

# GPIO

## General Purpose Input Output

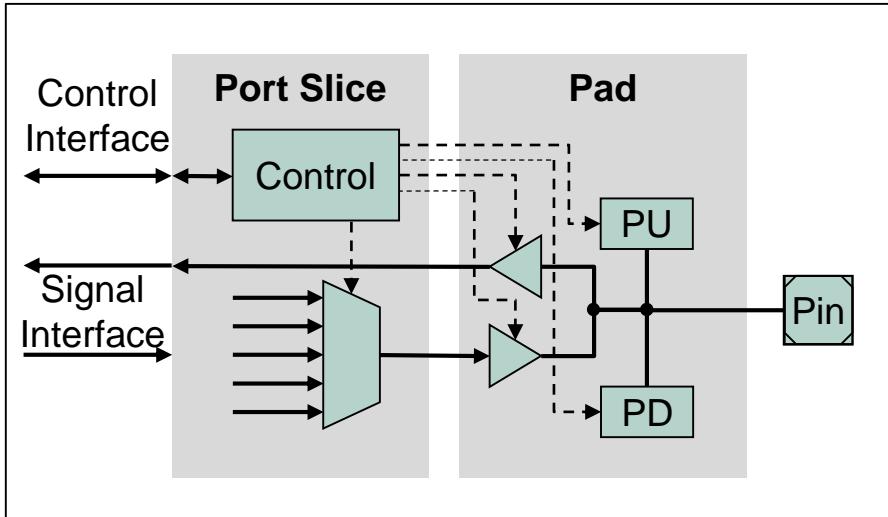
AURIX™ TC3xx Microcontroller Training  
V1.0 2020-06



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# GPIO

## General Purpose Input Output



### Highlights

- > Digital input and output pins controlled by software or by peripherals
- > Capable to drive 5 V or 3.3 V output level
- > TTL or CMOS input hysteresis
- > Pin toggle with one CPU instruction

### Key Features

High configuration capabilities

Access protection

Port emergency stop

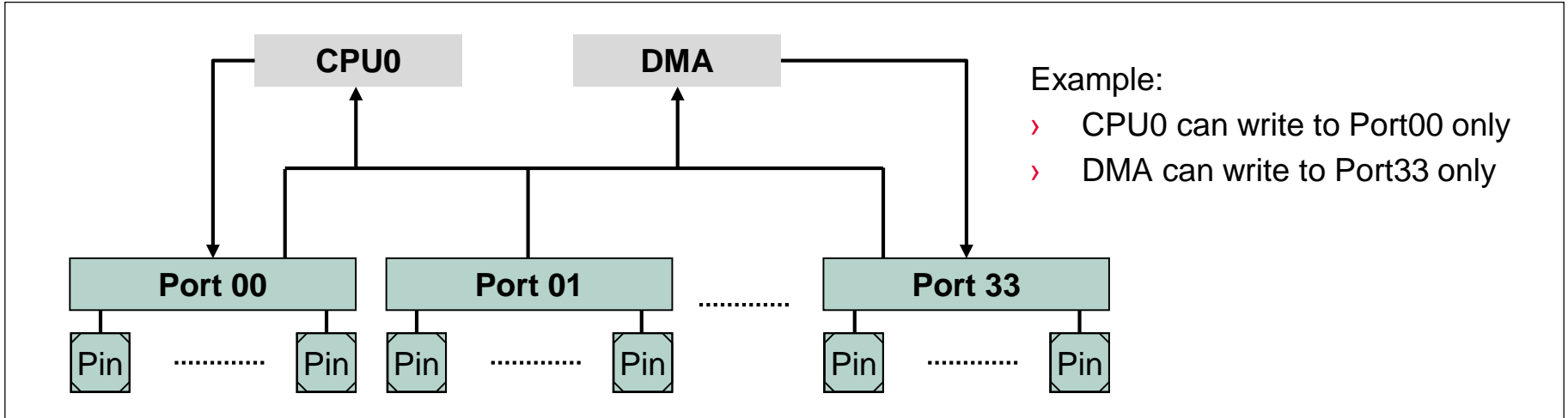
### Customer Benefits

- > Flexible adaption of pin characteristics to application needs e.g. EMC
- > Protection against unintended modification of port configuration
- > Pre-defined pin states for critical situations without software intervention

