

# XILINX ULTRASCALE+ RFSOC GEN1/2 ZU2X/3X POWER AND TIMING: OVERVIEW

Xilinx's Zynq® UltraScale+™ RFSoCs integrate multi-gigasample RF data converters and soft-decision forward error correction (SD-FEC) into an SoC architecture. The multi-generation portfolio features a breadth of devices with varying direct RF performance to meet diverse spectrum needs and use cases. The integration of direct RF-sampling data converters offers the most flexible, smallest footprint, and lowest power solution for a wide range of radio applications. Although Xilinx has released a Gen3 version of this family, the Gen 1 & 2 are still in heavy use in the industry.

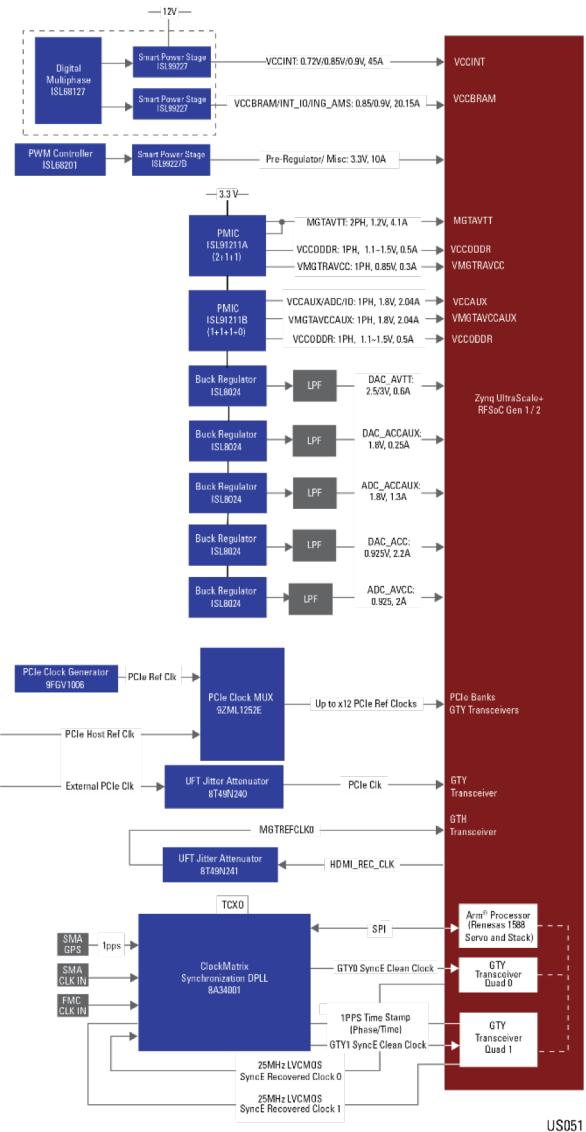
An SoC with this level of performance demands a high-current power supply with tight regulation and extremely low jitter clock sources. This winning combination highlights the power and timing devices that Xilinx chose for supporting their ZU2x & ZU3x products and additional suggested solutions that would be an excellent fit for many designs.

Visit the [RFSOC ZU2x/3x](#) page to learn more.

## Key Features:

- Digital multi-phase power to deliver high current outputs with very low voltage ripple
- Pre-programmed PMICs specifically designed to meet any use case
- FemtoClock®NG Universal Translator capable of 1GHz outputs with jitter specs in compliance with Ethernet standards up to 25G. Devices supporting up to 8 independent outputs allows users to minimize footprints with maximum flexibility.
- Added system synchronizer for IEEE 1588

# XILINX ULTRASCALE+ RFSOC GEN1/2 ZU2X/3X POWER AND TIMING: BLOCK DIAGRAM



# XILINX ULTRASCALE+ RFSOC GEN1/2 ZU2X/3X POWER AND TIMING: SUMMARY

## ▪ System benefits

- High currents and low voltage ripple at tight tolerances to meet Xilinx requirements
- Programmable multiple output PMICs to reduce board space
- High performance clocking devices acting as jitter cleaners and reference clocks for Xilinx integrated data converters

