

ISSUE: [April 2020](#)

PMIC Reference Designs For Xilinx FPGAs And SoCs Speed Time To Market

[Renesas Electronics](#) has introduced three easy-to-use power management IC (PMIC) reference designs for powering the multiple supply rails of Xilinx Artix-7 FPGAs, Spartan-7 FPGAs, and Zynq-7000 SoCs, with and without DDR memory. Renesas has worked closely with Xilinx to offer low-risk and easy-to-design power solutions to accelerate FPGA and SoC design. The reference designs speed the development of power supplies for a variety of industrial and computing applications, including motor control, machine vision cameras, programmable logic controllers (PLCs), home gateways and appliances, and portable medical and wireless equipment (see the figure).

Renesas' high-efficiency PMIC reference designs provide user-friendly turnkey solutions that enable a single design to support different Xilinx speed grades and DDR memory types: DDR3, DDR3L, DDR4, LPDDR2 and LPDDR3. They are based on the four-phase, three output ISL91211AIK PMIC, and the four-output ISL91211BIK PMIC.

Both PMICs can deliver up to 20 A of total output current and feature independent dynamic voltage scaling. Their control loops are tuned to optimally support the load profiles of Xilinx FPGAs. They manage power up and shutdown sequencing of their rails internally, without requiring external sequencing controllers. Applying a 2-MHz switching frequency and fast load transient response enables each PMIC board to use 22- μ F output capacitors and a small inductor to reduce solution size. The PMICs come in 4.7-mm x 6.3-mm, 35-ball BGA with 0.8-mm pitch packages.

"Our PMIC reference designs significantly accelerate customer development schedules by providing tested and complete solutions ready to connect to and power Xilinx's Artix-7, Spartan-7 and Zynq-7000 devices," said Andrew Cowell, vice president, Mobility, Infrastructure and IoT Power Business Division at Renesas. "Both multiphase PMICs employ Renesas' industry-leading R5 modulation technology for blazingly fast transient response, while allowing designers to dynamically scale power to improve overall system performance."

The ISL91211A-BIK-REFZ reference design board for Artix-7 devices employs the ISL91211AIK and ISL91211BIK multiphase PMICs, ISL80030 3-A synchronous buck converter, and ISL21010DFH312 micropower voltage reference. The PMICs deliver efficiency up to 95% for multiple power rails and they accept 5-V input from a plug-in ac-dc adaptor or dc power supply. The ISL80030 supports VCCO and VCC_IO for 3.3 V, 2.5 V and 1.8 V, and the ISL21010DFH312 is for XADC input voltage of 1.25 V with $\pm 0.2\%$ accuracy.

The ISL91211BIK-REF2Z reference design board for Spartan-7 devices employs the ISL91211BIK multiphase PMIC and ISL80030 3-A synchronous buck converter. The ISL91211BIK is required for VCCINT, VCCBRAM, VCC_DDR, VCCAUX and VTT, and it accepts 5-V input from a plug-in ac-dc adaptor or dc power supply. The ISL80030 dc-dc converter supports VCCO and VCC_IO for 3.3-V, 2.5-V and 1.8-V rails.

The ISL91211AIK-REFZ reference design board for Zynq-7000 devices employs the ISL91211AIK multiphase PMIC, ISL9123 low I_q buck regulator and two ISL80030 3-A synchronous buck converters. The ISL91211AIK is required for VCCINT, VCCBRAM, VCC_DDR, and VCCAUX. The ISL9123 supplies the VTT power rail, and two ISL80030 dc-dc converters support VCCO and VCC_IO for 3.3-V, 2.5-V and 1.8-V rails.

Each PMIC reference design board is supplied with a user's guide, complete schematic, bill of materials (BOM), and PCB layout files.

The ISL91211A-BIK-REFZ reference board for Artix-7 FPGAs is available now from Renesas Electronics' worldwide distributors with a recommended resale price of \$168.00. For more information, visit the ISL91211A-BIK-REFZ [Xilinx Artix-7 FPGAs Reference Board page](#).

The ISL91211BIK-REF2Z reference board for Spartan-7 FPGAs is available now from Renesas Electronics' worldwide distributors with a recommended resale price of \$160.00. For more information, visit the ISL91211BIK-REF2Z [Xilinx Spartan-7 FPGAs Reference Board page](#).