## High configuration capabilities

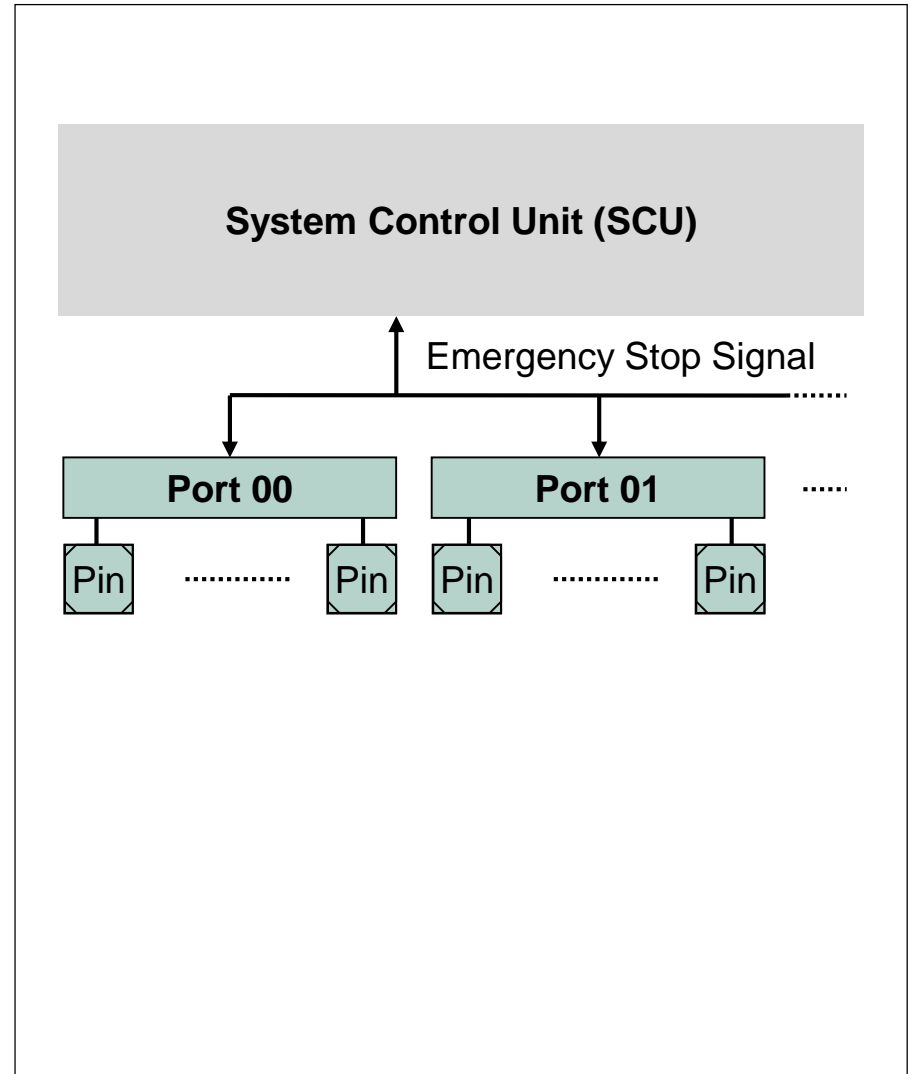
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- › Each port pin can be configured and controlled by software for input or output operation (general-purpose mode)
- › A port pin can be assigned to one of 7 peripheral **outputs**
- › Peripherals decide which **input** port pin to use as input
- › The level of a pin can always be read by software independent of whether the port pin operates as input or output
- › Configured as input:
  - an internal **pull-down** or **pull-up** devices can be connected
  - the user can select between 3 different **input hysteresis**
- › Configured as output:
  - **Push-pull** mode or **open-drain** mode can be selected
  - up to 4 different **speed grades** are available to apply the optimal balance between speed needs and EMC behavior of the application