Device Category	P/N	Key Features
Power	ISL68127	Digital Dual Output, 7-Phase Configurable, PWM Controller with PMBus
Power	ISL99227	Smart Power Stage (SPS) Module with Integrated High Accuracy Current and Temperature Monitors
Power	ISL99227B	Smart Power Stage (SPS) Module with Integrated High Accuracy Current and Temperature Monitors
Power	ISL91211A	Triple Output Power Management IC
Power	ISL8024	Compact Synchronous Buck Regulators
Power	ISL91211B	Configurable Quad Output Power Management IC
Power	ISL68201	Single-Phase R4 Digital Hybrid PWM Controller with PMBus/SMBus/I2 C and PFM
Timing	9FGV1006	Programmable PhiClock™ Generator
Timing	9ZML1252E	2:12 DB1200ZL Derivative Low Power HCSL Clock Mux
Timing	8T49N240	FemtoClock®NG Universal Frequency Translator
Timing	8T49N241	FemtoClock®NG Universal Frequency Translator
Timing	8A34001	System Synchronizer for IEEE 1588 - Eight Channels

# ISL68127 – HIGH PERFORMANCE, COMPACT

Digital Dual Output, 7-Phase Configurable, PWM Controller with PMBus

## Flexible Outputs

- Supports any desired phase assignments up to a maximum of seven phases across the two output
- 7+0, 6+1, 5+2, and 4+3 phase operations
- Operation using fewer than seven phases between two outputs is also supported

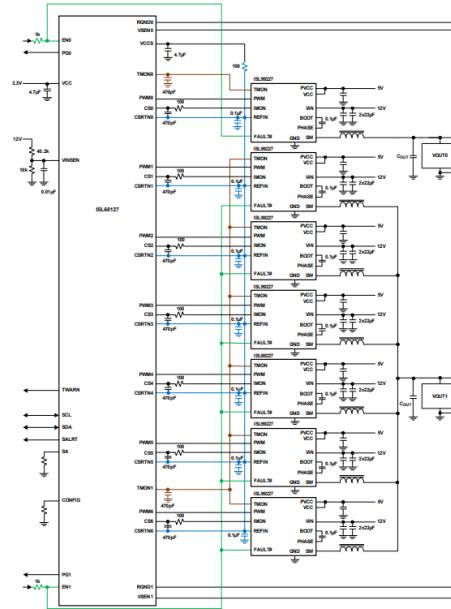
## PMBus 1.3 Support

- Telemetry -  $V_{IN}$ ,  $V_{OUT}$ ,  $I_{OUT}$ , power IN/OUT, temperature, and various fault status registers
- Up to 1MHz bus interface

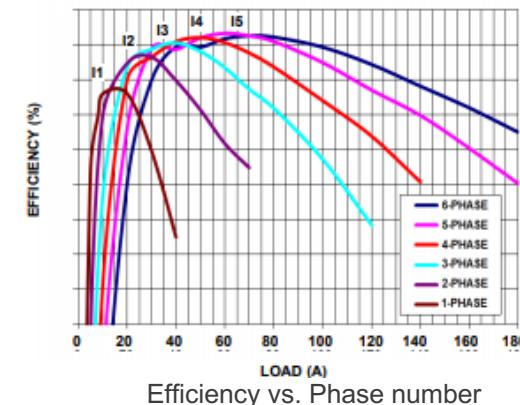
## Advanced linear digital modulation

- Zero latency synthetic current control for excellent HF current balance
- Dual edge modulation for fastest transient response

Part #	Package
ISL68127IRAZ-T7A	48L 6x6mm QFN (T&R 250)
ISL68127IRAZ	48L 6x6mm QFN (T&R 500)
ISL68127IRAZ-T	48L 6x6mm QFN (T&R 4000)



