2025–2026 UCLA Analog, Mixed Signal, RF and Microwave Circuit Design Program

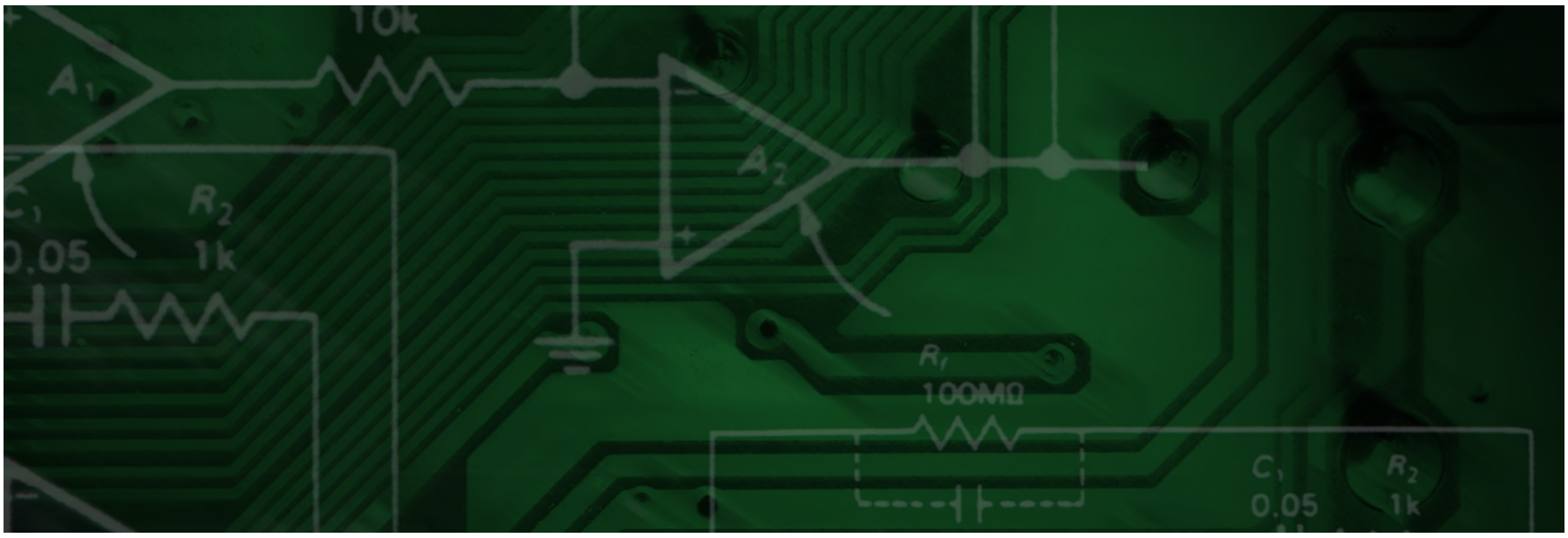
This program consists of six (6) courses in digital, analog, mixed signal, RF and microwave circuits and systems design to give engineers a broad knowledge and understanding of the complex microelectronics design in today's advanced technology. Individual courses can also be taken without the certificate.

Contact us for more information:
Nicole Lim
UCLA Extension
10960 Wilshire Blvd, 16th Floor
Los Angeles, CA 90024
Tel: (310) 825-9911
nlim@unex.ucla.edu
uclaextension.edu

UCLA Extension

Program Requirements

You must complete the following six (6) courses to receive your award of completion. Individual courses can be taken without award completion.



