

## 23V, 500mA Low Dropout Voltage, Low I<sub>Q</sub>, Linear Regulator

PRELIMINARY DATASHEET

### Product Overview

**Datasheet Brief**

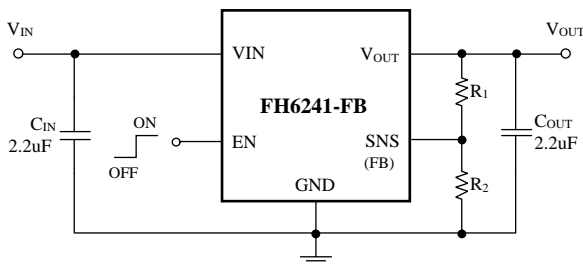
The FH6241 series are a group of low-dropout (LDO) voltage regulators offering the benefits of wide input voltage range, low dropout voltage, low power consumption, and miniaturized packaging.

Quiescent current of only 1.5µA makes these devices ideal for powering the battery-powered, always-on systems that require very little idle-state power dissipation to a longer service life.

There is a shutdown mode by pulling the EN pin low. The shutdown current in this mode goes down to only 100nA (typ.).

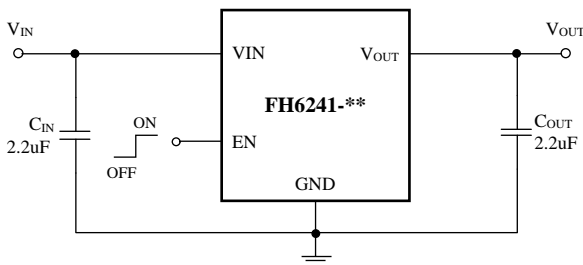
The FH6241 series of linear regulators are stable with the ceramic output capacitor over its wide input range from 2.0V to 23V and the entire range of output load current (0~500mA).

### Simplified Application Circuit



$$V_{OUT} = V_{FB} (1 + R_1 / R_2)$$

Adjustable Output Voltage Version



Fixed Output Voltage Version

**Note:** Input capacitor ( $C_{IN} = 2.2\mu F$ ) and output capacitor ( $C_{OUT} = 2.2\mu F$ ) are recommended in all application circuits.

Figure 1. FH6241 Typical application

### Features

- Wide Operating Input Voltage Range: 2.0V to 23V
- 500mA Output Peak Current
- 1.5µA Ground Current at no Load
- Output Accuracy: ±1%
- 100nA Disable Current
- Dropout Voltage: 0.35V at 100mA /  $V_{OUT} = 5V$
- Support Fixed Output Voltage 1.8V, 3.3V, 5V
- High PSRR: 70dB (typ.) @ 1kHz
- Adjustable Output Voltage Available by Specific Application
- Stable with Ceramic or Tantalum Capacitor
- Current Limit Protection
- Over-Temperature Protection
- -40°C to +85°C Operating Temperature Range

### Package Type

- 4-pin FBP1.0\*1.0-4L
- 5-pin SOT-23-5L

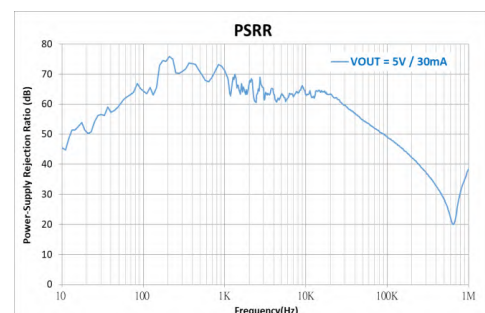
Device Information <sup>(1)</sup>

PART NUMBER	PACKAGE	BODY SIZE (NOM)
FH6241C**M5	SOT-23 (5L)	2.90mm × 1.60mm
FH6241C**U4	FBP (4L)	1.00mm x 1.00mm

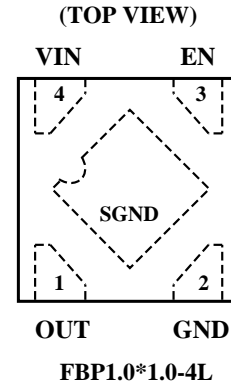
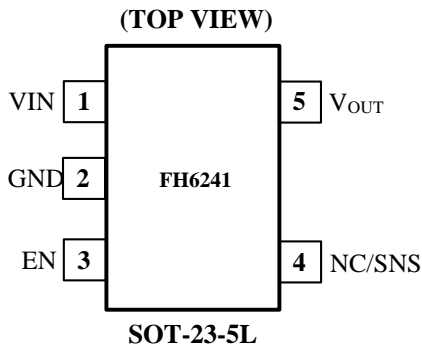
(1) For all available packages, see the orderable addendum at the end of the data sheet.

