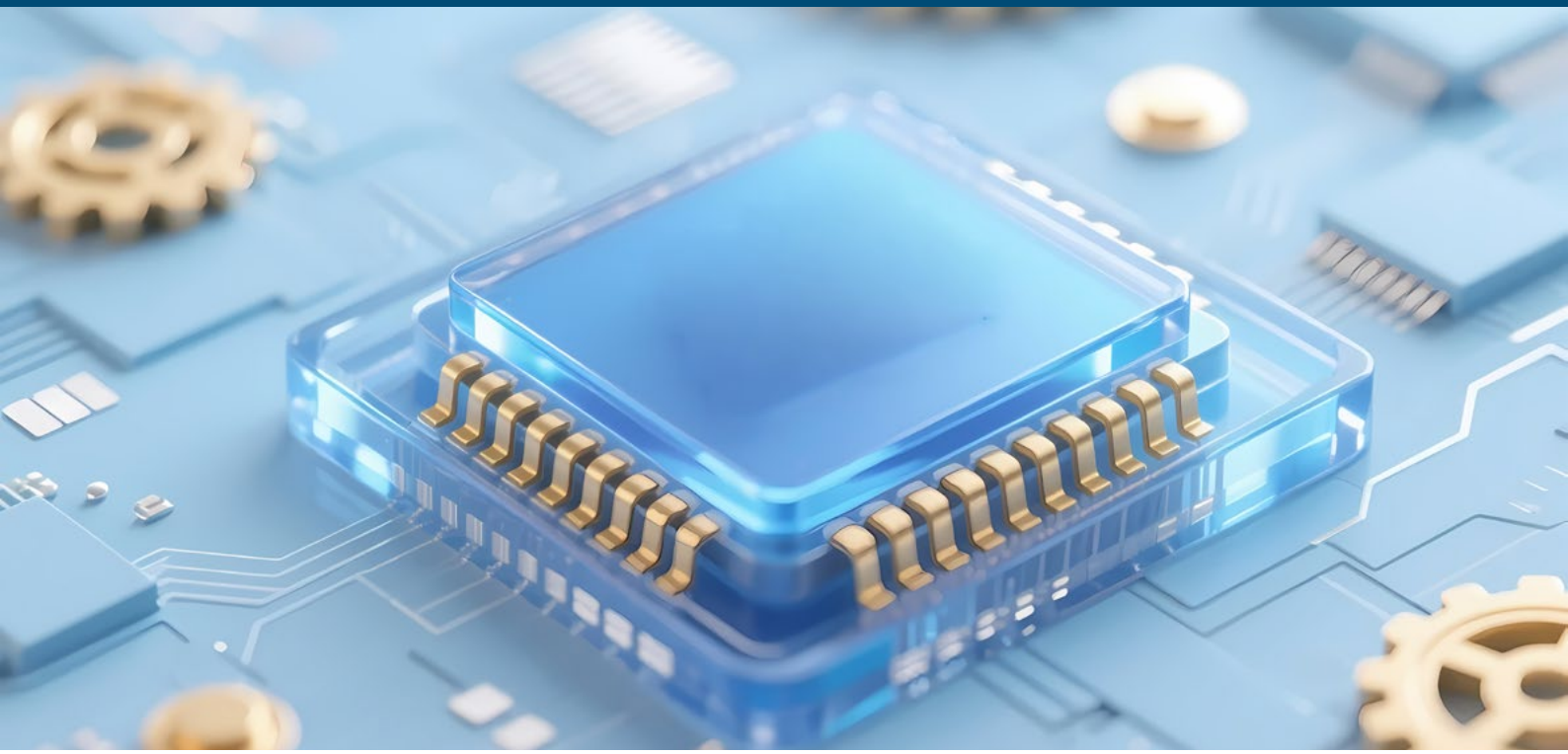
HS Channel



About eInfochips

eInfochips is a product engineering and semiconductor design services company offering ASIC/SoC design, Analog & Mixed- Signal IP development, FPGA design, and embedded engineering services across multiple industry segments.

eInfochips provides silicon-proven Analog IPs and custom design solutions for power management, data conversion, connectivity, and mixed-signal applications. The company enables customers to accelerate chip development and deliver high-performance, power-efficient semiconductor products.

eInfochips Advantages

- **30** Years of experience in system design
- **17** Design centres worldwide
- **75+** Successful Tapeouts and Silicon Bring up
- **100M+** Product deployments across globe
- **180nm to 18A** expertise

eInfochips A3ACPNBTC Boost Converter

The HS Channel provides high-side gate-drive capability for an external NMOS switch. The channel supports flexible selection of the external NMOS device based on application requirements. The design has been validated with external NMOS devices having a gate charge of up to 220 nC and supports input control signals from DC to PWM operation at frequencies up to 1 kHz.

