM or FPWM Mode</li> <li>• Vout: 4.5V ~ 20V (Adjustable)</li> <li>• Switch frequency: <a href="#">200kHz ~ 1.0MHz (Adjustable)</a></li> <li>• Current limit: 15.0A</li> <li>• Two modes of with fast or slow tr/ff for EMI solution</li> </ul>	-40°C to +85°C	QFN3.5*4.5-20L	FH47119B <u>YY WW LL</u>	5000EA/Reel

**Note:**

- **FH47119A | FH47119B** devices are Pb-free and RoHs compliant.
- The surface prints of our semiconductor devices are subject to change during the production process and do not involve changes in electrical parameters, and we will not separately state the notice.
- If you have any other custom purchase needs, please contact our sales department.
- FOCMCU Inc. reserves the right to amend and legally interpret the electrical parameters of this chip device. (<http://www.fordevices.com>)



[Evaluation Kit Available](#)



[Design Resources](#)

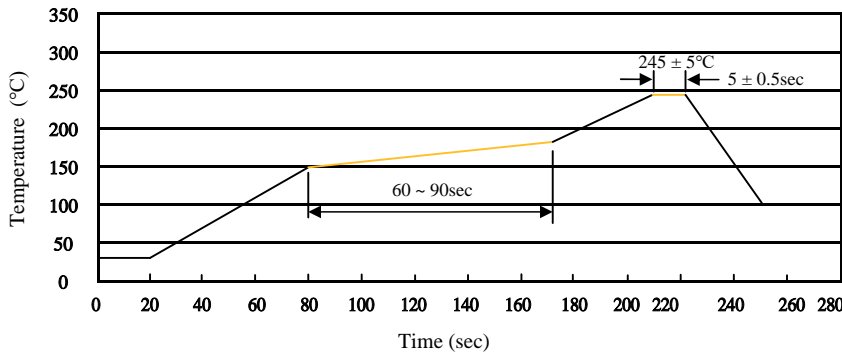


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## 回流焊温度曲线图(无铅) | Temperature Profile for IR Reflow Soldering (Pb-Free)



**Note:**

1. Preheating: 150 ~ 180°C, Time: 60 ~ 90sec.
2. Peak Temp.: 245 ± 5°C, Duration: 5 ± 0.5sec.
3. Cooling Speed: 2 ~ 10°C/sec.

**说明:**

- 1、预热温度 150 ~ 180 ，时间 60 ~ 90sec ；
- 2、峰值温度 245 ± 5 ，时间持续为 5 ± 0.5sec ；
- 3、焊接制程冷却速度为 2 ~ 10 /sec.

## 耐焊接热试验条件 | Resistance to Soldering Heat Test Conditions

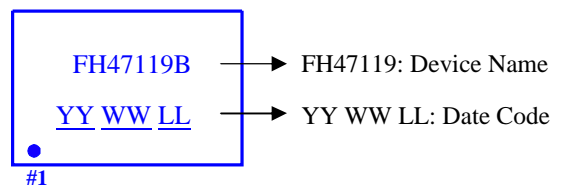
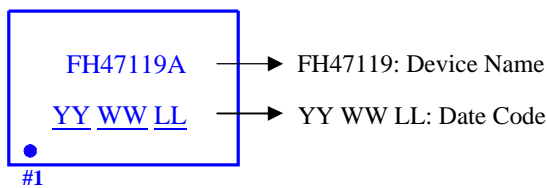
温度：260 ± 5°C

时间：10 ± 1sec.

Temp.: 260 ± 5°C

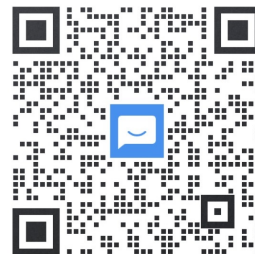
Time: 10 ± 1sec

Device Name: DFN3.5x4.5-20L



### ESD SENSITIVITY CAUTION

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.



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