Introduction to Op-Amp Design
Sept 9, 11, 16, 23, 25, 30, 2025
4–7 p.m. PST

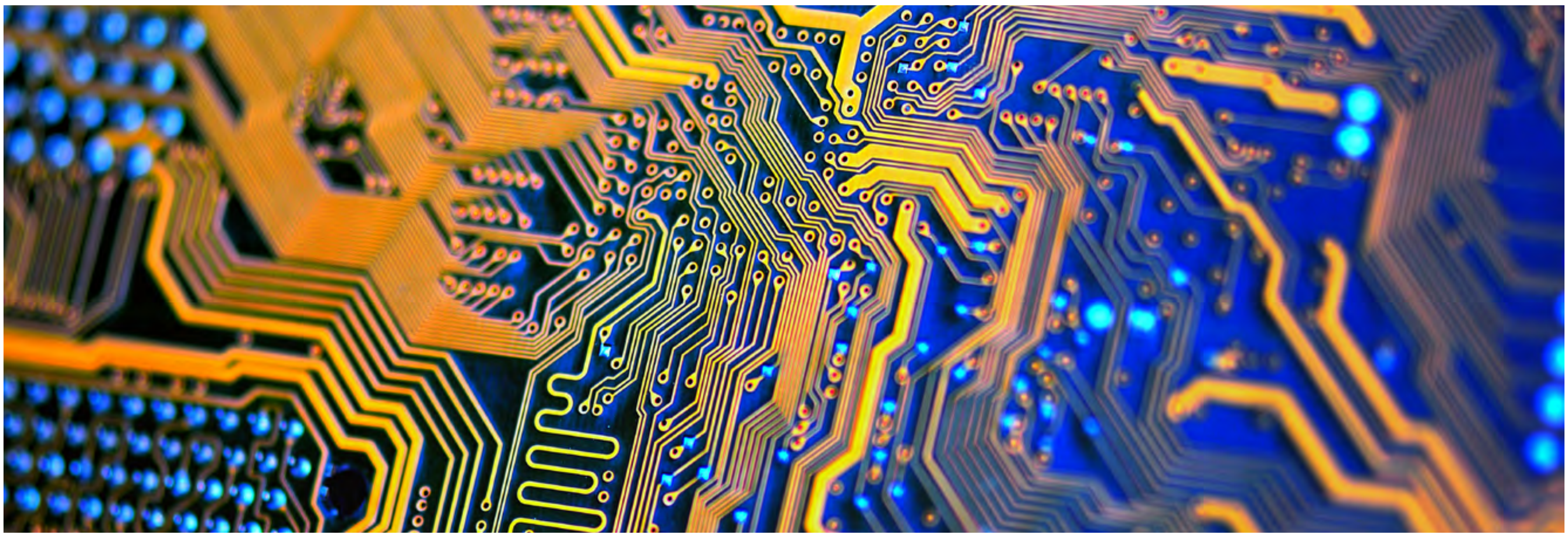
CEUs	1.8 (18 instruction hrs.)
PID#	405692
Course fee	$1,850

The primary building block of all analog and mixed signal integrated circuits is operational amplifiers (Op-Amps). Amplifiers are the main components in anything analog from analog to digital converters (ADC) to digital to analog converters (DAC), filters, transmitters, receivers, transceivers and more.

This course provides fundamental understanding of analog CMOS technologies, modeling, device characterization, and CMOS circuit design. It covers the application, design and operation of operational amplifiers including building blocks of amplifiers such as current source and sink circuitries, current mirrors, bias circuitries, differential input stage, gain stage and output stage. It also covers the frequency response analysis of operational amplifiers. It concludes with step-by-step design instruction of op-amps to meet the design specification.

Learning Outcomes:

- Understand the importance and vast application of operational amplifiers in analog and mixes signal circuit design
- Learn feedback architecture and various inverting and non-inverting configurations
- Learn fundamentals of the building blocks of operational amplifiers
- Learn how to design op-amps to meet design spec



Advanced Op-Amp Design and Comparators
Oct 6, 8, 13, 15, 20, 22, 2025
4–7 p.m. PST

