

1 General description

The PF5300, PF5301 and PF5302 integrate high-performance buck converters, 12 A, 8 A, and 15 A, respectively, to power high-end automotive and industrial processors. With adaptive voltage positioning and a high bandwidth loop, they offer excellent transient regulation to minimize capacitor requirements.

Clock synchronization and spread-spectrum features reduce EMC issues in the system. The PF5300/PF5301/PF5302 can operate as stand-alone point-of-load regulator ICs or as companion chips to a larger PMIC.

2 Features and benefits

- Low Rdson Internal FETs
- 2.2 MHz switching frequency
- Dynamic Voltage Scaling
- Programmable AVP (droop)
- XFAILB interface for synchronization with NXP PF-PMICs
- Over temperature protection
- I2C Interface for monitoring and control
- Watchdog Timer

3 Applications

- Industrial Market
- Smart home



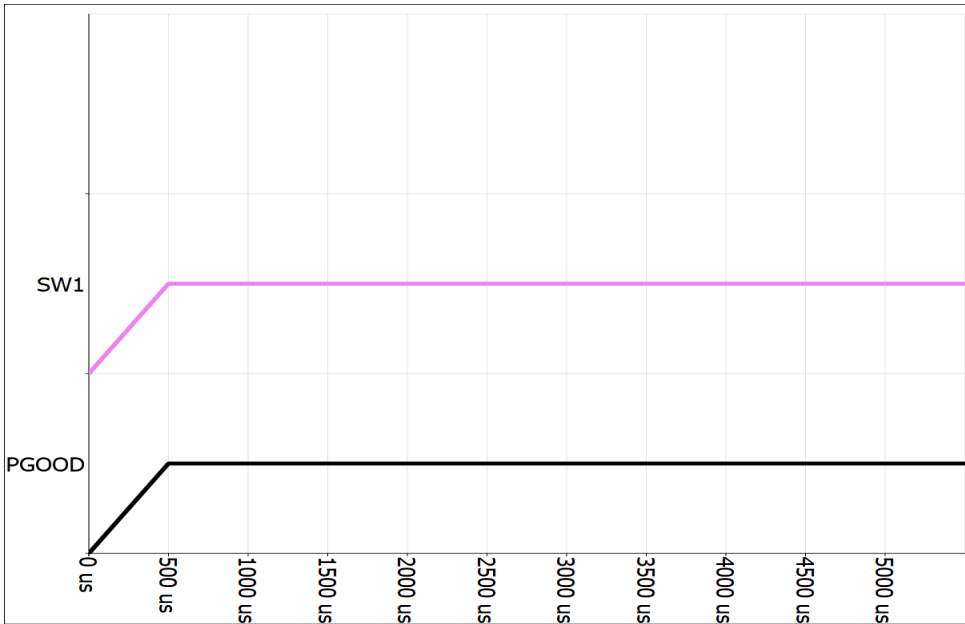
4 Ordering information

Table 1. Ordering information

Type number ^[1]	Package		
	Name	Description	Version
MPF5301BVNABEP	H-FC-PQFN-24	No leads, plastic thermal enhanced very thin quad flat pack; 24 terminals, 0.5 mm pitch, 4.5 mm x 3.5 mm x 0.75 mm body	SOT2090 - 1

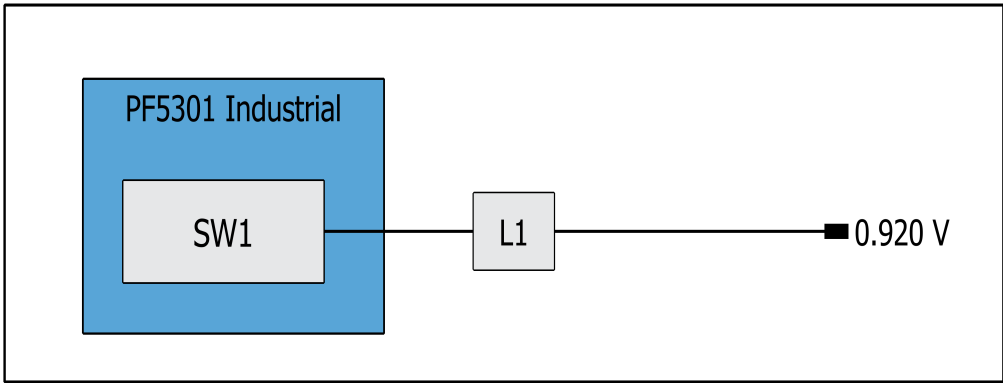
[1] To order parts in tape and reel, add the R2 suffix to the part number.