Automotive Electronic Fuse (eFuse)

Battery Management Systems (BMS)

Battery Disconnect Units (BDU)

Power Distribution Units (PDU)

Body Control Modules (BCM)

Motor and Solenoid Drivers

Automotive Lighting Systems

Power Window, Door lock, and Seat Control

Smart Power Distribution Systems

Telecom and Networking Equipment

Server and Data-Center Power Modules

High-Side Switch Modules

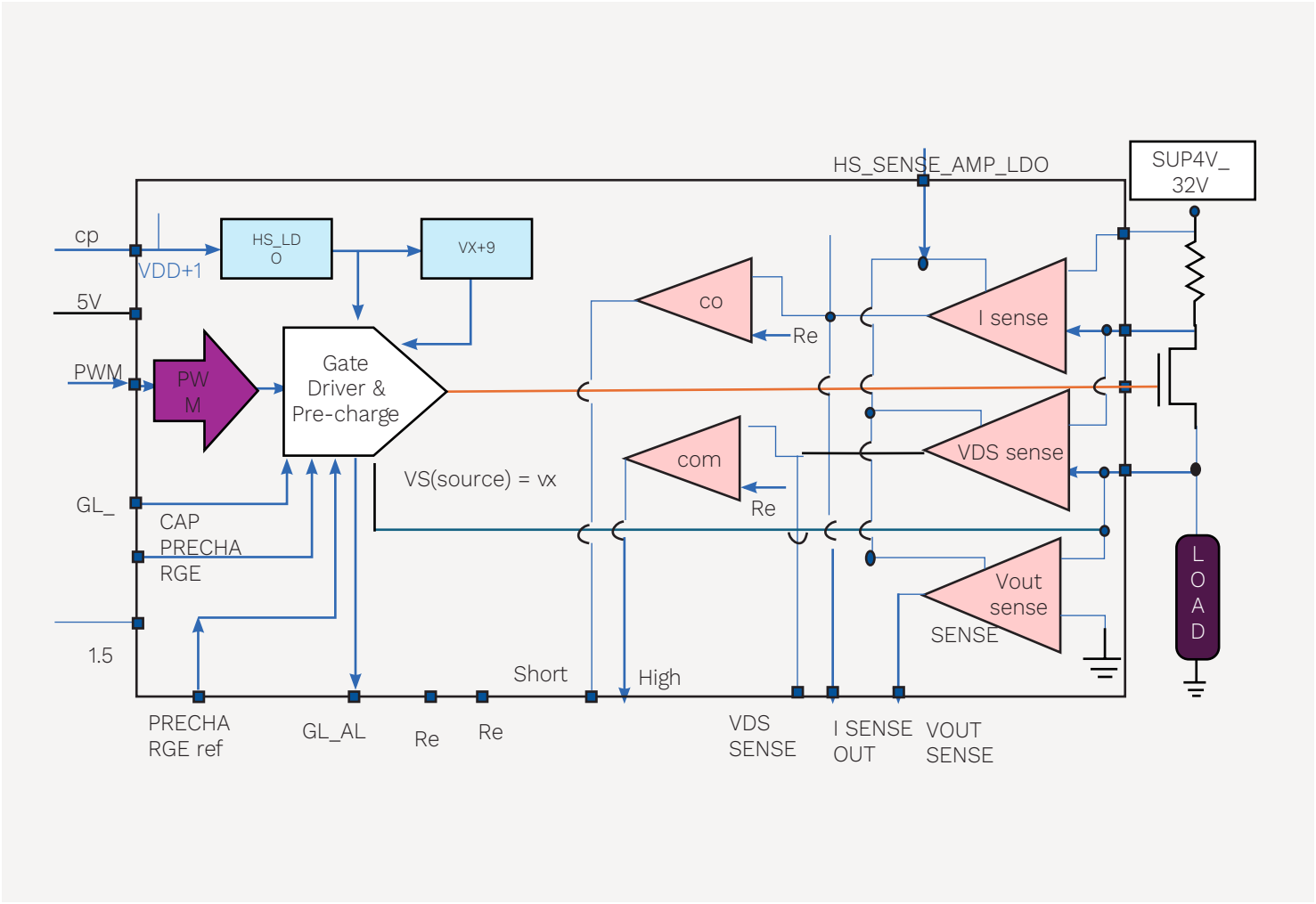


Fig. Block diagram

Features

- Operating temperature range: –40°C to +150°C
- Integrated high-side gate driver for external N-channel MOSFET
- Floating gate drive supplies (VS +14 V, VS +9 V, and VS +5 V)
- Supports external MOSFET gate charge up to 220 nC
- DC ON and PWM operation up to 1 kHz.
- Integrated dead-time generation for shoot-through protection
- Current sensing with high-CMRR instrumentation amplifier
- VDS sensing for MOSFET protection and diagnostics
- Output voltage (VOUT) sensing with buffered output
- Shared analog multiplexer (MUX) and ADC interface for multi-channel monitoring
- Short-circuit, high-VDS, and gate-leakage fault detection
- Capacitive pre-charge mode for controlled startup of capacitive loads