The ISL91211AIK-REFZ reference board for Zynq-7000 SoCs is available now from Renesas Electronics' worldwide distributors with a recommended resale price of \$160.00. For more information, visit the ISL91211AIK-REFZ [Xilinx Zynq-7000 SoC Reference Board page](#).

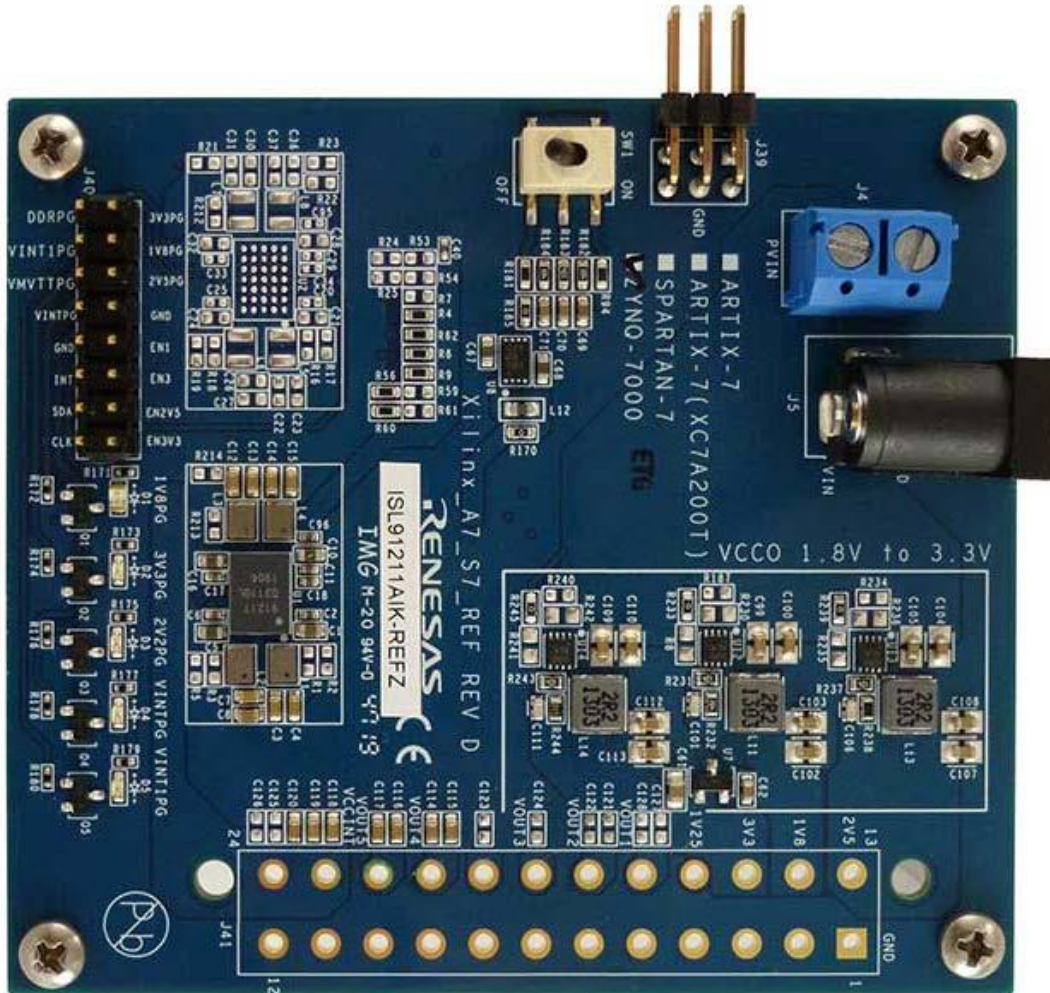


Figure. Based on Renesas' multi-phase ISL91211AIK and ISL91211BIK PMICs, three PMIC reference designs have been developed for powering the multiple supply rails of Xilinx Artix-7 FPGAs, Spartan-7 FPGAs, and Zynq-7000 SoCs. These reference designs provide user-friendly turnkey solutions that enable a single design to support different Xilinx speed grades and DDR memory types, and speed the development of power supplies for a variety of industrial and computing applications. The reference board shown here is for the Zynq-7000 SoC.