CEUs	1.8 (18 instruction hrs.)
PID#	405693
Course fee	$1,850

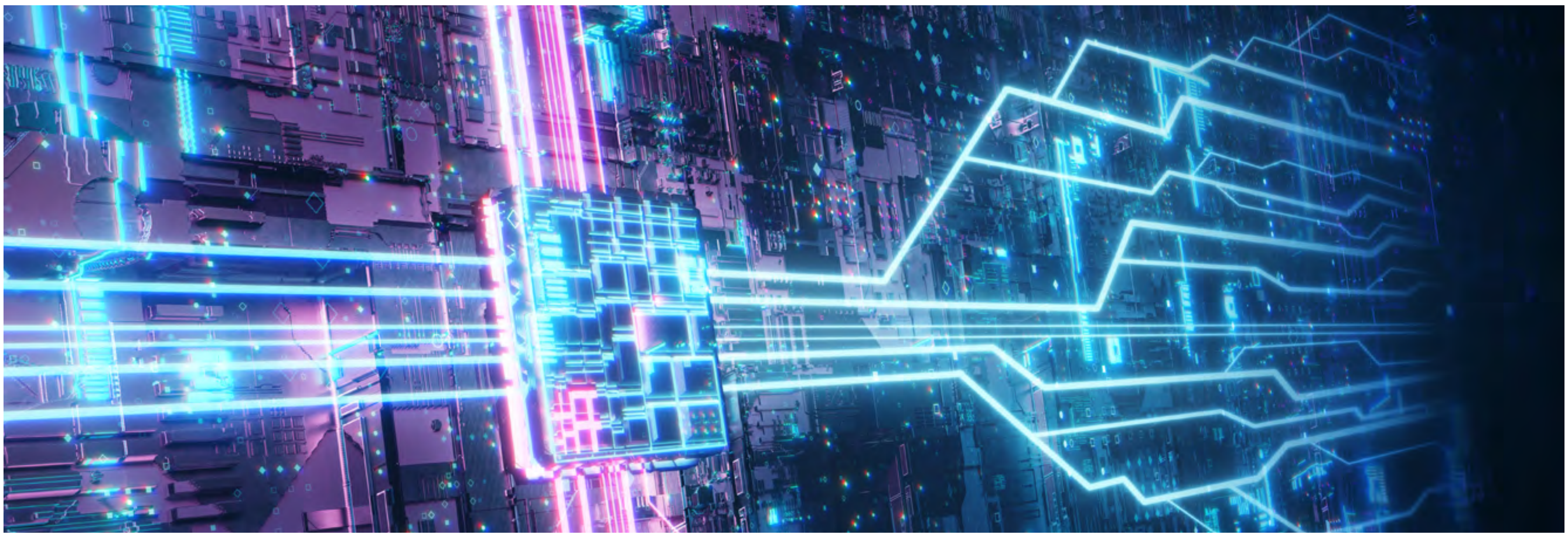
Op-amps are one of the most fundamental building blocks of analog and mixed signal design, and they readily lend themselves to a variety of IC implementations of different subsystems from amplifiers and voltage regulators to filters and data converters.

In this course you will learn about modern op-amp architectures, stability of op-amp feedback networks, compensation techniques, fully differential circuits and common mode feedback issues, advanced and special purpose op-amps, and some practical applications. We will also look at biasing techniques including voltage and current references.

Finally, we will look at a special class of differential circuits called comparators and their particular design considerations.

Learning Outcomes:

- Develop proficiency in op-amp application and design with emphasis on performance optimization
- Learn about application of op-amps in variety of circuits such as VCOs and filters
- Learn about design and challenges of high speed and low noise op-amps
- Learn about compensation techniques to design stable op-amps
- Learn about comparators, their applications and design



Digital Microelectronics VLSI Design
Nov 4, 6, 13, 18, 20, 25, 2025
4–7 p.m. PST

CEUs	1.8 (18 instruction hrs.)
PID#	405694
Course fee	$1,850

This course covers design approach and techniques to optimize for speed, area and power for Very Large Scale Integrated (VLSI) digital circuits from design to physical layout.

It examines microelectronics design, MOS transistor characterization, non-ideal behaviors, fabrication processes, design rules, multi-layer interconnect engineering and modeling, standard and custom cell layout.

It addresses design optimization techniques to minimize power, minimize area and maximize speed. It will cover basic digital circuits, and planar and FinFet technologies.

It provides a condensed and focused look at VLSI chip design for the 21st century, something that every chip designer must be aware of.

Learning Outcomes:

- Refresh your basic digital circuit design knowledge
- Learn about VLSI design and its challenges
- Become proficient in optimizing digital circuits for speed, power and area
- Learn the trade-off between speed, power and area
- Learn about circuit layout and fabrication and their impact on circuit performance, in particular speed
- Learn about design rules and tools used to check for DRC (design rule check) prior to tape out
- Learn about FinFet technology

Data Converters (ADCs and DACs)
Jan 13, 15, 20, 22, 27, 29, 2026
4–7 p.m. PST

CEUs	1.8 (18 instruction hrs.)
PID#	405695
Course fee	$1,850

Modern communication requires traversing the digital and analog domain. Every transmitter and receiver has a data converter in the form of an analog to digital converter (ADC) and/or a digital to analog converter (DAC).

