Application Note AN16001

SystemBase's MIO Bus^{TM} Overview

For Octal-UART, SB16C1058

SystemBase Co., Ltd.

Document Information

Information	Content
Abstract	This document provides a guideline for MIO Bus^{TM} Structure of Octal-UART Controller, SB16C1058 Application Design.
Revision History	V1.0, Edited by Louis Kim @ 7th May 2009

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1. Overview

SB16C1058 UART supports Normal mode in which the chip operates as other common Octal-UARTs and MIO mode which supports SystemBase's MIO mode.

SB16C1058 contains built-in control and memory circuits that allow expansion of up to 32 ports (by 8 ports) by adding MIO Bus^{TM} Interface and Option Registers structure on a common Octal-UART. Through this method, glue-logics are unnecessary when expanding ports. With SystemBase's PCI Bridge Controller SB4002A or Generic CPU, 8, 16, 24 and 32 port serial communication PCI Card Adapter and Device Server applications can be made easily with low cost.

2. MIO Bus^{TM} Main Features

- ■ Expandable up to 32-port Serial Channel without any glue-logics in the MIO Bus^{TM}
- ■ Supports flexible structures of application using the automatic daisy chain installation checking
- ■ Fast Interrupt Service using Interrupt Vector Processing

  Interrupt Vector Processing is based on Option Registers (IMR & IPR)
- ■ S/W Notification of the serial interfaces and UART controller using Option Registers
- ■ Support dedicated MIO chip selections, UARTn and OPTn for the efficient data transfer

# 3. MIO Bus^{TM} Signals

PIN Name	MIO mode	Description
ADDR[7:0]	ADDR[7:0]	MIO mode (nUART) ADDR[7:6] / ADDR[5:3] / ADDR[2:0] 4 octal-uart selection / 8 uart selection / 8 uart internal register selection MIO mode (nOPT) ADDR[5:0] : option registers selection
DATA[7:0]	DATA[7:0]	8-bits Data Bus
nIOR	nIOR	Read Strobe
nIOW	nIOW	Write Strobe
nCS_nUART	nUART	UART Registers Access Enable
nOPT	nOPT	Option Registers Access Enable
nBUF	nBUF	MIO Bus Read Enable for 245 Buffer
IDASY[1:0]	IDASY[1:0]	Input Daisy Chain for 8-port Unit Block
ODASY[1:0]	ODASY[1:0]	Output Daisy Chain for 8-port Unit Block
nPNEN0_OSC0	nPNEN0_OSC0	Input @ Initial Time
nPNEN1_OSC1	nPNEN1_OSC1	OSC[1:0] – UART operational frequency
nPNEN2_INTF0	nPNEN2_INTF0	INTF[1:0] – The kind of Serial Interfaces, RS232/422/485
nPNEN3_INTF1	nPNEN3_INTF1	Output @ Normal : nPNEN[3:0] – Octal-UART installation information