### Applications

- Portable, Battery Powered Equipment
- Low Power Microcontrollers
- Multi-cell Battery Powered System
- Wearables
- NB-IoT Module
- Industrial Controls



## Pin Configuration



## Pin Description

Pin No		Pin Name	Pin Function
FH6241			
SOT-23-5L	FBP1x1-4L		
1	4	VIN	Input of Supply Voltage.
2	2	GND	Ground
3	3	EN	Enable Control Input.
4		NC	No internal connection
		SNS	Sense of Output Voltage.
5	1	V <sub>OUT</sub>	Output of the Regulator
	5	SGND	Substrate of Chip. Leave floating or tie to GND.

## Functional Block Diagram

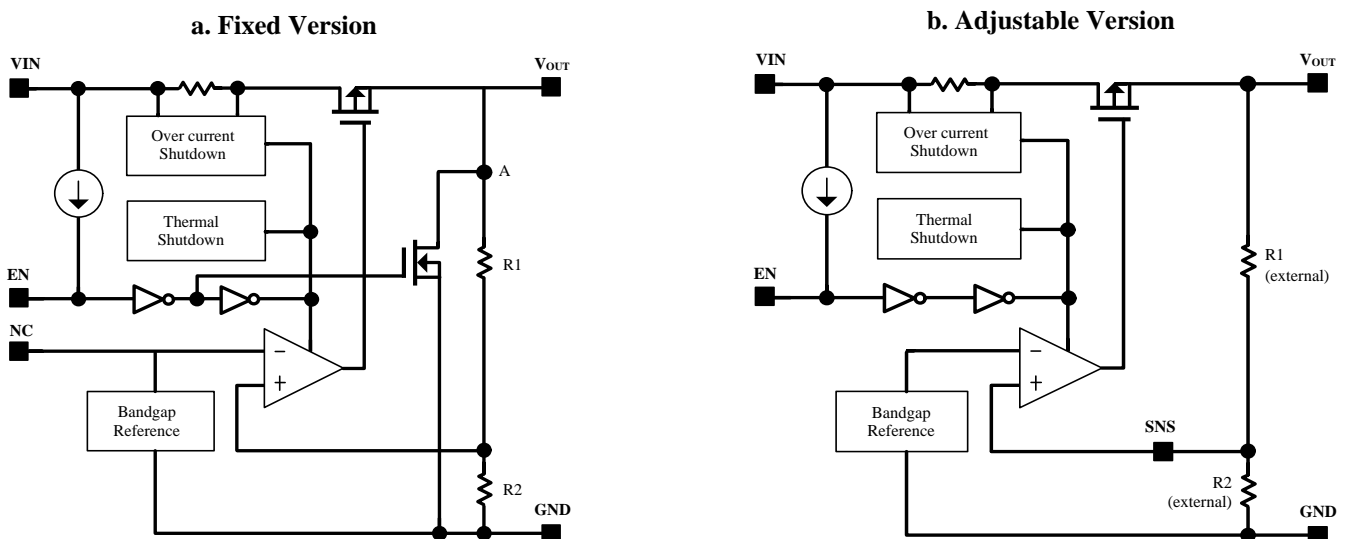


Figure 2. FH6241 Block Diagram

## 23V / 500m, 低静态电流, 低压差线性稳压器

## 产品概述

FH6241 系列是一组低压差 (LDO) 转换器, 具有 2.0V 至 23V 宽电压输入范围、低压差、低功耗和小型化封装的等特性。

FH6241 低至 1.5 $\mu$ A 低静态电流特性, 特别适用于电池供电、长时间待机系统设备应用, 能帮助降低系统设备的待机功耗, 有效延长待机时间和电池使用寿命。

FH6241 具有带 EN 使能功能, 将 EN 脚拉低可进入关断模式, 此关断模式下静态电流可降至仅 100nA (典型值)。

FH6241 系列支持输出电容采用陶瓷电容器, 在 2.0V 至 23V 的宽输入电压范围内和整个输出负载电流 0~500mA 范围内稳定工作。

## 极限参数值

描述	参数值	单位
VIN, EN 至 GND	-0.3 ~ 28	V
SNS 至 GND	-0.3 ~ 6.5	V
VOUT 至 GND	-0.3 ~ 6.5	V
VOUT 至 VIN	-27 ~ 0.3	V
封装热阻 $\theta_{JA}$	SOT-23-5L	220 °C /W
	FBP 1*1-4L	195 °C /W
引脚焊锡温度 (Soldering, 10 sec.)	260	°C
结点温度	150	°C
存储温度范围	-40 ~ 150	°C
ESD 静电	HBM	2000 V
	MM	200 V
功耗, PD	SOT-23-5L	500 °C /W

