Description

VCA-11 is a high-voltage, Via-Configurable Array (VCA) optimized for low-cost, customized developments. Internal resources include over 1,600 20V transistors, 460 low-voltage transistors, 43 op-amps, 2 Digital to Analog Converters (DACs), 1 Analog to Digital Converter (ADC), supporting analog resources, and logic resources (refer to Figure 1).

The I/O pads and internal resources are capable of operation at 3.3V, 5V, and up to 20V, making this VCA an excellent fit for integration of existing mixed-signal designs, or new mixed-signal developments that require several voltage supplies. Analog resources support the development of multi-channel data acquisition where several channels are muxed into a single ADC, analog filters, programmable amplifiers, voltage regulators and LED drivers. In addition to the generous mix of analog resources, the VCA contains over 6,900 digital gates and 9K bits of SRAM, allowing the creation of serial interfaces, state machines, and customized memory elements.

VCA-11 uses patented via-only, single-mask configuration allowing design changes in weeks rather than months, low development costs, reduced risk and support for any production volume.
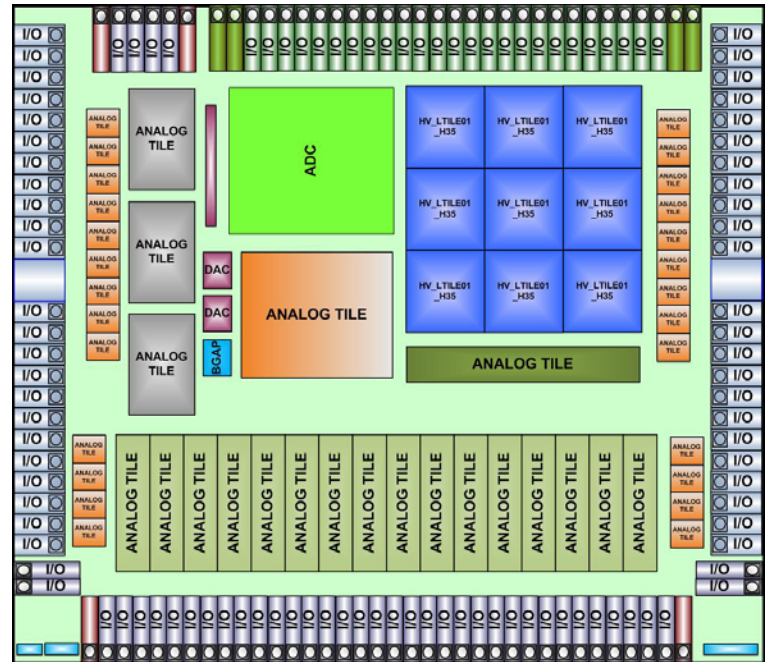

Figure 1: VCA-11 Via Configurable Array

Resources & Capabilities

Resource	Quantity
Single-ended op-amps	43
Unity gain bandwidth	up to 15MHz
Discrete transistors	2,100+
DACs	2
ADCs	1
ASIC Gates	6,900+
Memory	9K bits, single-port
Configurable I/O	113
Digital operating speed	60MHz system clock
Core logic voltage	3.3V
Analog & I/O voltage	up to 20V

Applications

- High Voltage Analog Filters and Programmable Amplifiers
- CPLD Plus Analog Replacement
- High Voltage Multi-channel Data Acquisition
- Integration of High Voltage Discrete Components
- Boost, Buck, and LDO Regulators
- 12V / 24V Automotive Applications

VCA-11 Features Summary

- **Technology**
  - 0.35μm AMS high voltage process technology
  - 3.3V digital core voltage
  - 3.3V, 5V, and up to 20V analog core voltage
- **Op-Amps**
  - 34 single-ended 3.3V / 5V op-amps with unity gain bandwidth up to 4MHz (can also be configured as an OTA)
  - 6 single-ended 3.3V only op-amps with unity gain bandwidth up to 4MHz (can also be configured as an OTA)
  - 3 single-ended 20V op-amps with unity gain bandwidth up to 15MHz
  - Via-configurable options per op-amp include: input type, output drive, input current, compensation, and more
- **Capacitors**
  - 3,362 individual capacitors
  - 527.5pF of total capacitance
  - 0.1pF and 0.4pF capacitors
  - Excellent matching
- **Resistors**
  - 5,584 individual 6.5KΩ resistors
  - 36.296MΩ of total resistance
  - Excellent matching
- **MOSFETs**
  - 2,116 discrete transistors with various W/L ratios
  - 1,656 20V devices
  - 340 5V devices
  - 120 3.3V devices
  - 922 NFETs
  - 1,194 PFETs