- Integrated self-test for analog sensing path diagnostics
- Precision 1.2 V bandgap reference with trim support, low noise, and high PSRR
- Automotive-grade design optimized for eFuse and high-side power switching aplications

DC Simulation Results

- **Input Range:** 1 mV to 20 mV
- **Absolute Error:** Pre-layout ≤ 2.359 mV; Post-layout ≤ 3.297 mV
- **Percentage Error:** Pre-layout ≤ 11.76%; post-layout ≤ 5.16%
- **Operating Conditions:** TT/FF/SS, **TJ = -40°C to +150°C**

Stability Simulation Results (Pre & Post-Layout)

- **Phase Margin:** 80.5° to 94.19°
- **Unity-Gain Bandwidth (UGB):** 60.88 kHz to 134.8 kHz
- **Gain Margin:** 17.1 dB to 20.89 dB
- **Pre- vs. Post-Layout:** Identical results across all simulated conditions
- **Operating Conditions:** VIN = 4 V to 32 V, TT/FFs/SS, **TJ = -40°C to +150°C**

Channel LDO- DC & Stability Simulation Results (External MOSFET OFF)

- **LDO Output Voltage:** 13.91 V to 14.13 V
- **DC Gain:** 87.88 dB to 100.9 dB
- **Unity-Gain Bandwidth (UGB):** 233.5 kHz to 869 kHz
- **Phase Margin:** 68.08° to 83.19°
- **Gain Margin:** 23.02 dB to 35.96 dB
- **Condition:** Pre-layout, external MOSFET OFF

DC Simulation Results (External MOSFET ON, CL=22 nF)

