VCA-10 Data Brief

Configurable Mixed Signal Array

Description

VCA-10 is a high-voltage, Via-Configurable Array (VCA) that can operate at up to 20V. Internal resources include over 2,200 20V FETs, 51 op-amps, 1 Analog to Digital Converter (ADC), 2 Digital to Analog Converters (DACs), supporting analog resources and configurable logic gates (refer to Figure 1).

VCA-10 is optimized for multi-channel designs requiring both high voltage and low voltage resources. With over 2,200 20V transistors, 540 low voltage transistors, 51 op-amps and 3 data converters, multi-channel data acquisition solutions can be developed for 12V/24V automotive applications, portable medical devices and sensor interfaces. The VCA also contains sufficient logic resources to develop a variety of serial or parallel digital interfaces. In this way, VCA-10 can integrate existing analog front end components along with a digital interface to communicate with FPGAs/CPLDs and microcontrollers. Additionally, 12K bits of onboard SRAM allows creation of customized memory elements such as RAMs and FIFOs for data storage and buffering.

Like all of Triad's configurable devices, VCA-10 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.

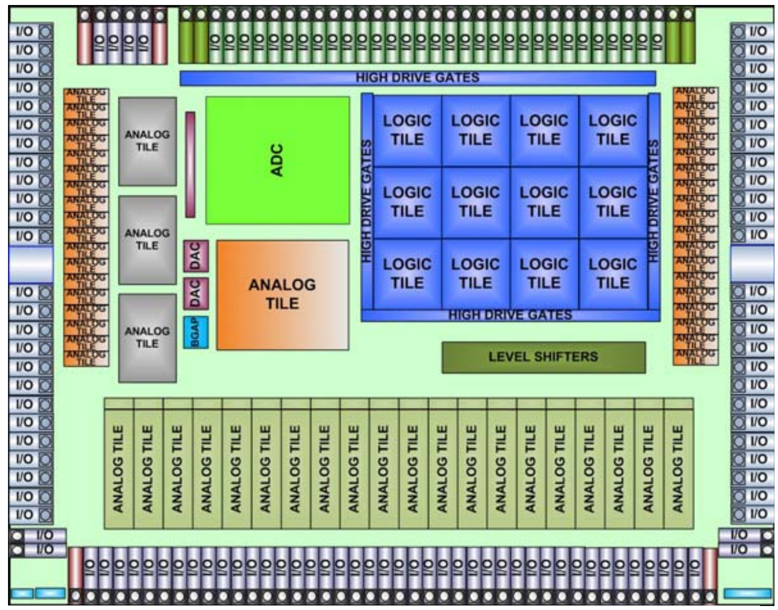

Figure 1: VCA-10 Via Configurable Array

Resources & Capabilities

Resource	Quantity
Single-ended op-amps / OTAs	51
Unity gain bandwidth	up to 15MHz
Discrete transistors	2,700+
DACs	2
ADCs	1
ASIC Gates	9,200+
Memory	12K bits
Configurable I/O	131
Digital operating speed	60MHz
Core logic voltage	3.3V
Analog & I/O voltage	up to 20V

Applications

- CPLD Plus Analog Replacement
- High Voltage Multi-channel Data Acquisition
- Power Management and Sequencing
- Automotive
- Sensor Interfaces
- Integration of High Voltage Discrete Components
- Microcontroller Slave Devices

VCA-10 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**
  - 42 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 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**
  - 3,978 individual capacitors
  - 621.8pF of total capacitance
  - 0.1pF and 0.4pF capacitors
  - Excellent matching
- **Resistors**
  - 6,608 individual 6.5KΩ resistors
  - 45.952MΩ of total resistance
  - Excellent matching
- **MOSFETs**
  - 2,756 discrete transistors with various W/L ratios
  - 2,216 20V devices
  - 420 5V devices
  - 120 3.3V devices
  - 1202 NFETs
  - 1,554 PFETs
- **Switches**
  - 408 individual analog switches
  - 336 5V switches
  - 60 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**
  - 9,200+ ASIC gates
  - 12K bits of single-port SRAM
  - RAMs Implemented as 12 64x16 SRAMs
  - 60MHz system speed
- **Configurable I/O**
  - 100 Via-Configurable analog I/O
  - 31 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, 52-QFN to 80-QFN, 64-BGA to 144-BGA, 44-TQFP to 144-TQFP

VCA Platform Comparison

VCA-10 is part of a family of high voltage VCAs which also contains VCA-9 and VCA-11. 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.

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+	6900+
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

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.

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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