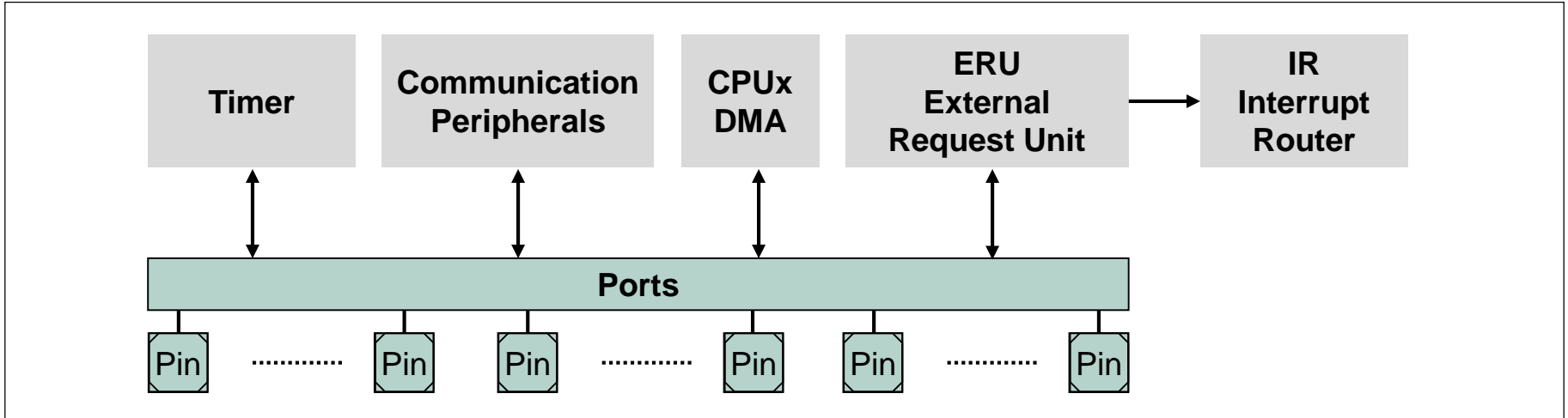
- > Unintended settings of port pins could cause serious and irreversible damages of the application hardware especially in high power applications
- > To avoid unintended modifications of port pin configurations during operation, AURIX™ provides a write protection for ports
  - The registers group of each port (e.g. P00, P01, P33, ...) can be protected against write accesses
  - Write accesses can be disabled separately for each bus master like e.g. CPUx, DMA, and HSSL

- › The emergency stop signal from the System Control Unit (SCU) forces port pins from output mode to general-purpose input mode
- › Emergency stop logic can be enabled for each port pin individually



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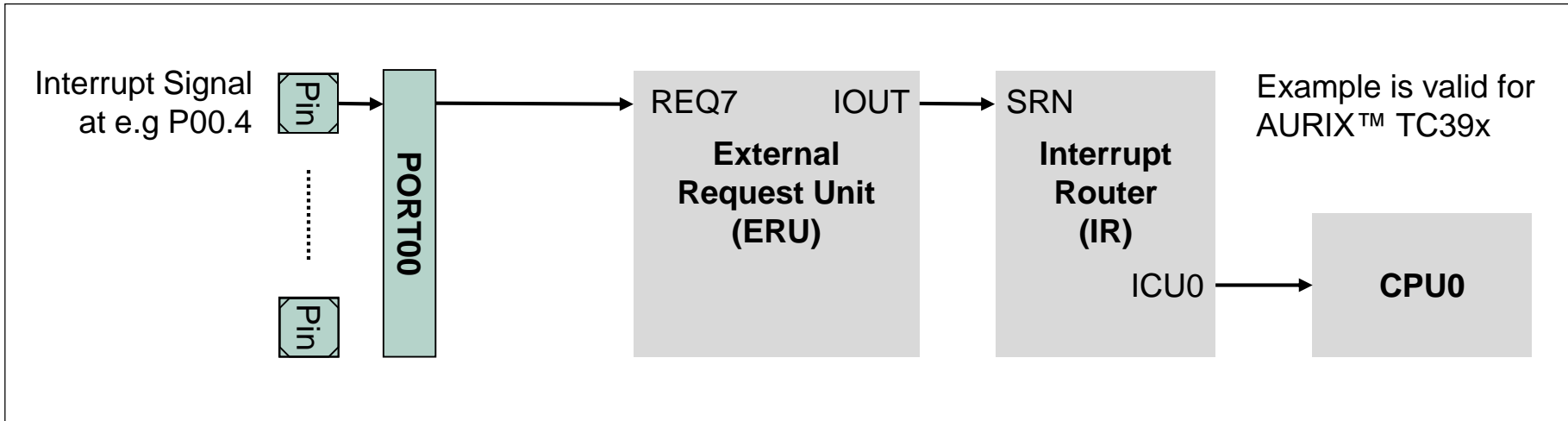
## System integration



- › Almost all peripherals are interacting with port pins used as connection to the outside world
- › External interrupt signals (service requests) can be routed via the External Request Unit (ERU) to the Interrupt Router (IR)

# Application example

## External interrupt



### Overview

- > The selected interrupt input pin P00.4 must be configured to input (optional: open drain mode, pull-device activated)
- > In the ERU the input REQ7 must be selected and routed to an output

### Advantages

- > Several interrupt signals can be combined in the ERU and routed to one interrupt node
- > Up to 16 possible external interrupt inputs

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### Document reference

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**General\_Purpose\_Input\_Output**

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