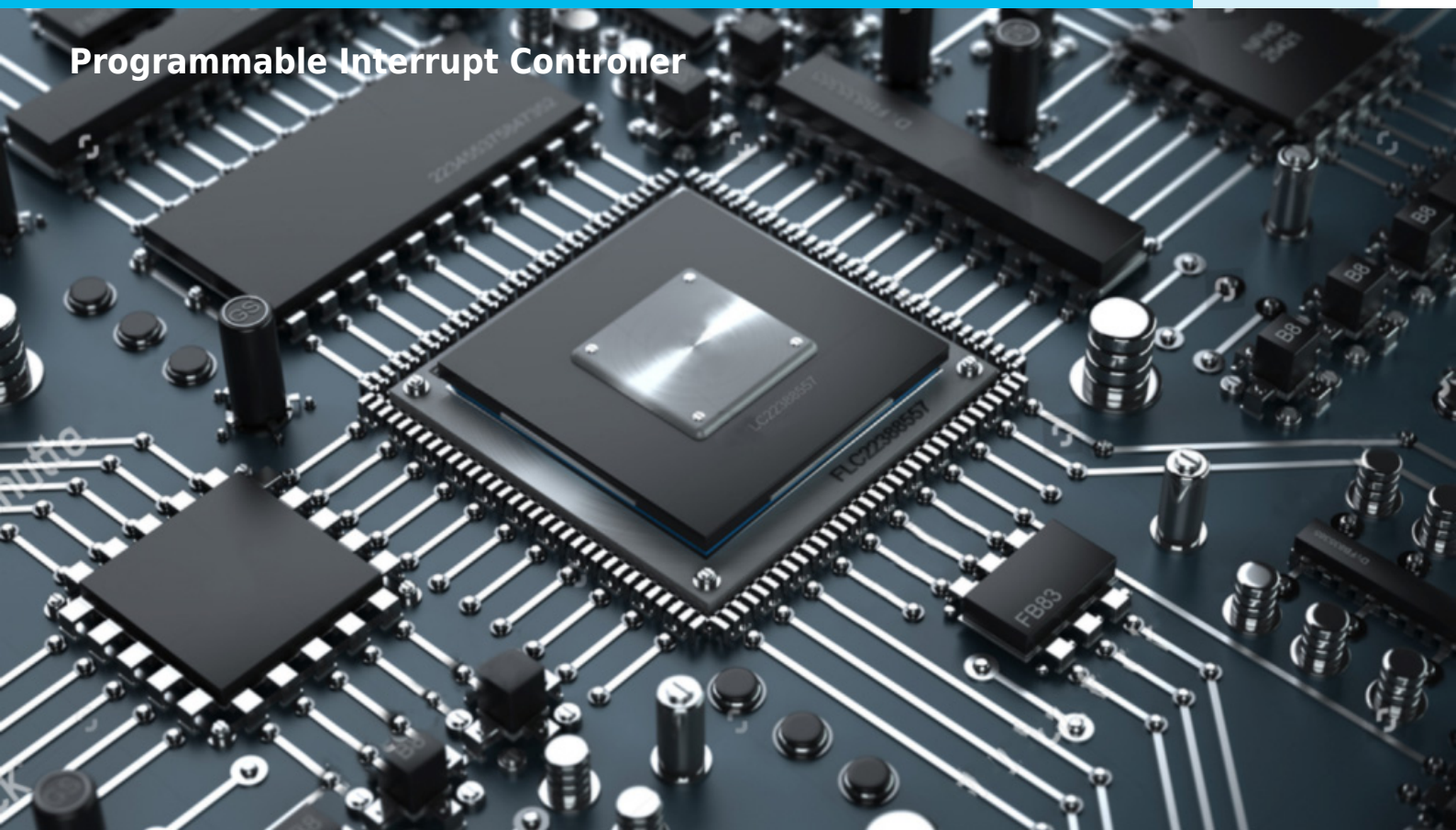
DIGITAL CORE DESIGN

D8259

Programmable Interrupt Controller



COMPANY OVERVIEW

Digital Core Design is a leading IP Core provider and a System-on-Chip design house. The company was founded in 1999 and since the very beginning has been focused on IP Core architecture improvements. Our innovative, silicon proven solutions have been employed by over 300 customers and with more than 500 hundred licenses sold to companies like Intel, Siemens, Philips, General Electric, Sony and Toyota. Based on more than 70 different architectures, starting from serial interfaces to advanced microcontrollers and SoCs, we are designing solutions tailored to your needs.

IP CORE OVERVIEW

D8259 IP Core — Programmable Interrupt Controller for Embedded Systems

High-Performance Soft Core Interrupt Controller

The **D8259 IP Core** from DCD-SEMI is a **soft-core Programmable Interrupt Controller (PIC)**, fully compatible with the **82C59A industry-standard device**. Designed for **embedded systems and SoC designs**, this efficient IP Core allows engineers to manage **up to 8 vectored priority interrupts**, with support for **cascading to 64 vectored interrupts**. For advanced applications, the D8259 can be configured in **Poll Command Mode** to handle **more than 64 vectored interrupts**, offering maximum flexibility for complex systems.