Typical Application: 6+1 Configuration w/ISL99227 SPS



# ISL99227/B – Smart Power Stage (SPS) Module

## Core, graphic, and memory regulators for microprocessors, POL DC/DC converters

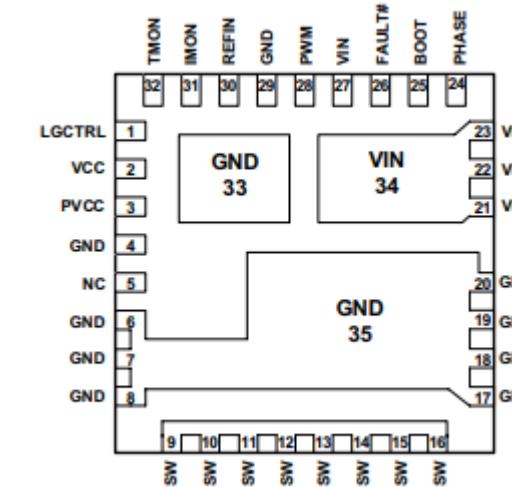
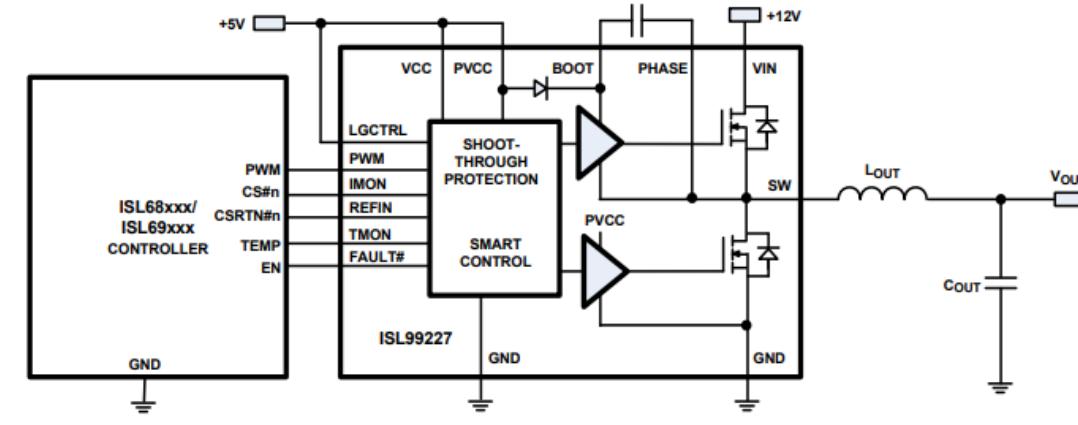
### Key Features

- Compatible with ISL68xxx/69xxx Digital Multiphase (DMP) controllers and phase doubler (ISL6617A), 2.5V to 5.5V supply voltage
- ISL99227 with 3.3V compatible tri-state PWM input
- ISL99227B with 5.0V compatible tri-state PWM input

### Robust Solution

- Supports 60A DC current
- Input range: +4.5V to +18V
- $\pm 3\%$  accuracy current monitor (IMON) with REFIN input
- 8mV/ $^{\circ}\text{C}$  temperature monitor with OT flag

Part #	Package
ISL99227IRZ-T7A	32L 5x5mm QFN
ISL99227HRZ-T7A	32L 5x5mm QFN
ISL99227FRZ-T7A	32L 5x5mm QFN



# ISL68201 – HIGH PERFORMANCE, COMPACT

## Single-Phase R4 Digital Hybrid PWM Controller with PMBus/SMBus/I<sup>2</sup>C and PFM

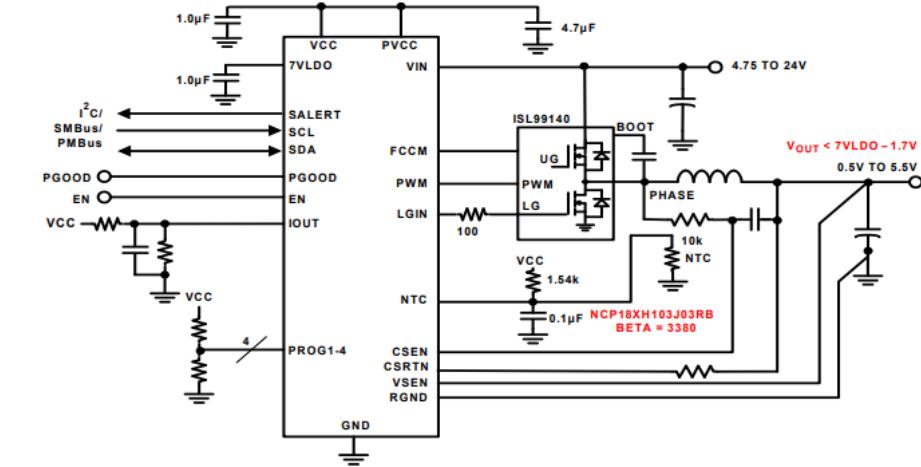
### Renesas R4 Technology

- R4™ Control Loop Technology - Rapid Robust Ripple Regulator
- Linear control loop for optimal transient response
- Variable frequency and duty cycle control during load transient for fastest possible response

