GPIO
General Purpose Input Output
### GPIO
**General Purpose Input Output**

#### Key Features
- High configuration capabilities
- Access protection
- Port emergency stop

#### 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

#### 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

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[Image of the circuit diagram showing Port Slice and Pad with control interface and signal interface connections.]
GPIO
High configuration capabilities

› 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 2 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.

Example:
- CPU0 can write to Port00 only
- DMA can write to Port33 only
The emergency stop signal from the Safety Management Unit (SMU) 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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**Diagram:**

- **Safety Management Unit (SMU)**
- **Emergency Stop Signal**
- **Port 00**
  - Pin
- **Port 01**
  - Pin
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

Example is valid for AURIX™ TC29x
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