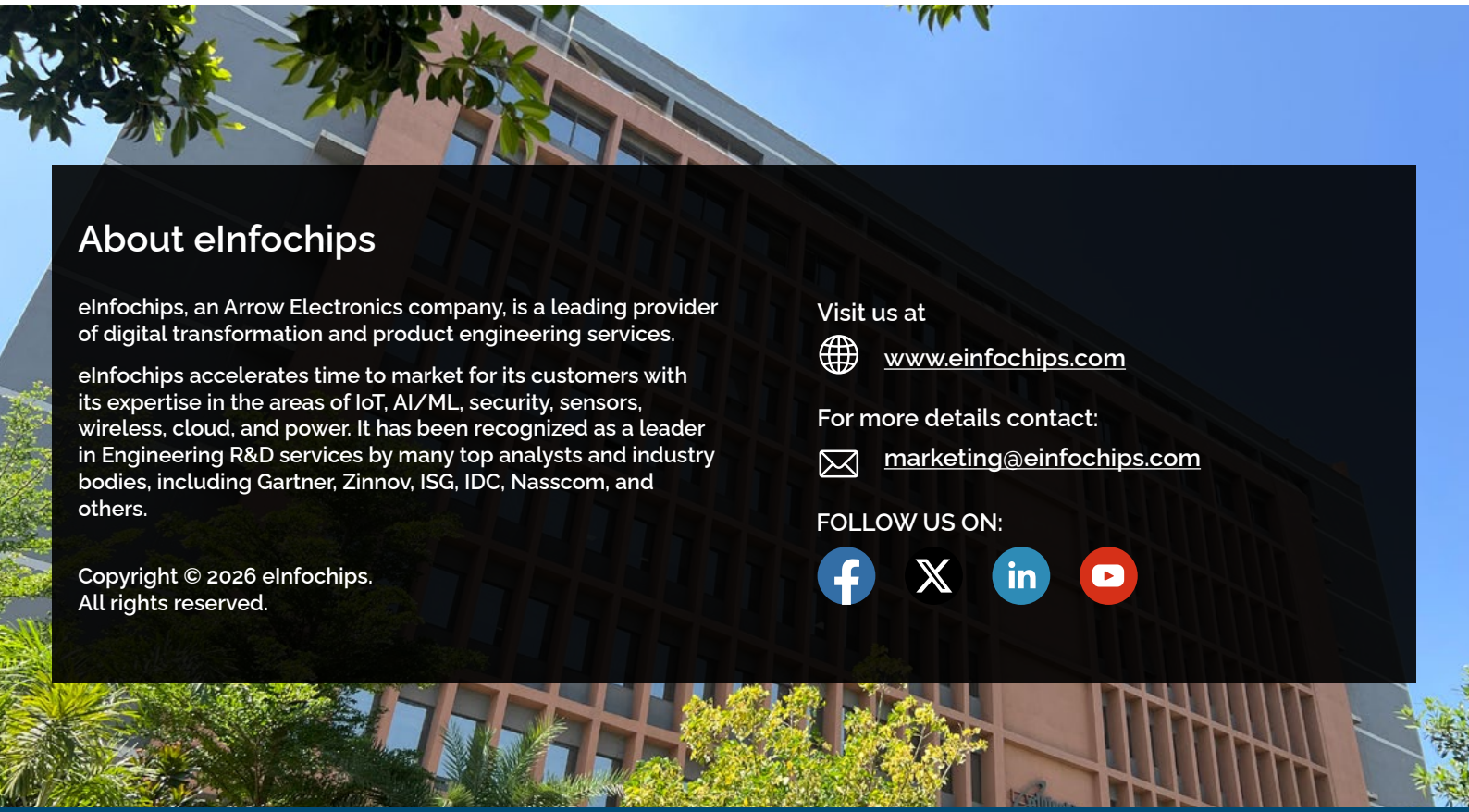
- **LDO Output Voltage:** 13.91 V to 14.13 V
- **DC Gain:** 86.16 dB to 108.5 dB
- **Unity-Gain Bandwidth (UGB):** 90.86 kHz to 517.7 kHz
- **Phase Margin:** 75.59° to 96.9°
- **Gain Margin:** 42.99 dB to 50.2 dB

VDS Sense Amplifier – DC Simulation Results

- **Input Range:** 15.1 mV to 309.7 MV
- **Absolute Error:** ≤ 13.54 mV (post-Layout)
- **Percentage Error:** ≤ 1.94% (post-Layout)
- **Operating Conditions:** TT/FF/SS, **TJ = -40°C to +150°C**

VDS Sense Amplifier – Stability Simulation Results

- **Phase Margin:** 85.48° to 91.51°
- **Unity-Gain Bandwidth (UGB):** 51.66 kHz to 107.5 kHz
- **Gain Margin:** 14.27 dB to 24.19 dB
- **Pre- vs. Post-Layout:** Identical results across all simulated conditions
- **Operating Conditions:** VIN = 4 V to 32 V, TT/FF/SS, **TJ = -40°C to +150°C**



About eInfochips

eInfochips, an Arrow Electronics company, is a leading provider of digital transformation and product engineering services.

eInfochips accelerates time to market for its customers with its expertise in the areas of IoT, AI/ML, security, sensors, wireless, cloud, and power. It has been recognized as a leader in Engineering R&D services by many top analysts and industry bodies, including Gartner, Zinnov, ISG, IDC, Nasscom, and others.

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