### Key Features

- Input voltage range: 4.5V to 24V
- Output voltage range: 0.5V to 5.5V
- ±0.5% DAC accuracy with remote sense
- SMBus/PMBus/I<sup>2</sup>C compatible, up to 1.25MHz
- 256 boot-up voltage levels with a configuration pin
- Eight switching frequency options from 300kHz to 1.5MHz

Part #	T&R	Package
ISL68201IRZ-T7A	250	24L 4x4 QFN
ISL68201IRZ	750	24L 4x4 QFN



Wide range input and output applications

PART NUMBER	INTEGRATED DRIVER	PWM OUTPUT	PMBus/SMBus/I <sup>2</sup> C INTERFACE	COMPATIBLE DEVICES
ISL68200	Yes	No	Yes	Discrete MOSFETs or Dual Channel MOSFETs
ISL68201	No	Yes	Yes	Renesas Power Stages: ISL99140, ISL99227, ISL99125B, ISL99135B Renesas Drivers: ISL6596, ISL6609, ISL6627, ISL6622, ISL6208

Single-Phase R4 Digital Hybrid PWM Controller Options

# ISL91211A/B – Triple/Quad Output Power Management IC

## Client/Enterprise/Data Center SSD, NAS, Optical Transceiver Modules, custom power

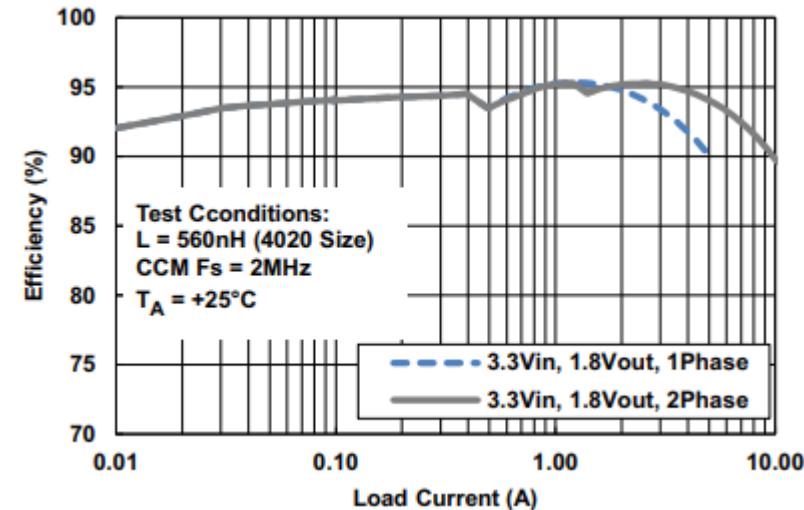
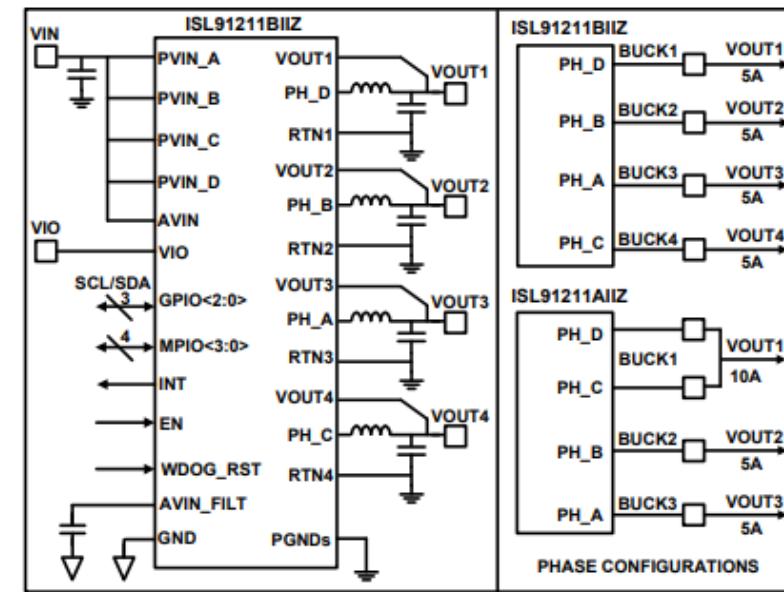
### Custom Power

- Triple output 2+1+1 phases (ISL91211A) or quad output single phase (ISL91211B)
- I<sup>2</sup>C programmable output from 0.3V to 2V
- 5V to 5.5V supply voltage
- 5A per phase output current capability