注: 任何超过“最大耐压值”的应用可能会导致芯片遭受永久性损坏。这些是额定最大耐压值, 仅表示在这个范围内芯片不会损伤, 但不保证所有性指标都正常, 在任何超过“最大耐压值”的场合使用, 都可能导致芯片永久性损坏。在接近或等于最大耐压值情况下使用, 可能会影响产品可靠性。

## 引脚功能

引脚序号 FH6241		名称	功能描述
SOT-23-5L	FBP 1*1-4L		
1	4	VIN	电源输入端口
2	2	GND(VSS)	接地
3	3	EN(CE)	使能脚输入
4	/	NC	浮空脚
5	1	VOUT	电源输出端口
/	5	SGNG	散热焊盘, 浮空或连接到地

## 电气特性

- 宽范围输入电压: 2.0V 至 23V
- 500mA 输出瞬间最大电流
- 1.5 $\mu$ A 静态电流 (无负载)
- 输出电压精度:  $\pm 1\%$
- 100nA 关断电流
- 低压差: 0.35V ( $V_o=5V/I_o=100mA$  条件下)
- 输出电压: 1.8V/2.8V/3.0V/3.3V/5V (固定)、可调电压
- 支持陶瓷电容或者钽电容
- 限流保护
- 过温保护
- 封装形式 SOT-23-5L & FBP 1x1-4L

## 应用建议

## 输入、输出电容的选择

陶瓷电容由于其高容值、低成本特性使其适用于更小的体积的应用, 其高频波电流、高电压额定值、低 ESR 等特性使其更佳适用于转换器的应用。运用陶瓷电容可以获得低输出电压纹波和小的外围电路尺寸。选择 X5R 或者 X7R 型号作为输出和输入电容, 这些型号的电容器有更好的温度和电压特性。

陶瓷电容作输入电容时, 当 VIN 电压大于 15V 时, 热插拔在 VIN 管脚处产生的高压尖峰可能会超过 40V, 有可能会造成芯片的永久性损坏。因此, 我们建议, 电路在 VIN > 15V 的应用中, 使用吸收上电尖峰性能更好的电解电容或者钽电容, 可以有效地保护芯片, 提高系统可靠性。

当 VIN 上电电压非常迅速时, 芯片内部电路来不及响应时, 输出电压容易出现超过额定输出电压的情况, 即输出过冲。当系统出现输出电压过冲时, 可以利用增加输出电容 (20~100 $\mu$ F) 来减少这种过冲。

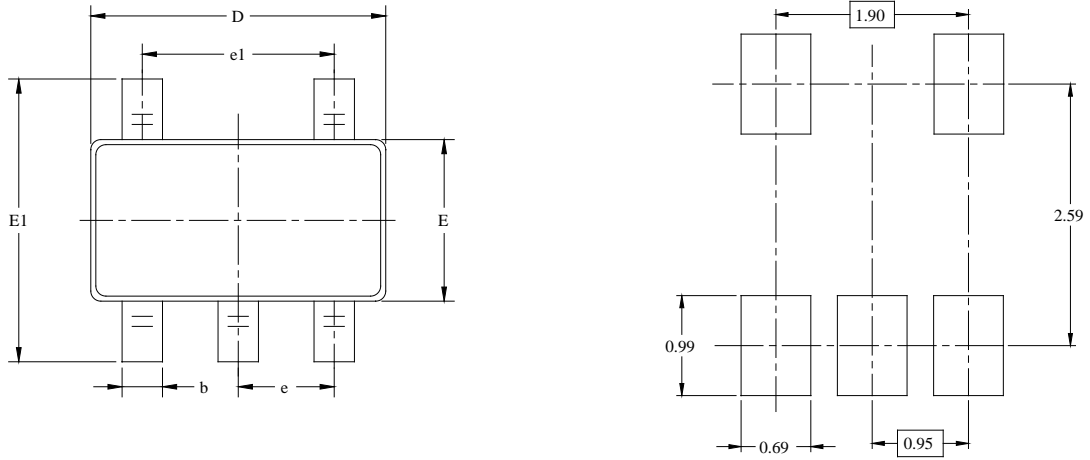
特别注意: 当电源快速启动或者电源发生波动时, 输出电压都可能会有过冲现象。请务必在实际应用环境中对电源启动时的输出电压过冲现象进行充分实测验证后再决定使用。