- **Switches**
  - 344 individual analog switches
  - 272 5V switches
  - 72 3V switches
- **Digital to Analog Converters**
  - 2 Resistive DACs
  - 10-bit resolution
  - 1μs setting time
- **Analog to Digital Converters**
  - 1 Successive Approximation ADC
  - 12-bit resolution
  - 1.5MSPS sampling rate
  - Single ended or fully-differential operation
- **Digital**
  - 6,900+ ASIC gates
  - 9K bits of single-port SRAM
  - RAMs Implemented as 9 64x16 SRAMs
  - 60MHz system speed
- **Configurable I/O**
  - 88 Via-Configurable analog I/O
  - 25 Via-Configurable digital I/0
  - Digital I/O configuration options include: drive strength, tri-state, Schmitt input, pull-up/dn, …
  - Analog I/O configuration options include 0, 50, and 1.5kΩ series resistance
- **Package Options**
  - Wide variety of customer defined package choices: 20-SOIC to 28-SOIC, 44-QFN to 88-QFN, 36-BGA to 121-BGA, 32-TQFP to 120-TQFP

VCA Platform Comparison

VCA-11 is part of a family of high voltage VCAs which also contains VCA-9 and VCA-10. All three VCAs in this family are similar in the types of analog and digital resources that they contain. Differences between them lie in the specific number of each type of resource. For comparison purposes, Table 1 illustrates these differences.

What is a VCA?

VCA stands for Via Configurable Array. Triad's VCAs are configurable mixed signal ASICs. Each VCA contains silicon-proven analog, digital and memory resources. A patented global routing fabric is placed over the top of all the resources. VCAs are staged at the semiconductor foundry awaiting a single via-layer mask change to configure and interconnect the analog and digital resources. To learn more about VCA technology please visit www.triadsemi.com, call 336-774-2150, or email info@triadsemi.com.

Resource	VCA-9	VCA-10	VCA-11
20V Op Amps	30	3	3
3.3/5V Op Amps	17	48	40
20V FETs	3,446	2,216	1,656
3.3/5V FETs	636	540	460
12-bit ADCs	3	1	1
10-bit DACs	2	2	2
ASIC Gates	18,400+	9,200+	6,900+
SRAM (bits)	24K	12K	9K
20V Analog I/O	78	50	46
3.3/5V Analog I/O	16	50	42
Digital I/O	46	31	25
Min. BGA/QFN Size (mm)	8x9	8x8	7x7

Table 1 VCA Family Resource Comparison

Why Use VCAs?

VCAs are the fast, inexpensive and safe way to create mixed signal ASICs.

Designing with VCAs enables going from concept to working silicon in two to six months. VCA fabrication time is weeks instead of the three months typical of full-custom. By using Triad's large IP library and growing family of VCAs, risk is minimized and time to working silicon is shortened. Because VCAs are reusable development costs are reduced and any production volume can be supported.

Talk with a Triad System Architect about Your Design

Need to turn your idea into a single chip solution? Whether you have an idea, a working FPGA, discrete PCB schematic, or a full specification, Triad's system architects are available to speak with you about your application and how we can help you turn your idea into your VCA. Contact us by Email at info@triadsemi.com, by phone at 336-774-2150 or visit www.triadsemi.com.

Speak with a Triad Business Development Manager or Find your Local Rep

Contact one of Triad's Business Development Managers to discuss the financial aspects of your project and to get an idea for just how accessible VCA technology can be for your business. Contact us by Email at sales@triadsemi.com, by phone at 336-774-2150 or find your local representative at www.triadsemi.com/contact.

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