### High Efficiency and Accuracy

- Low IQ in low power mode
- High efficiency (94.7% for 3.8VIN/1.8VOUT)
- ±0.7% system accuracy, remote voltage sensing
- Small solution size

Part #	Package
ISL91211AIIZ-T	54L 3.67x2.55mm WLCSP
ISL91211BIIZ-T	54L 3.67x2.55mm WLCSP



# ISL8023/24 – Compact Synchronous Buck Regulator

## General purpose POL DC/DC, µC/µP, FPGA and DSP power

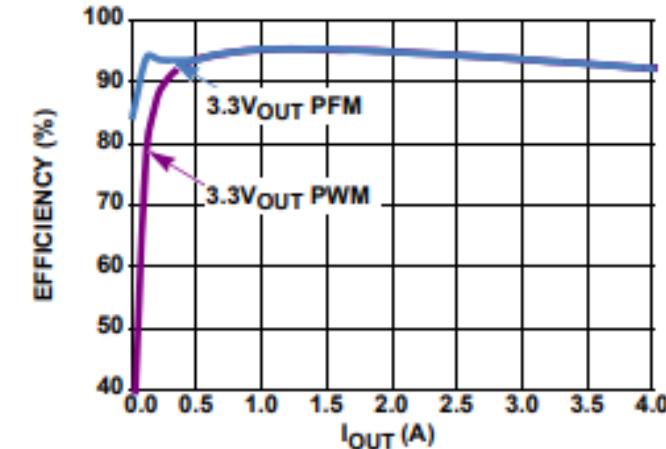
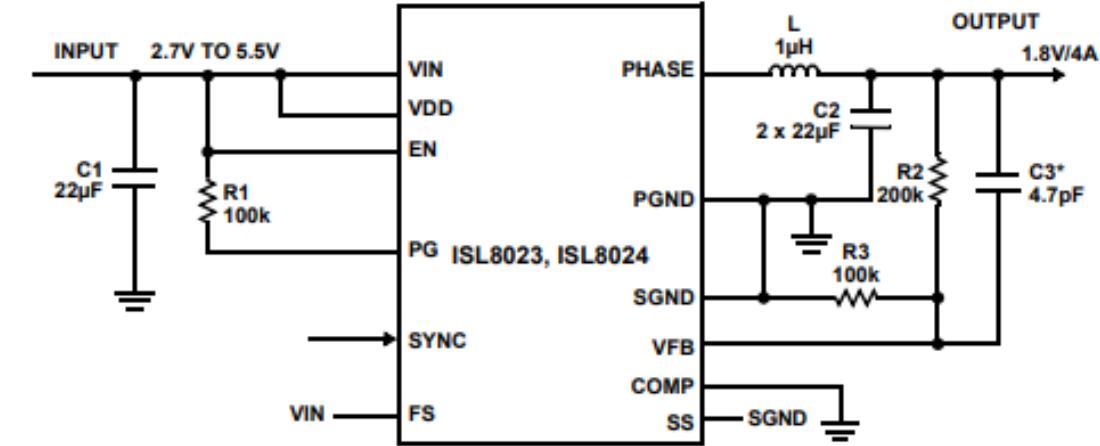
### Flexible and Efficient Power

- Input voltage range: 2.7V to 5.5V
- Current out max: 3A (ISL8023) or 4A (ISL8024) of continuous output
- Very low on-resistance FET's - P-Channel 45mΩ and N-Channel 19mΩ typical values
- Very low  $r_{DS(ON)}$  MOSFETs to maximize efficiency

### Robust Design in a small package

- Operates at 100% duty cycle
- Over-temperature, Overcurrent, Overvoltage and negative overcurrent protection
- Tiny 3x3 QFN package

Part #	Package
ISL8023IRTAJZ-T7A	16L 3x3mm TQFN
ISL8024IRTAJZ-T7A	16L 3x3mm TQFN



# 9FGV1006 – LOW NOISE, HIGH-PERFORMANCE Programmable PhiClock™ Generator

## High Performance Clock

- Two outputs used for low phase noise spread-spectrum applications such as PCIe Express
- Both are completely independent of each other
- 25MHz–325MHz LVDS or LP-HCSL outputs
- 10MHz–200MHz output frequency (LVCMOS), integer configuration
- 10MHz–156.25MHz output frequency (LVDS or LP-HCSL), fractional or spread spectrum configuration

