

E-Ray

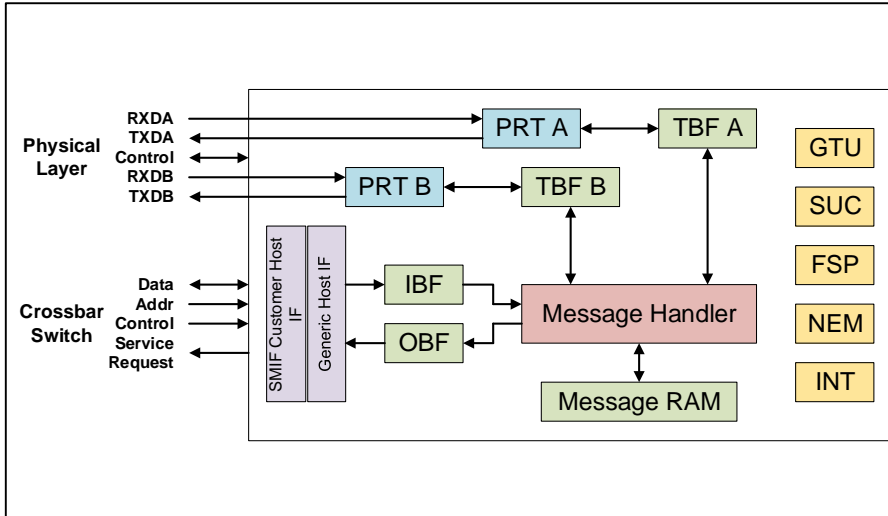
FlexRay™ Protocol Controller

AURIX™ TC3xx Microcontroller Training
V1.0 2020-06



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E-Ray FlexRay™ Protocol Controller



Highlights

E-Ray module performs communication according to the FlexRay™ protocol specification v2.1

E-Ray module supports data rates of up to 10 Mbit/s on each channel.

Key Features

Configuration of up to 128 message buffers

Filtering based on slot, cycle, and channel value

Customer Benefits

Allows greater flexibility with definition of a network

Simplifies definition of acceptance or transmit criteria for each message

Configuration of up to 128 message buffers

RAM Word			
0..3	Message Buffer 0	Static Buffers	Start of Header Partition
4..7	Message Buffer 1		
	...	Static + Dynamic Buffers	
	Message Buffer N-1	FIFO	End of Header Partition
	Message Buffer N		
4*(N+1)			Start of Data Partition
	...		
2047			End of Data Partition

- › 8 Kbyte of Message RAM for storage of e.g. 128 Message Buffers with max. 48 byte data field or up to 30 Message Buffers with 254 byte Data Sections
- › Configuration of Message Buffers with different payload lengths possible
- › Each Message Buffer can be configured as receive buffer, as transmit buffer or as part of the receive FIFO
- › Host access to Message Buffers via Input and Output Buffer
 - Input Buffer: Holds message to be transferred to the Message RAM
 - Output Buffer: Holds message read from the Message RAM

Filtering based on slot, cycle, and channel value

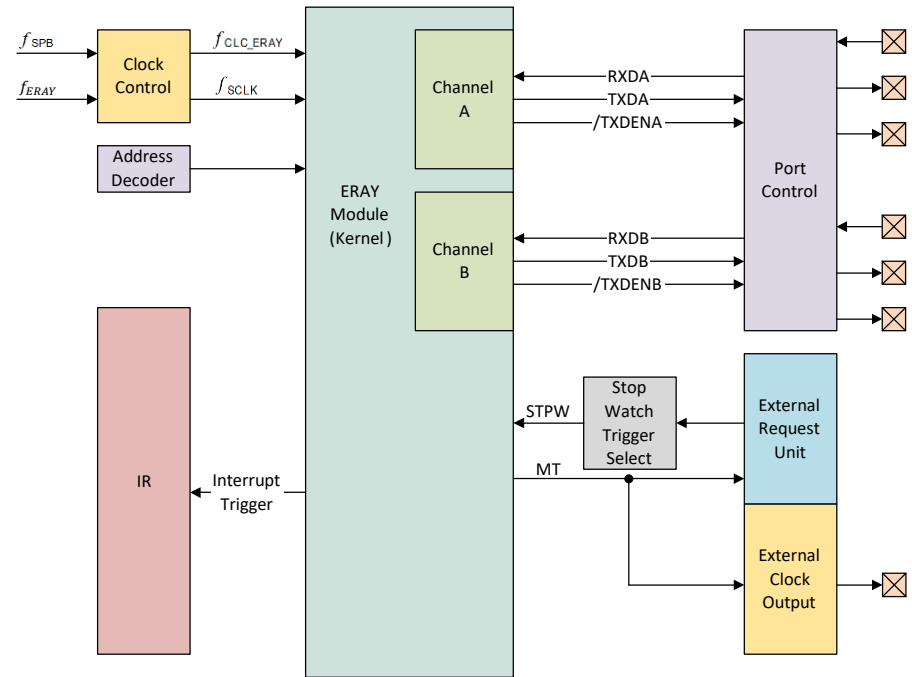
- › Acceptance filtering → checking specific fields in a received Frame against the corresponding configuration values of the valid Message Buffers
- › Transmit filtering → comparing the configuration constants of the valid Message Buffers against the actual slot and cycle counter values
- › Filtering is done on the following fields:
 - Channel ID
 - Frame ID
 - Cycle counter
- › The following filter combinations for acceptance / transmit filtering are allowed:
 - Frame ID + Channel ID
 - Frame ID + Channel ID + Cycle Counter

