CAN FD IP

CAN FD controller

Single channel type

OVERVIEW

This IP is CAN FD one channel version controller that is compliant with ISO 11898-1 (2015) Specifications.
This CAN module embeds single CAN channel.
This CAN module can be configurable to CAN FD or classic CAN and transmits and receives both ID formats of messages, namely the standard identifier (11 bits) (identifier is hereafter referred to as ID) and extended ID (29 bits).

IMPORTANT: When selling a device that includes the Renesas CAN FD one channel version IP core, you must contract CAN FD Protocol license with Bosch(© Robert Bosch GmbH).

CAUTION:
(1) This IP does not include a temporary buffer memory array and Error detection logic for the message to be transmitted in 10.10, ISO11898. It includes only the Error detection of 10.11, ISO11898.
(2) “CAN FD one channel version” means one channel version of a multi channel Renesas scalable CAN FD IP.

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KEY FEATURE

Item	Specification
Communication	CAN functionality conform to CAN FD ISO 11898-1 (2015)
Protocol engine Version	RS-CANFD_PE V3.0
Data transfer rate	up to 1Mbps for arbitration phase and up to 8Mbps for data phase , individually for CAN channel
Proposed min. operation frequency peripheral clock/APB clock	80MHz
Data Link Layer clock (DLLC)	8MHz ≤ max ≤ Peripheral (APB bus) clock Frequency
Input/Output pins	TX/RX
CAN channels	1
Selectable ID type	11-bit Standard ID
	11-bit Standard ID + 18-bit Extended ID
Selectable Frame Type	Data Frame (RTR = 0) (CAN and CAN FD frames)
	Remote Frame (RTR = 1) (only CAN frames)
Variable Data Byte Count for Data Frames	DLC range: 0 to F
Message Buffer RAM interface	Up to 32 reception message buffers
	4 transmit message buffers
	1 transmission queue Automatic message transfer into transmission queues supported
FIFO number	2 Reception FIFO Buffers 1 COMMON FIFO individually configurable as - Reception FIFO - Transmission FIFO
Automatic delay interval timer for transmission	The delay timer can be applied to: - Transmission FIFO
Enhanced reception filtering	support of 11bit and 29bit CAN identifier
	programmable 29 bit CAN identifier acceptance filter mask for each entry
	programmable routing capability for each FIFO and reception message buffers (up to 2 routing destinations)
	RTR and IDE masking
	DLC filter
	Message buffer payload overload protection
	Payload filter
	Updating AFL entry during communication
General SW Support	Automatic label information added to receive message (for upper SW layer support)
Timer	TX and RX Time Stamp function
Power down function	Module start stop function for each CAN node (Channel & Global Sleep Mode)

These items are not included. Please prepare that on your own.

Buffer memory area	The size depends on your configuration. Max. is 2328Byte (582 word * 32 bit. The capacity which increases by ECC is not included.)
Error detection for 10.10, ISO11898 (10.11, ISO11898 is included)	Error detection with Buffer memory. It adds a parity bit in write-data and checks it in read-data. If it detects an error, then it must send an error status to IP.

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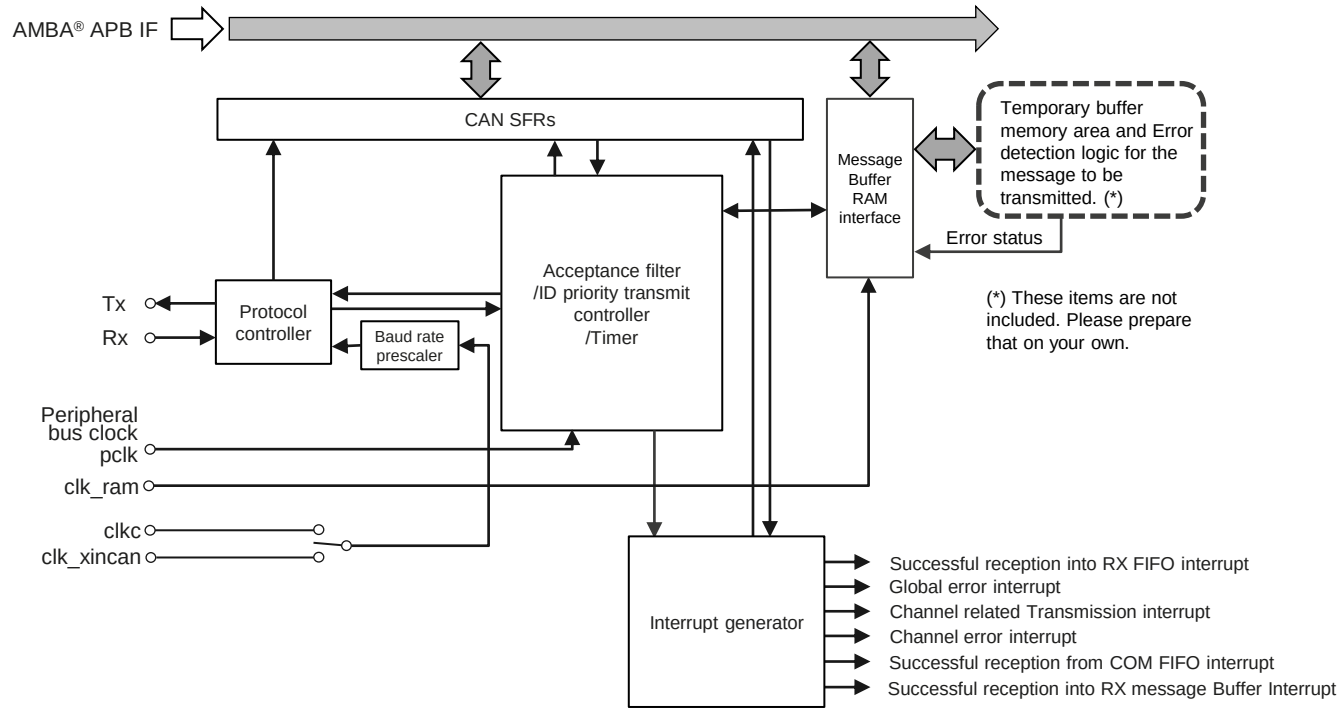
BLOCK DIAGRAM



Tx/Rx:
Input/Output pins of the CAN module

Protocol controller:
Handles CAN protocol processing such as bus arbitration, bit timing at transmission and reception, stuffing, error handling, etc.

Message Buffer RAM interface:
This RAM interface is used to store messages after reception or for transmission using a normal Message Buffer or a FIFO. Each message entry has an individual ID, data length code, data field, message pointer for upper layer application usage and a time stamp.

This RAM interface is also used to store the message acceptance filtering entries. Each acceptance filter entry has an individual ID, data length code, data field, message pointer for upper layer application usage and message direction pointer.

Acceptance filter:
Performs filtering of received messages. The entries in the Acceptance filter list RAM are used for the filtering process.

Timer:
Two timers
- Reception Timestamp function
- Transmission separation time for FIFO Buffers

Interrupt generator:
Generates several types of global and channel interrupts

CAN SFRs:
Registers associated with CAN.