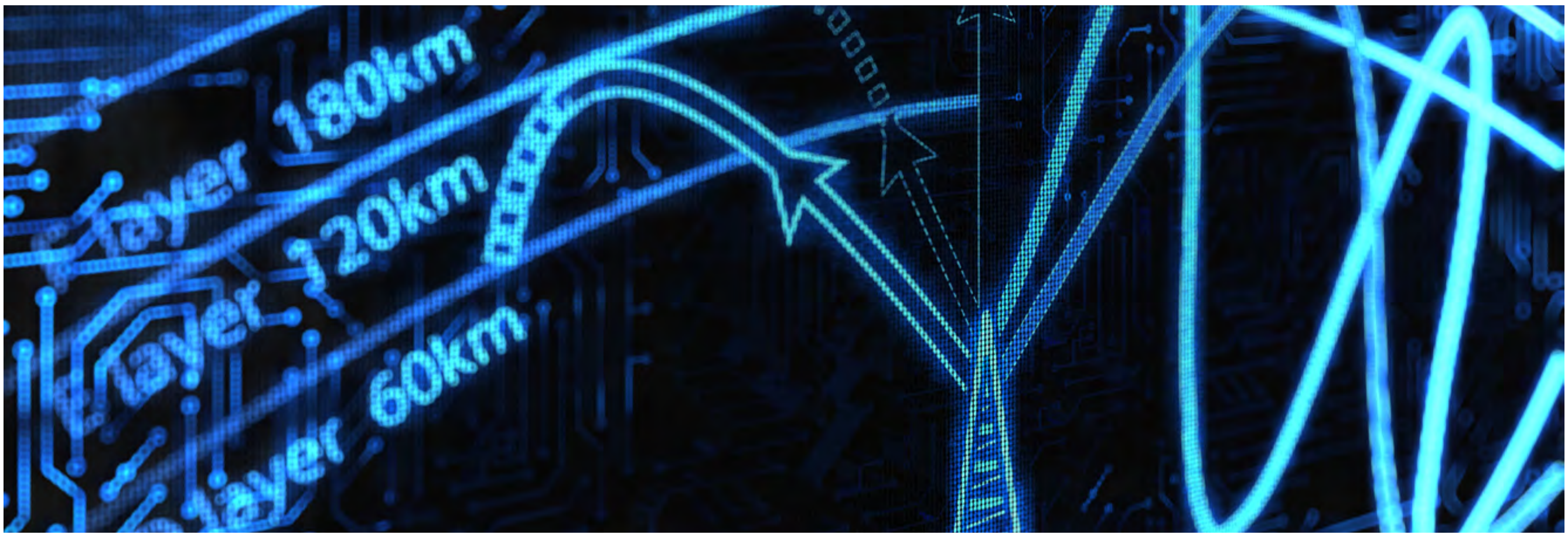
This course starts with a look at digital and analog domain in communication, sampling theorem and discrete time analog signal processing.

We then look at the architecture, design and operation of ADCs and DACs. We study different families of DACs such as segmented DACs, thermometer, binary weighted, R-2R, sigma-delta and more.

For ADCs we study successive approximation ADCs, flash converters, pipelined, tracking ADCs and more.

Learning Outcomes:

- Understand the application and importance of data converters in wireless communication and mixed signal electronics
- Learn about sampling theorem and traversing the digital and analog domain in signal processing and communication
- Learn the basics of DACs and ADCs and characterize them
- Learn different families of DACs and ADCs and how to improve their performance
- Learn how to evaluate and design different types of data converters for different applications
- Understand the trade-offs between resolution, speed and accuracy



RF Circuit and System Design
Feb 9, 11, 16, 18, 23, 25, 2026
4–7 p.m. PST

CEUs	1.8 (18 instruction hrs.)
PID#	405696
Course fee	$1,850

This course covers the principles of radio frequency (RF) circuit and system design, with emphasis on monolithic implementation in nanometer CMOS integrated circuits.

Topics covered include, RF components, RF communication systems, matching and available power, noise and noise figure, distortion, low-noise amplifiers and mixers, oscillators, power amplifiers and transceiver architectures.

The students must be familiar with basic communication theory, and principles of integrated circuit design.

Learning Outcomes:

- Learn basics of RF communication and applications in cell phones, radio and television
- Learn about the importance of RF systems in modern electronics
- Learn the principles of wireless systems
- Learn about the implementation of RF systems in modern nanometer CMOS technology
- Learn the characteristics, design and application of RF components
- Learn how to optimize RF circuits
- Learn the basics of RF transmitters and receivers
- Learn the trade-offs between performance, power, speed and noise
- Learn modeling for RF systems

Microwave Design
March 9, 11, 16, 18, 23, 25, 2026
4–7 p.m. PST

CEUs	1.8 (18 instruction hrs.)
PID#	405697
Course fee	$1,850

This course covers the concept, design and application of microwave systems and devices.

The course starts with an introduction to the various microwave systems such as wireless communication and networks. It then covers the fundamentals of microwave design, the wave equations, transmission line and waveguides, and microwave network theory (Z/Y/S parameters, ABCD matrices).