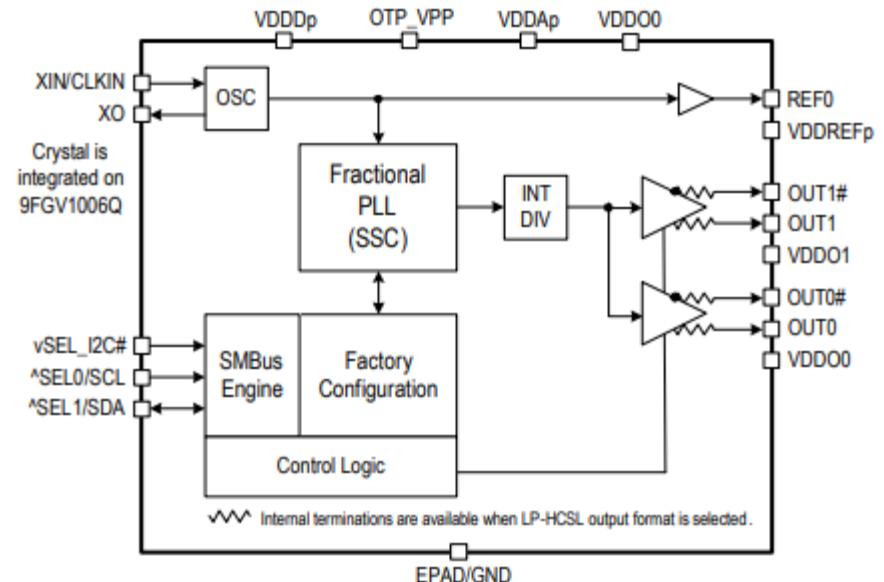
## Configurable

- On-board OTP supports up to 4 complete configurations
- Configuration selected via strapping pins or I<sup>2</sup>C

## Key Specifications

- 12kHz–20MHz typical phase jitter at 156.25M (SSC off) 276ps RMS
- PCIe Gen4 jitter (CC) < 0.23ps RMS
- PCIe Gen5 jitter (CC) < 0.08ps RMS
- PCIe Gen5 jitter (SRIS) < 0.07ps RMS

Part #	Package
9FGV1006A000LTGI	16L 3x3mm LGA
9FGV1006Q500LTGI	16L 3x3mm LGA
9FGV1006A001LTGI	16L 3x3mm LGA
9FGV1006A002LTGI	16L 3x3mm LGA



# 9ZML1252E – LOW POWER, HIGH-PERFORMANCE

## 2:12 DB1200ZL Derivative Low Power HCSL Clock Mux

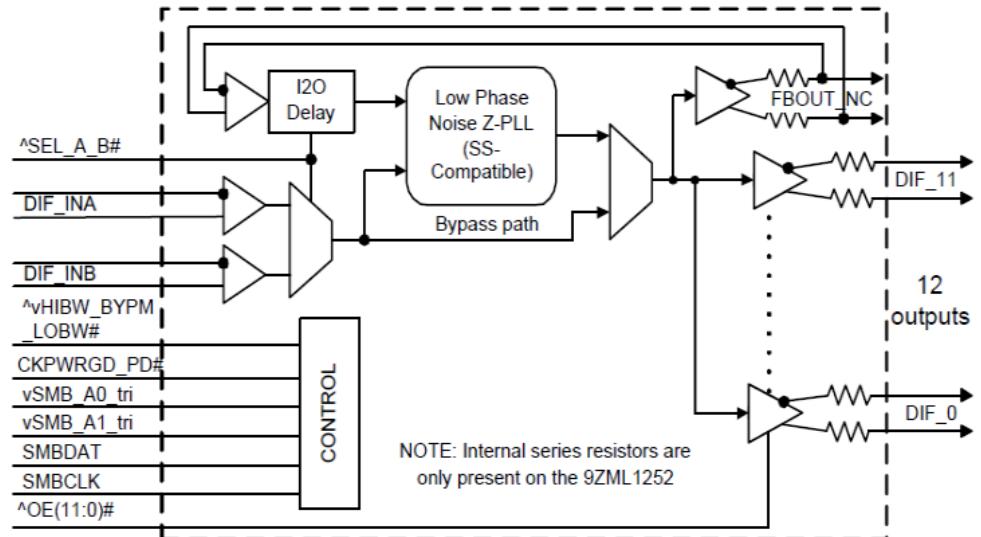
### Key Features

- 2-input/12-output differential mux
- LP-HCSL outputs with  $Z_{out} = 85\Omega$ ; eliminate 48 resistors
- 12 Low-power HCSL (LP-HCSL) output pairs with  $85\Omega Z_{out}$
- Suitable for PCI-Express Gen1–4 or QPI/UPI applications
- 9 selectable SMBus addresses; multiple devices can share same SMBus segment