In MIO mode, ADDR[7:0] 8-bits are used. ADDR[7:6] are used to select one of 4 Octal-UARTs, ADDR[5:3] are used to select one of the 8 UART channels and ADDR[2:0] are used to select one of
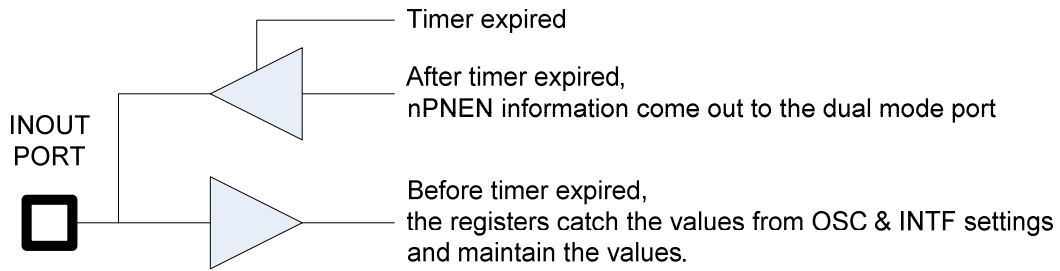
the selected UART channel's internal registers.
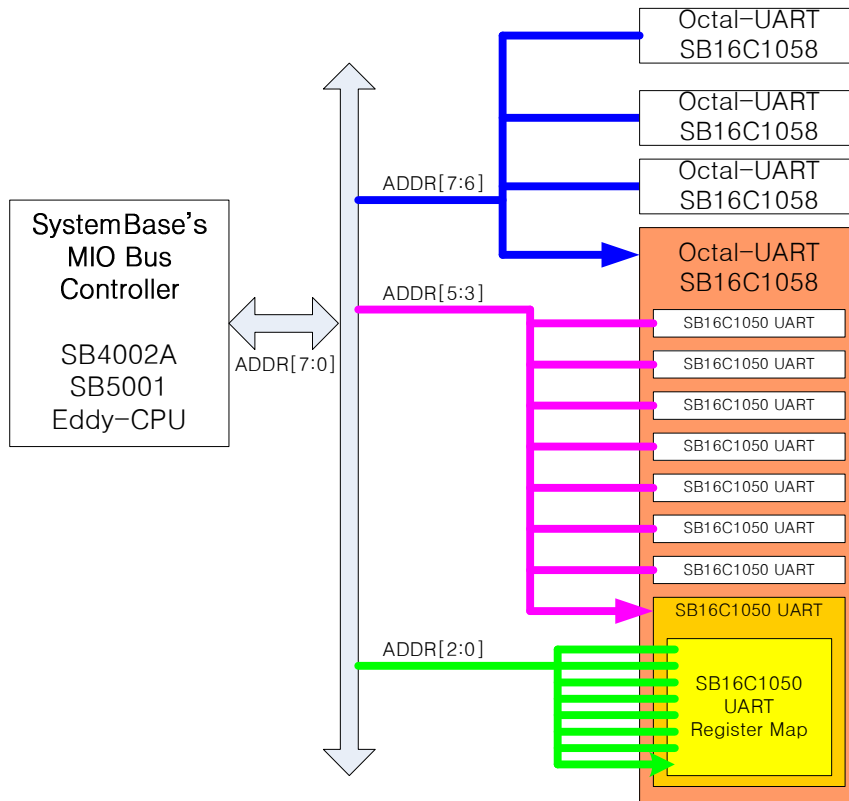
SB16C1058 can expand up to 32 ports with MIO Bus^{TM} by 8 ports. A flexible structure can be made using MIO Bus^{TM}. Using this structure, SB16C1058 can be made into 8, 16, 24 and 32 port. In this structure, Daisy Chain is used to determine how many 8-port units are connected thereby allowing an easier management for software.
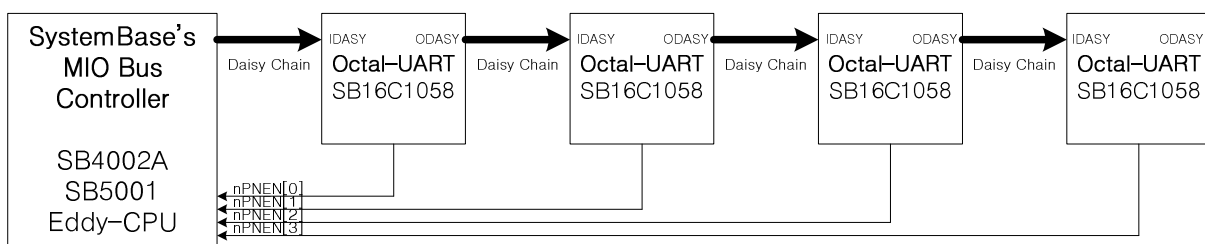
SB16C1058 has 4 Dual Mode Pins which are PNEN0n_OSC0, PNEN1n_OSC1, PNEN2n_INTF0 and PNEN3n_INTF1. These dual mode pins operate in input mode for a certain amount of time (0 ~ 4ms) after the power is inserted and work as output mode after that.

Input pin @ Initial Time	Output pin @ Normal
OSC[1:0] – UART operational frequency INTF[1:0] – The kind of Serial Interfaces	nPNEN[3:0] – Octal-UART installation information

- Timer expired

- After timer expired,
  nPNEN information come out to the dual mode port

- Before timer expired,
  the registers catch the values from OSC & INTF settings
  and maintain the values.

INOUT PORT

4. Octal-UART Applications using MIO Bus^{TM}

16-port serial card and expandable 32-port serial card can be made. 16-port serial card is designed to expand 16 serial ports with two SB16C1058 Octal-UARTs connected to SB4002A by MIO Bus as shown in below diagram. 32-port serial card is designed as shown in below diagram. It is composed of one SB4002A and is capable of expanding by 8 ports using 8-port panels.

When serial communication port is expanded over 8 ports, there is higher chance of the FIFO Buffer getting full in the UART as the result of PCI Bus' performance problem and as data is overwritten, overrun errors are more likely to occur. Since SB16C1058 uses 256-Byte FIFO, overrun errors and the loss of data can be prevented. Therefore, SB16C1058 can be considered the optimum solution for serial cards with multiple ports.

32-port Serial Multiport PCI Card

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