Comprehensive Feature Set

The D8259 IP Core supports:

- **All 82C59A modes** including fully vectored and priority-controlled interrupts
- **Cascading capability** to expand from 8 to 64 interrupts
- **Poll Command Mode** for handling extended interrupt counts
- **Technology-independent design** for FPGA, ASIC, and SoC integration
- **Fully automated test bench** with complete tests for **easy SoC validation**

This combination of features ensures **reliable, efficient, and flexible interrupt management** across modern embedded system architectures.

Why Choose DCD-SEMI D8259 IP Core

- Fully compatible with the **82C59A standard**
- Supports **up to 8 vectored interrupts**, expandable to 64+
- Configurable in **all 82C59A modes**
- **Poll Command Mode** for high-interrupt-count applications
- Includes **automated test bench** for seamless verification
- **Technology-independent**, suitable for FPGA, ASIC, and SoC designs
- Ideal for **embedded microprocessors and complex system designs**

ALL DCD'S IP CORES ARE TECHNOLOGY AGNOSTIC, ENSURING 100% COMPATIBILITY WITH ALL FPGA AND ASIC VENDORS.

For technical specifications, integration guidance, or custom configurations, contact
info@dcd-semi.com

KEY FEATURES

- 8 vectored priority interrupts
- Up to sixty-four vectored priority interrupts with cascading
- Support for all 82C59A modes features
  - MCS-80/85 and 8088/8086 processor modes
  - Fully nested mode and special fully nested mode
  - Special mask mode
  - Buffered mode
  - Pool command mode
  - Cascade mode with master or slave selection
  - Automatic end-of-interrupt mode
  - Specific and non-specific end-of-interrupt commands
  - Automatic and Specific Rotation
  - Edge and level triggered interrupt input modes
  - Reading of interrupt request register (IIR) and in-service register (ISR) through data bus
- Fully synthesizable HDL Source Code
- Static design and no internal tri-states

APPLICATIONS

- Embedded microprocessor boards

UNITS SUMMARY

Data Bus Buffer – The Data Bus Buffer is used to interface

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the D8255, to the system data bus. Data is transmitted or received by the buffer upon execution of input or output instructions, by the CPU. Control words and status information are also transferred through the data bus buffer.

Read/Write and Control Logic – The control logic block manages all of the internal and external transfers of both, Data and Control or Status words. It accepts inputs from the CPU Address and Control busses and in turn, issues commands to both, A and B Control Groups.

Ports A, B, and C – The D8255 contains three 8-bit ports. All can be configured in a wide variety of functional characteristics by the system software, but each has its own special features or "personality", for further enhancement of the power and flexibility of the D8255.

Port A – One 8-bit data output latch/buffer and one 8-bit input latch buffer. Both „pull-up" and "pulldown" bus hold devices present on Port A.

Port B – One 8-bit data input/output latch/buffer. Only „pull-up" bus hold devices are present on Port B.

Port C – One 8-bit data output latch/buffer and one 8-bit data input buffer (no latch for input). This port can be divided into two 4-bit ports under mode control. Each 4-bit port contains a 4-bit latch and can be used for the control signal outputs and status signal inputs, in conjunction with ports A and B. Only „pull-up" bus hold devices are present on Port C.

Group A and Group B Controls – The functional configuration of each port is programmed by the systems software. In essence, the CPU "outputs" a control word to the D8255. The control word contains information, such as "mode"', "bit set", "bit reset", etc., that initializes the functional configuration of the D8255. Each of the Control blocks (Group A and Group B), accepts "commands" from the Read/Write Control Logic, receives "control words" from the internal data bus and issues the proper commands to its associated ports.

Group A – Port A and upper half of Port C

Group B – Port B and lower half of Port C

The control word register can be both written and read. The figure on the right shows the control word format, for both Read and Write operations. When the control word is read, bit D7 will always be logic "1", as this implies control word mode information.

DESIGN FEATURES

- One global system clock
- Synchronous reset
- All asynchronous input signals are synchronized before internal use
- All latches implemented in original 8255 devices are replaced by equivalent flip-flop registers, with the same functionality

PERFORMANCE

The following table gives a survey about the Core area and performance in **LATTICE FPGA** devices after Place & Route (all key features included):

Device	Speed grade	LUTs/PFUs	F_{max}
XP	-5	394 / 125	108 MHz
ECP	-5	394 / 125	114 MHz
EC	-5	394 / 125	114 MHz

DELIVERABLES

- HDL Source Code
- Testbench environment
  - Automatic Simulation macros
  - Tests with reference responses
- Synthesis scripts
- Technical documentation
- 12 months of technical support

LICENSING

Comprehensible and clearly defined licensing methods without royalty-per-chip fees make use of our IP Cores easy and simple.

– Single-Site license option – dedicated to small and middle sized companies which run their business at one place.

– Remote Access license option – allows authorized users to access and use the licensed product from a remote location.

In all cases the number of IP Core instantiations within a project and the number of manufactured chips are unlimited. There are no restrictions regarding the time of use.

The IP is delivered in HDL Source code suitable for ASIC and FPGA projects.

CONTACT

DCD-SEMI Sp. z o.o. Headquarters:
Wroclawska 94, 41-902 Bytom, POLAND
E-mail: info@dcd.pl
tel.: +48 32 282 82 66
fax: +48 32 282 74 37
Distributors:
Please check: dcd.pl/contact-us/

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