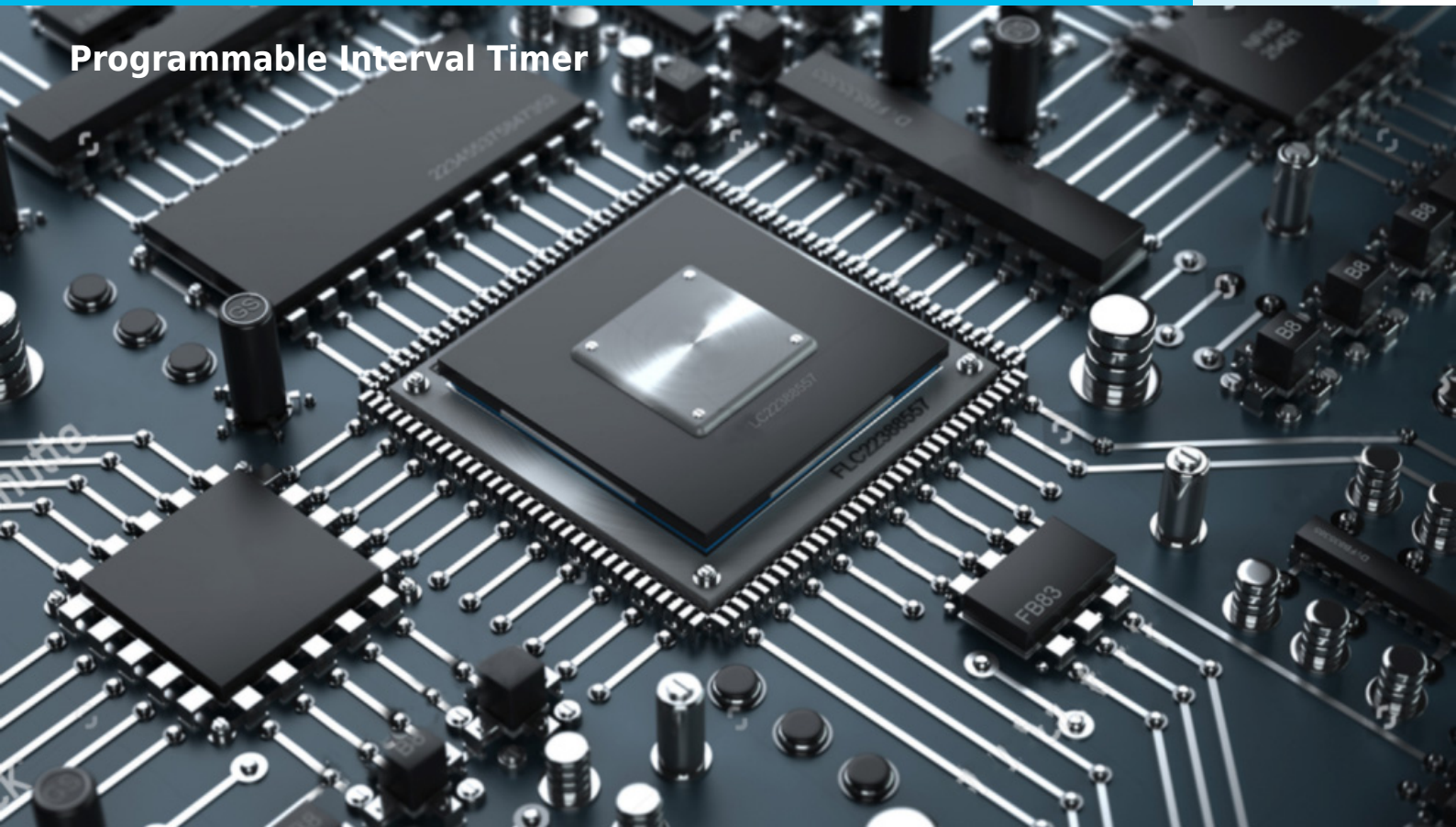


D8254



Programmable Interval Timer



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

The D8254 is a programmable interval timer/counter, binary compatible with the 82C54 industry standard. Since DCD's core value is innovation, this unique IP Core solves one of the most common problems in any micro-computer system: the **generation of accurate time delays under software control**. The D8254 can be used as:

- Real-time clock
- Even counter
- Digital one-shot
- Programmable rate generator
- Square wave generator
- Binary rate multiplier
- Complex waveform generator
- Complex motor controller
- Interrupt on terminal count

The D8254 includes a **fully automated test bench** with a **complete set of tests**, which allows easy package validation at each stage of the SoC design flow. Our proprietary core is a technology-independent design that can be implemented in a variety of process technologies.