### Key Specifications

- Cycle-to-cycle jitter < 50ps
- Output-to-output skew < 50ps
- Input-to-output delay: Fixed at 0 ps
- Input-to-output delay variation < 50ps
- Phase jitter: PCIe Gen4 < 0.5ps rms

Part #	Package
9ZML1252EKILF	75L 10x10mm QFN
9ZML1252EKILFT	75L 10x10mm QFN (T&R)



# 8T49N240 - ULTRA-PERFORMANCE JITTER ATTENUATOR

## FemtoClock®NG Universal Frequency Translator

### Excellent Jitter Performance

- < 200fs (typical) RMS (including spurs): 12kHz to 20MHz for integer-divider outputs in jitter attenuator mode or in fractional-feedback synthesizer mode

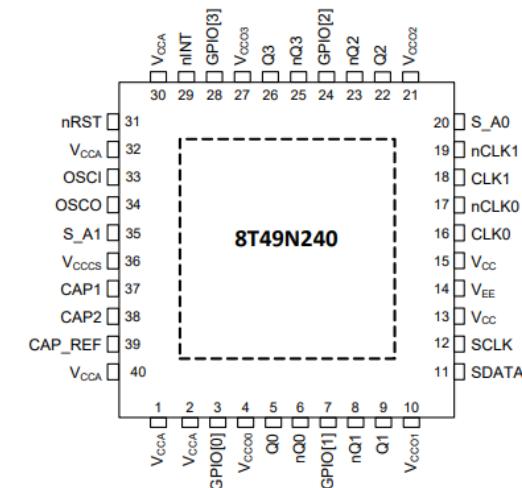
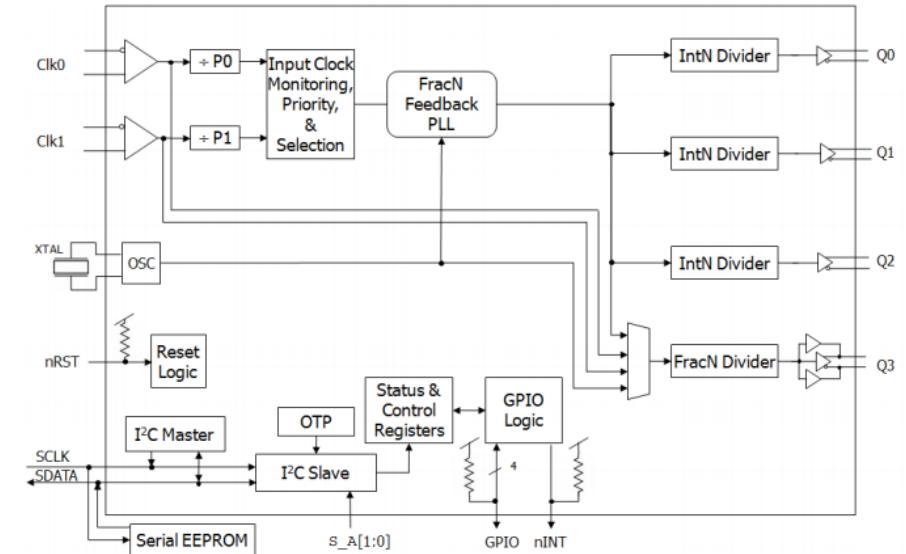
### Wide Support

- Operating Modes: Synthesizer, Jitter Attenuator
- Operates from a 10MHz to 54MHz fundamental-mode crystal
- Accepts up to two LVPECL, LVDS, LVHSTL, or LVC MOS input clocks

### Configurable

- Output Generates up to 4 LVPECL / LVDS / HCSL or 16 LVC MOS output clocks ranging from 8kHz up to 1.0GHz (diff), 8kHz to 250MHz (LVC MOS), that meet jitter limits for 10G up to 25G Ethernet applications