As part of microwave design, the course covers Smith Chart, CAD design tools, impedance matching techniques, microwave resonators, power splitters, couplers, equivalent circuits of microwave devices, amplifier design, stability and VSWR requirements.

Learning Outcomes:

- Learn basics of microwave communication and applications
- Learn about the importance of microwave systems in modern electronics such as in satellite, radar and wireless communications
- Learn about the application of shorter microwave in remote sensing
- Learn about the implementation of microwave systems in modern nanometer CMOS technology
- Learn the characteristics, design and application of microwave components
- Learn how to optimize microwave circuits

CONTACT US

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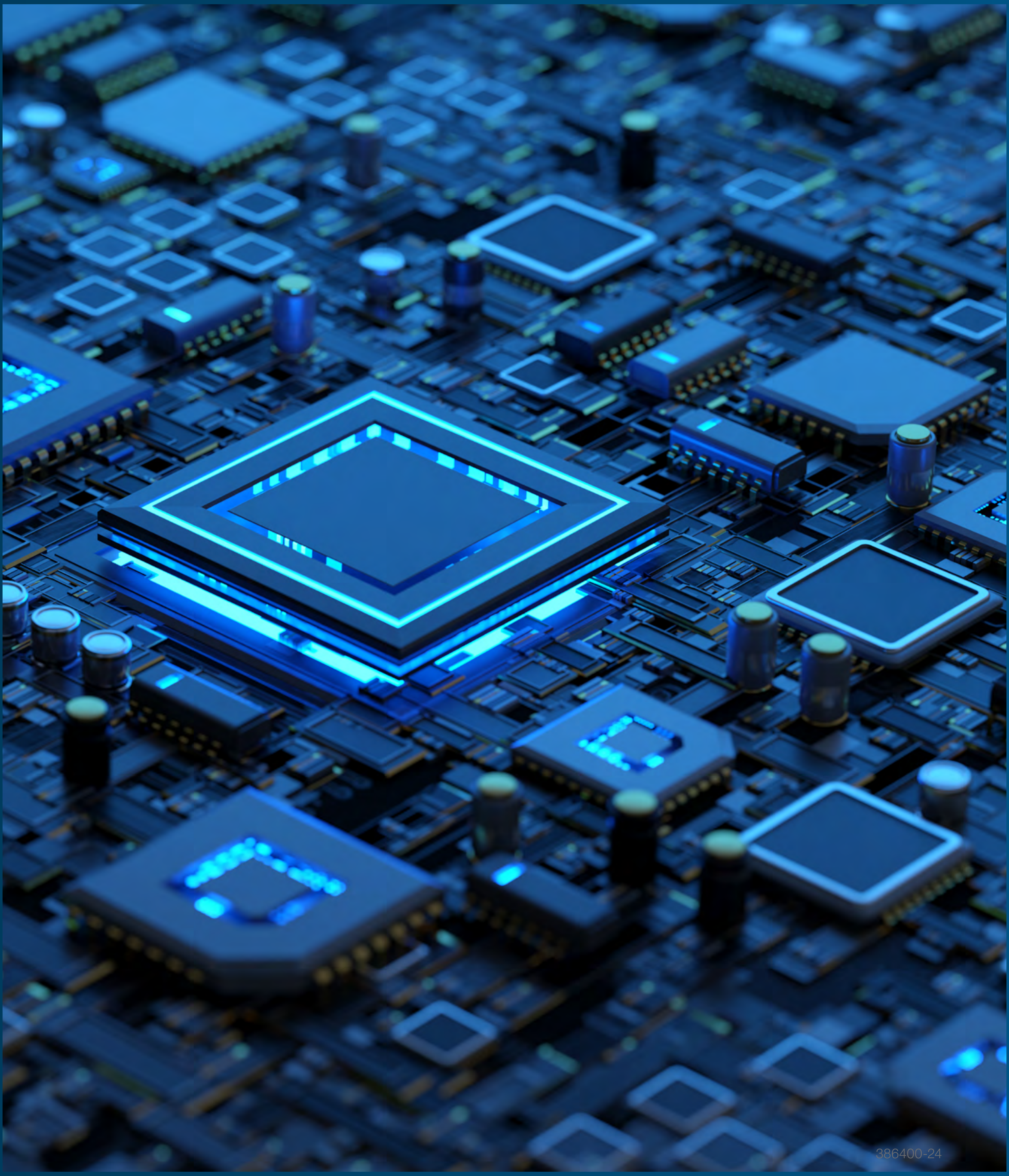

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