AN1713
APPLICATION NOTE

SMBus SLAVE DRIVER FOR ST7 I2C PERIPHERAL

by Microcontroller Division Applications

INTRODUCTION

The goal of this application note is to implement the SMBus slave protocol using ST7 I2C. The software of this application performs all SMBus bus protocols mentioned in SMBus v1.1. The device chosen here is ST72F264 which has multi-master I2C capability.

The program described in this application note is in C language. The driver is compatible with Metrowerks and Cosmic compilers.

1 CHARACTERISTICS

The main characteristics of this SMBus slave driver are:

- SMBus bus protocols: Quick command, Send/ Receive Byte, Write/ Read Byte, Write/ Read Word, Write/ Read Block, Process Call Word/ Block
- Slave SMBus addressing
- CRC-8 Packet Error Checking

For more details please refer to the SMBus specification v1.1.

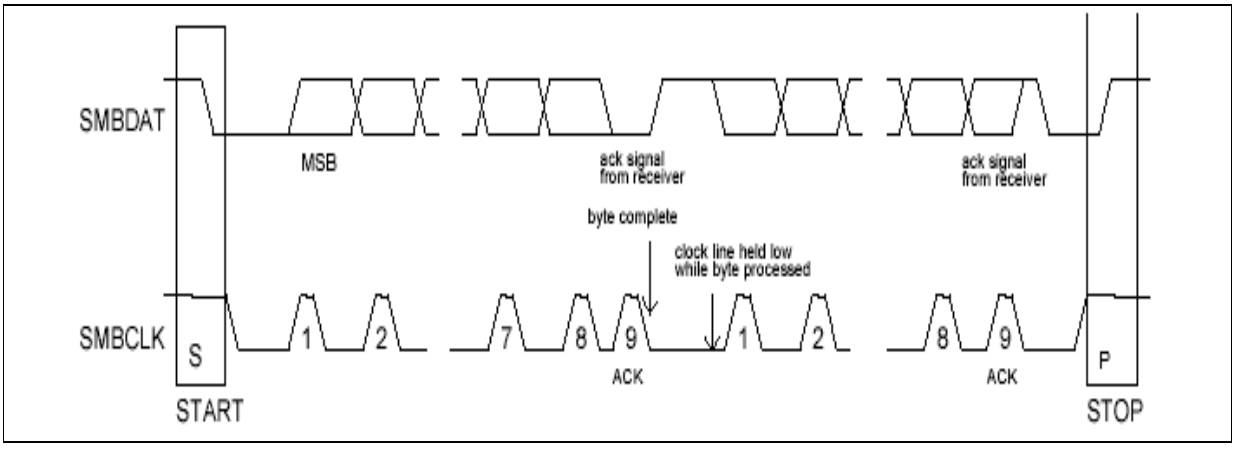
2 SMBus

The System Management Bus (SMBus) is a two-wire interface through which various system component chips can communicate with each other and with the rest of the system. It is based on the principles of operation of I2C.

2.1 Similarities of SMBus and I2C

- 2 wire bus protocol (1 Clk, 1 Data)
- Master-slave communication, Master provides clock
- Multi master capability
- SMBus data format similar to I2C 7-bit addressing format.

Figure 1. Data transfer format



SMBDAT: SMBus data line

SMBCLK: SMBus clock line

2.2 Differences between SMBus and I2C

The following table describes the differences between SMBus and I2C.

Table 1. SMBus vs I2C

SMBus	ST7 I2C
Max. speed 100 kHz	Max. speed 400 kHz
Min. clock speed 10 kHz	No minimum clock speed
35ms clock low time-out	No time-out
Logic levels are fixed	Logic levels are VDD dependent
Different address types (reserved, dynamic etc.)	7-bit, 10-bit and general call slave address types
Different bus protocols (quick command, process call etc.)	No bus protocols
Packet error checking (PEC) implemented	No packet error checking. Only error status indication

2.3 SMBus Application

With System Management Bus, a device can provide manufacturer information, tell the system what its model/part number is, save its state for a suspend event, report different types of errors, accept control parameters, and return its status. SMBus provides a control bus for system and power management related tasks.

Section 3 contains the description of the SMBus driver. These functions available with the driver configure the ST7 I2C peripheral as an SMBus slave and allow it to communicate with any SMBus master. Here all SMBus v1.1 features are supported. This driver can be used in the Smart Battery System and other low-power devices.

For more details about the functions please refer to the SMBS_UM.pdf file.

3 SOFTWARE

The Software and user manual are available in the zip file supplied with this application note. The User manual explains how to use the SMBus slave functions. An example is also provided to help the user to write an application using SMBus functions.

The following lists the source files which can be used for the SMBus slave interface. They are separated into 2 types.

1. User accessible files: Following files can be modified by the user depending on the requirement.
   main.c: Contains the Example program for SMBus slave driver communication for Write Word, Write Block and read word protocols. Here the PEC option is not chosen.
   SMBS_config.h: Select the CPU frequency and Packet Error Checking option

2. Non-user accessible files: These files should not be modified by the user.
   SMBS.c: Contains source code for all the Slave SMBus functions
   SMBS.h: Contains prototypes for all the slave SMBus functions
   SMBS_hr.c: Contains all the I2C hardware registers
   SMBS_hr.h: Declares all the hardware registers as extern

This software is tested only for write word, read word and write block protocols.

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