## 应用领域

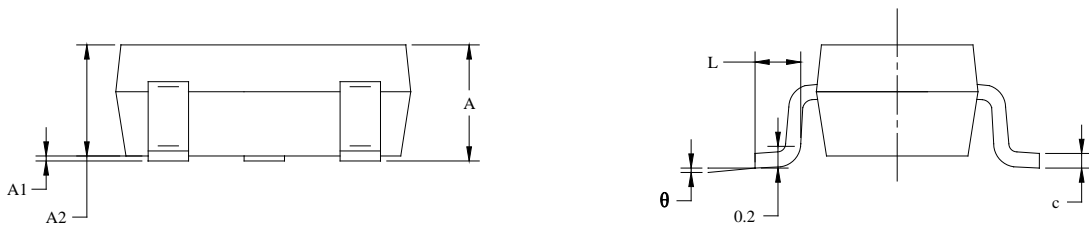
- 手持式、电池供电设备
- 低功耗微处理器
- 无线通讯设备
- 车载导航系统
- 智能家居
- 智能电表
- 音频/视频设备
- 工业控制

## Package Information

- Type: SOT-23-5L



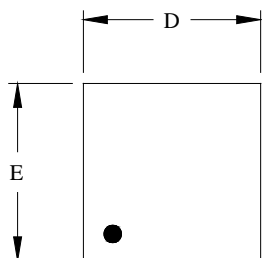
RECOMMENDED LAND PATTERN(Unit: mm)



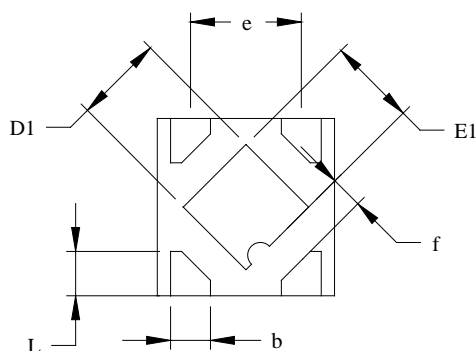
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	1.900BSC		0.075 BSC	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

## Package Information

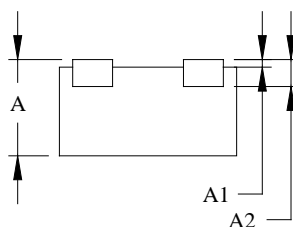
- Type: FBP 1.0\*1.0-4L



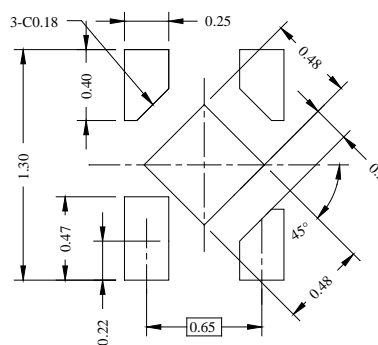
TOP VIEW



BOTTOM VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.500	0.550	0.600
A1	0.000		0.050
A2	0.152 REF		
D	0.950	1.000	1.050
D1	0.450	0.500	0.550
E	0.950	1.000	1.050
E1	0.450	0.500	0.550
b	0.175	0.225	0.275
e	0.625 BSC		
f	0.195 REF		
L	0.200	0.250	0.300

## ORDERING INFORMATION

Part Number	Input Voltage	Output Function	Operating Temperature	Package Type	Top Mark	SPQ
FH6241C**M5	~ 23.0V	<ul style="list-style-type: none"> <li>** → Output voltage</li> <li>e.g., 15 = 1.5V</li> <li>18 = 1.8V</li> <li>33 = 3.3V</li> <li>44 = 4.4V</li> </ul>	-40°C to +85°C	SOT-23-5L	AA ** YY MM LL	3000EA/Reel
FH6241C**U4	~ 23.0V	<p>FB = Adjustable</p> <ul style="list-style-type: none"> <li>The selectable voltage values are: 1.5V / 1.8V / 2.5V / 2.8V / 3.0V / 3.3V / 3.6V / 5.0V / Adjustable</li> <li>Enable can be set</li> </ul>	-40°C to +85°C	FBP1.0*1.0-4L	* * * *	10000EA/Reel

**Note:**

- **FH6241C\*\*M5 | FH6241C\*\*U4** devices are Pb-free and RoHs compliant.
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- If you have any other custom purchase needs, please contact our sales department.
- FOCCMU Inc. reserves the right to amend and legally interpret the electrical parameters of this chip device. (<http://www.fordevices.com>)



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➤ Update by Nov.2023