DESIGN FEATURES:

ALL DCD'S IP CORES ARE TECHNOLOGY INDEPENDENT WHICH MEANS THAT THEY ARE 100% COMPATIBLE WITH ALL FPGA & ASIC VENDORS E.G.

- **Altera / Intel,**
- **Xilinx / AMD,**
- **Lattice,**
- **Microsemi / Microchip,**
and others.

- **TSMC**
- **UMC**
- **SK Hynix**
and others.

KEY FEATURES

- Three independent 16-bit counters
- Six programmable Counter modes
 - Interrupt on terminal count
 - Hardware retriggerable One-Shot
 - Rate Generator
 - Square wave mode
 - Software triggered strobe
 - Hardware triggered strobe
- Binary or BCD counting
- Status Read Back Command
- Simple interface allows easy connection to microcontrollers
- Fully synthesizable
- Static design and no internal tri-states

APPLICATIONS

- Embedded microprocessor boards

UNITS SUMMARY

Read Write Logic - Accepts inputs from the system bus and generates control signals, for the other functional blocks of the D8254. ADDR(1:0) select one of the three counters or the Control Word Register, to be read from/written into. A "low" on the RD input tells the D8254, that the CPU is reading one of the counters. A "low" on the WR input tells the D8254 that the CPU is writing either a Control Word or an initial count. Both RD and WR are qualified by CS; RD and WR are ignored, unless the 82C54 has been selected by holding CS low. The WR and CLK signals should be synchronous. This is accomplished by using a CLK input signal to the D8254 counters, which is a derivative of the system clock source. Another technique is, to externally synchronize the WR and CLK input signals. This is done by gating WR with CLK.

Data Bus Buffer - This 8-bit buffer is used to interface the D8254 to the system bus.

Control Word - Selected by the Read/Write Logic when ADDR(1:0) = 11. If the CPU does a write operation to the D8254, the data is stored in the Control Word Register and is interpreted, as a Control Word used to define the operation of the Counters.

Status Register, Status Latch - Status register, which contains actual mode declaration and value of output signal. Latched in Status Latch, after receiving Read-Back Command with STATUS Bit = 0.

Control Unit - Controls read/write operation and decrementing of CE.

CR M, CR L - Input data registers. When a new count is written to counter, the count is written in the CR and later transferred to CE.

OL L, OL M - Output data registers. Latched when the suitable Counter Latch Command is sent to the D8254

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PERFORMANCE

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

Device	LUTs/PFUs	F _{max}
MachXO3	508 / 261	63 MHz
MachXO2	508 / 261	61 MHz
MachXO	499 / 251	51 MHz
XP2	507 / 261	51 MHz
XP	565 / 288	62 MHz
EPC5U	613 / 312	120 MHz
EPC2	598 / 303	72 MHz
ECP	527 / 249	70 MHz

DELIVERABLES

- **Source code:**
 - VERILOG or VHDL Source Code
 - VERILOG or VHDL test bench environment
 - Active-HDL automatic simulation macros
 - ModelSim automatic simulation macros
 - Tests with reference responses
- Technical documentation
 - Installation notes
 - HDL core specification
 - Datasheet

- Synthesis scripts
- Example application
- **Netlist**
 - Netlist for selected FPGA family
 - Sample FPGA project
 - Technical documentation
 - HDL core specification
 - Datasheet
- **Technical support**
 - IP Core implementation
 - 12 months maintenance
 - Delivery of the IP Core and documentation updates
 - Phone & email support
 - Design consulting

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.
 - **Multi-Site license option** - dedicated to corporate customers which operate at several locations. The licensed product can be used at selected company branches.
- 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.

There are two formats of the delivered IP Core that you can choose from:

- VHDL or Verilog RTL synthesizable source code (called HDL Source code)
- FPGA EDIF/NGO/NGD/QXP/VQM (called Netlist)

HDL Source code is suitable for ASIC and FPGA projects. The Netlist license is intended for FPGA projects only.

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