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APB SMBus Specification - Table of Contents

Component: APB System Management Bus (SMBus) Controller **Version:** 1.0 **Last Updated:** 2025-12-01 **Status:** Production Ready

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Document Organization

Chapter 1: Overview

Chapter 2: Blocks

Chapter 3: Interfaces

Chapter 4: Programming Model

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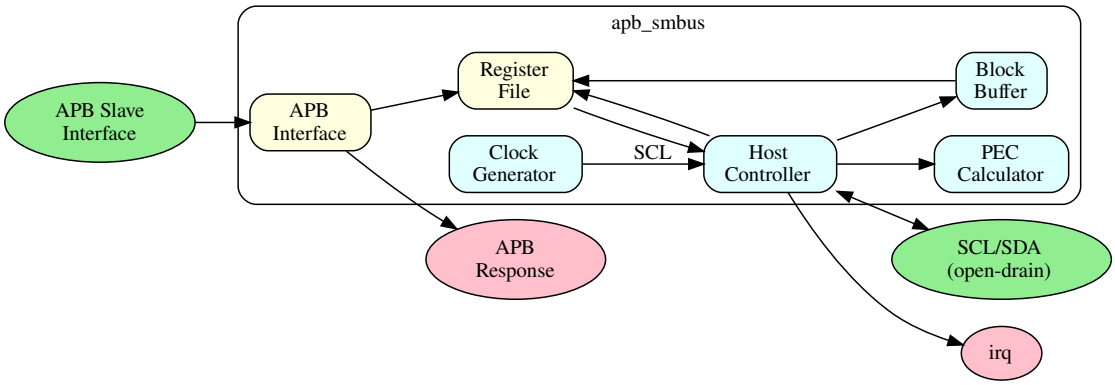
Block Diagram



SMBus Block Diagram

Version History

Version	Date	Author	Changes
1.0	2025-12-01	RTL Design Sherpa	Initial specification

APB SMBus - Overview

Introduction

The APB SMBus controller provides System Management Bus communication with APB interface. It supports host controller functionality for accessing SMBus devices.

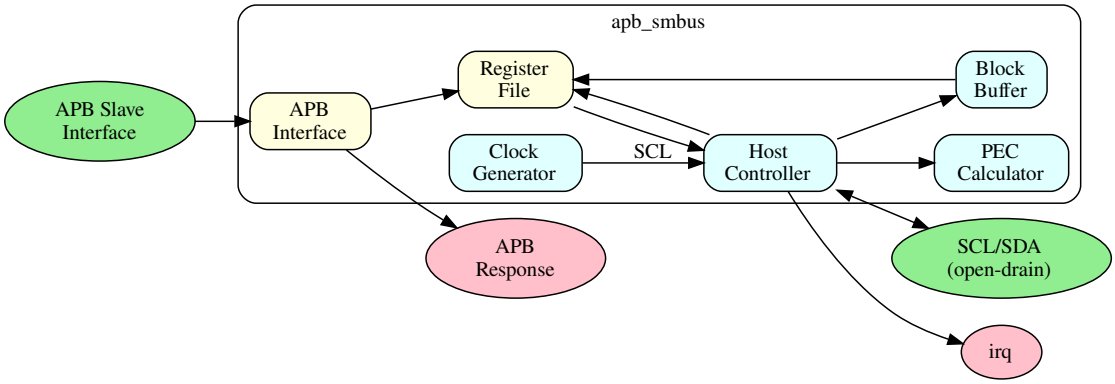
Key Features

- SMBus 2.0 compatible
- Host controller mode
- Quick Command, Send/Receive Byte
- Read/Write Byte/Word
- Block Read/Write (up to 32 bytes)
- PEC (Packet Error Checking) support
- Programmable clock divider
- Interrupt-driven operation
- Timeout detection

Applications

- Temperature monitoring
- Voltage monitoring
- Fan control
- EEPROM access
- Power management
- System health monitoring

Block Diagram



SMBus Block Diagram

Register Summary

Offset	Name	Description
0x00	SMBUS_STATUS	Status register
0x04	SMBUS_CONTROL	Control register
0x08	SMBUS_COMMAND	Command type
0x0C	SMBUS_ADDRESS	Target address
0x10	SMBUS_DATA0	Data byte 0
0x14	SMBUS_DATA1	Data byte 1
0x18	SMBUS_BLOCK	Block data count
0x1C	SMBUS_PEC	PEC value
0x20	SMBUS_AUXCTL	Auxiliary control
0x80-0x9F	SMBUS_BLOCKDATA	Block data buffer

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APB SMBus - Register Map

Register Summary

Offset	Name	Access	Description
0x00	SMBUS_STATUS	RO/W1C	Status
0x04	SMBUS_CONTROL	RW	Control
0x08	SMBUS_COMMAND	RW	Command byte
0x0C	SMBUS_ADDRESS	RW	Slave address
0x10	SMBUS_DATA0	RW	Data byte 0
0x14	SMBUS_DATA1	RW	Data byte 1
0x18	SMBUS_BLOCK_CNT	RW	Block count
0x1C	SMBUS_PEC	RO	PEC value
0x20	SMBUS_AUXCTL	RW	Auxiliary control
0x80-0x9F	SMBUS_BLOCK_DATA	RW	Block buffer (32 bytes)

SMBUS_STATUS (0x00)

Bit	Name	Access	Description
0	BUSY	RO	Transaction in progress
1	INTR	W1C	Interrupt pending
2	DEV_ERR	W1C	Device error
3	BUS_ERR	W1C	Bus error
4	FAILED	W1C	Transaction failed
5	ALERT	W1C	SMBus alert received

Bit	Name	Access	Description
6	TIMEOUT	W1C	Timeout occurred
7	PEC_ERR	W1C	PEC error

SMBUS_CONTROL (0x04)

Bit	Name	Access	Description
2:0	CMD_TYPE	RW	Command type
3	START	RW	Start transaction
4	PEC_EN	RW	Enable PEC
5	INTREN	RW	Enable interrupt
6	KILL	RW	Abort transaction
7	RESET	RW	Soft reset

Command Types

CMD_TYPE	Description
000	Quick Command
001	Send Byte
010	Receive Byte
011	Write Byte
100	Read Byte
101	Write Word
110	Read Word
111	Block Read/Write

SMBUS_ADDRESS (0x0C)

Bits	Name	Description
6:0	ADDR	7-bit slave address
7	RW	0=Write, 1=Read

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