5 Power-up sequence summary



The signals depicted above are enable signals for each regulator. They don't represent the actual ramp voltage.

6 Hardware configuration diagram



7 OTP configuration

See PF5300 datasheet for parametric details. The OTP configuration summary for AB sequence ID is provided in Tables below.

Table 2. Device OTP configuration

Functional block	Feature	OTP selection
System Configuration	I2C Address	0x2A
	Maximum Fault Counter	15 Faults
I/O Configuration	Standby Polarity	Standby pin is logic High
	Standby Delay	No delay
	XFAIL Operation	Disabled
	ULP OFF Control	Goto ULPOFF at turn off

Configuration report for Industrial OTP program ID: AB rev B

Clock Management	Nominal Switching Frequency	20 MHz
	SYNCIN Range	2000 kHz to 3000 kHz
	Frequency Spread Spectrum	Enabled
	FSS Select	Triangular Modulation
	SYNCIN Mode	STANDBY input
	SW1 PLL Enable	SW PLL is enabled

Table 3. Power Sequencer configuration

Functional block	Feature	OTP selection
Power Up Sequence	Sequence Time Base	500 us
	SW1 Sequence Slot	Slot 0
	PGOOD Sequence Slot	Slot 0
	Post Power Down Delay	0 ms
	Turn Off Delay	0 us

Table 4. SW Regulator configuration

Functional block	Feature	OTP selection
SW1	SW1 Output Voltage	0.920 V
	SW1 Standby Voltage	0.920 V
	SW1 Output Inductor	100 nH
	SW1 Discharge Resistor	PD resistor not discharged
	SW1 Soft Start	8 mV/us

Configuration report for Industrial OTP program ID: AB rev B

	SW1 AVP	3 mV/A
	SW1 AVP Filter	238 kHz
	SW1 Run Mode	PWM Mode
	SW1 Standby Mode	OFF
	SW1 Diode Emulation	Disable diode emulation
	SW1 Diode Braking Threshold	5.0 mV
	SW1 HIZ OFF	SW1 is actively discharged
	SW1 Discharge	2 mV/us
	SW1 DVS MAX	1.100 V
	SW1 DVS MIN	0.650 V
	SW1 TON Dominant	Disable
	SW1 TON Slave	Disable
SW1 State	SW1 OV Bypass	No impact due to SW1 OV on fault counter
	SW1 UV Bypass	No impact due to SW1 UV on fault counter
	SW1 ILIM Bypass	No impact due to SW1 ILIM on fault counter
VMON and PGOOD	VMON Overvoltage Threshold	105.0 %
	VMON Undervoltage Threshold	91.0 %
	VMON OV Debounce	25 us
	VMON UV Debounce	40 us
	PGOOD SW1 OV	PGOOD assertion on OV Fault
	PGOOD SW1 UV	PGOOD assertion on UV Fault
SW1 Compensation	SW1 Gain Margin	107 us
	SW1 Compensation Resistor	90 kOhm
	SW1 Compensation Capacitor	25 pF

Configuration report for Industrial OTP program ID: AB rev B

Table 5. Program ID

Functional block	Feature	OTP selection
Program ID	Program ID High	A
	Program ID Low	B

Configuration report for Industrial OTP program ID: AB rev B

8 Legal information

8.1 Definitions

Draft - The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Limited warranty and liability - Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. NXP Semiconductors takes no responsibility for the content in this document if provided by an information source outside of NXP Semiconductors. In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory. Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Terms and conditions of commercial sale of NXP Semiconductors.

Right to make changes - NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use - NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors and its suppliers accept no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications - Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification. Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products. NXP Semiconductors does not accept any liability related to any default, damage, costs or problem

which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

Limiting values - Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

Terms and conditions of commercial sale - NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nxp.com/profile/terms>, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

No offer to sell or license - Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

Suitability for use in automotive applications - This NXP Semiconductors product has been qualified for use in automotive applications. Unless otherwise agreed in writing, the product is not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors and its suppliers accept no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Export control - This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Translations - A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

8.2 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

NXP is a trademark of NXP B.V.

Contents

1 General description	1
2 Features and benefits	1
3 Applications	1
4 Ordering information	2
5 Power up sequence summary	2
6 Hardware configuration diagram	3
7 OTP configuration	3
8 Legal information	7

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

© NXP B.V. 2026 .

All rights reserved.

For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: salesaddresses@nxp.com

Date of release: 5/4/2026

Document identifier: R_MPF5301BVNABEP