E-Ray

System integration

E-RAY module is connected to several external modules:

- › Clock Control: generates all the necessary clocks for the E-RAY module
- › Interrupt Router: schedules service requests coming from various E-Ray interrupt sources
- › Port Control: connects the E-RAY module pins to the external GPIO pins
- › External Clock Output Unit (SCU module): distribution of Macro Tick as time base for distributed system control
- › External Request Unit (SCU module): possibility of triggering stop watch events and providing global time e.g to the on chip timers



Application Example

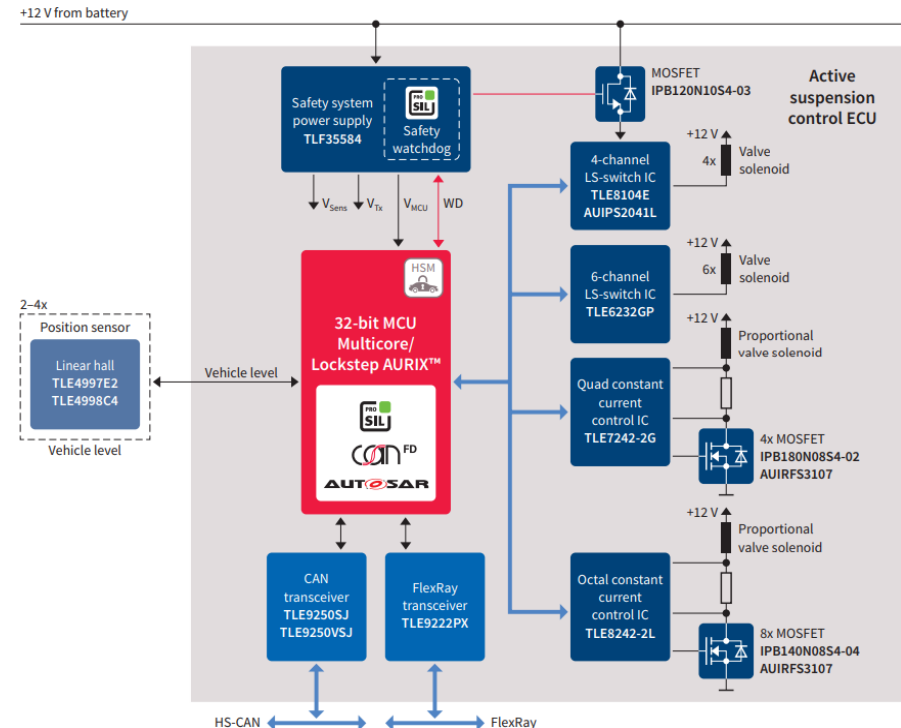
Active suspension control

Overview

- Used in the adaptive suspension control systems that act simultaneously as an active anti-roll stabilizer and an electronic shock absorber
- “X-by-Wire” system; mechanical or hydraulic control systems are replaced by fully electrical or electronic solutions

Advantages

- CAN lacks deterministic and fault-tolerant aspects that are mandatory for “X-by-Wire” systems
- Due to its higher bandwidth (10 Mbps) in comparison with CAN overall system complexity will be reduced, which offers a path for more cost-effective solutions



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