Part #	Package
8T49N240-991NLGI	40L 6x6mm VFQN
8T49N240-994NLGI	40L 6x6mm VFQN



# 8T49N241 – JITTER ATTENUATION, HIGH-PERFORMANCE FemtoClock®NG Universal Frequency Translator

## High Performance Clock

- Four different output frequencies, ranging from 8kHz to 1GHz.
- All are completely independent of each other
- Outputs may select among LVPECL, LVDS, HCSL or LVC MOS output levels

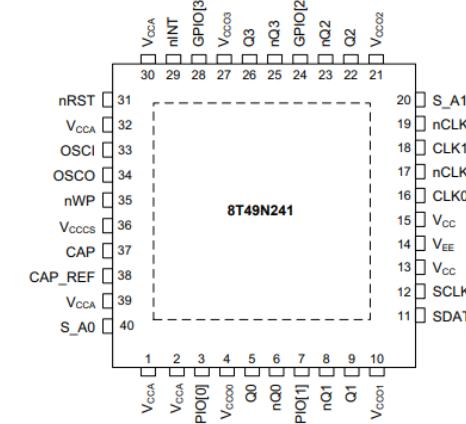
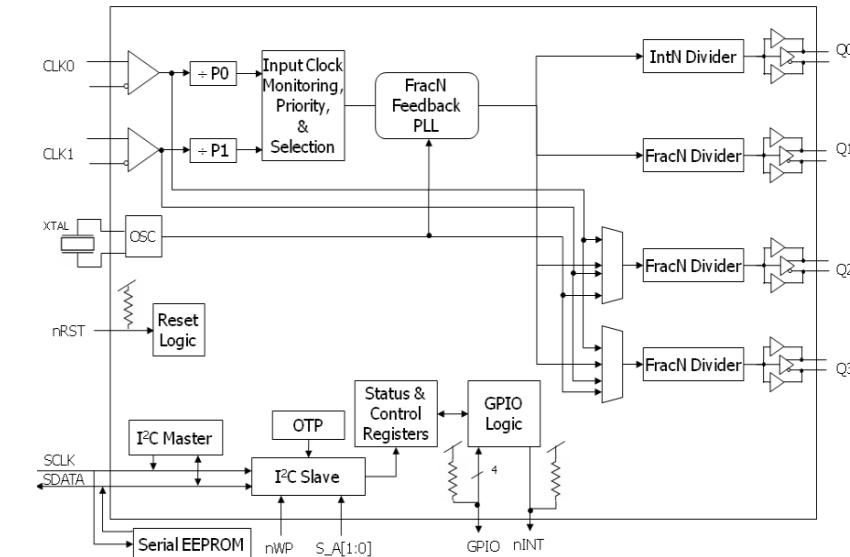
## Wide Input Frequency

- Operates from a 10MHz to 50MHz fundamental-mode crystal or a 10MHz to 125MHz external oscillator
- Accepts up to 2 LVPECL, LVDS, LVHSTL or LVC MOS input clocks, frequencies ranging from 8kHz to 875MHz

## Jitter Attenuation

- 0.35ps RMS Typical Jitter (including spurs): 12kHz to 20MHz

Part #	Package
8T49N241-998NLGI	40L 6x6mm VFQFPN
8T49N241-999NLGI	40L 6x6mm VFQFPN



# 8A34001 – HIGH PERFORMANCE

## System Synchronizer for IEEE 1588 – Eight Channels

### Flexible Timing

- Eight independent timing channels
- Digital PLLs (DPLLs) lock to any frequency from 0.5Hz to 1GHz
- DPLLs / Digitally Controlled Oscillators (DCOs) generate any frequency from 0.5Hz to 1GHz
- DPLLs comply with ITU-T G.8262 for Synchronous Ethernet (SyncE)

### Simple Input Frequency

- Device requires only a crystal oscillator or fundamental-mode crystal: 25MHz to 54MHz

### IEEE Support

- DCOs can be controlled by external IEEE 1588 software to synthesize Precision Time Protocol (PTP) / IEEE 1588 clocks with frequency resolution less than  $1.11 \times 10^{-16}$
- Combo Bus simplifies compliance with ITU-T G.8273.2

Part #	Package
8A34001C-000AJG	144L 10x10mm CABGA
8A34001C-000AJG8	144L 10x10mm CABGA
8A34001PC-000AJG	144L 10x10mm CABGA

