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Samurai-6M/MX

6 Port 10/100 Mbit/s Single Chip Ethernet Switch Controller (ADM6996MX - Green Package Version)

ADM6996M/MX, Version AD

Data Sheet

Revision 1.4

Communication Solutions



Never stop thinking

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ADM6996M/MX, 6 Port 10/100 Mbit/s Single Chip Ethernet Switch Controller (ADM6996MX - Green Package Version)

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Page 81-82	Rev. 1.21: Rearrange 0E _H and 0F _H registers map
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Table of Contents

	Table of Contents	4
	List of Figures	7
	List of Tables	8
1	Product Overview	10
1.1	Samurai-6M/6MX (ADM6996M/MX) Overview	10
1.2	Features	10
1.3	Applications	11
1.4	Block Diagram	12
1.5	Data Lengths	12
2	Interface Description	13
2.1	Pin Diagram	13
2.2	Abbreviations	14
2.3	Pin Description by Function	14
3	Function Description	29
3.1	Switch Functional Description	29
3.1.1	Basic Operation	29
3.1.2	Buffers and Queues	29
3.1.3	Full Duplex Flow Control	29
3.1.4	Half Duplex Flow Control	29
3.1.5	Back-Off Algorithm	29
3.1.6	Inter-Packet Gap (IPG)	30
3.1.7	Trunking Function	30
3.1.8	Illegal Frames	30
3.1.9	Broadcast Storm	30
3.1.10	Bandwidth Control	31
3.1.11	Smart Discard	31
3.1.12	LED Display	32
3.1.12.1	Single Color LED Display	32
3.1.12.2	Dual Color LED Display	34
3.1.12.3	Circuit for Single LED Mode	34
3.1.12.4	Circuit for Dual LED Mode	35
3.1.13	Packet Identification	35
3.1.13.1	Span Packet	36
3.1.13.2	Management Packet	36
3.1.13.3	Cross_VLAN Packet	37
3.1.14	Tagged VLAN or Port VLAN	38
3.1.14.1	VLAN Filters	38
3.1.14.2	Port VLAN	38
3.1.14.3	Tagged VLAN	38
3.1.14.4	VID for Comparison and Carried through Samurai-6M/6MX (ADM6996M/MX)	38
3.1.14.5	Admit Only VLAN-Tagged Packets	39
3.1.14.6	VID Check	39
3.1.14.7	FID and VLAN Boundary	39
3.1.14.8	Ingress Filter	40
3.1.14.9	VLAN Violation	40
3.1.14.10	TXTAG Carried through Samurai-6M/6MX (ADM6996M/MX)	40
3.1.14.11	Tagged Member Carried through Samurai-6M/6MX (ADM6996M/MX)	40

3.1.14.12	Egress Tag Rule	41
3.1.14.13	Tagged PRI Carried through Samurai-6M/6MX (ADM6996M/MX)	42
3.1.14.14	CFI Carried through Samurai-6M/6MX (ADM6996M/MX)	43
3.1.14.15	Egress TAG	43
3.1.15	Priority Queue	43
3.1.15.1	System PRI	44
3.1.15.2	Queue Assigned	44
3.1.15.3	Configure Samurai QoS Function	46
3.1.16	Address Learning	46
3.1.16.1	Dynamic Learning	47
3.1.16.2	Manual Learning	47
3.1.16.3	Learning Table	47
3.1.16.3.1	Entry Format in the Learning Table	47
3.1.16.3.2	The Registers Accessing the Learning Table	48
3.1.16.3.3	Rules to Access the Learning Table	50
3.1.16.3.4	Example	51
3.1.17	Hardware Based IGMP Snooping	51
3.1.17.1	Entry Format of IGMP Membership Table	52
3.1.17.2	The Registers Accessing the IGMP Membership Table	52
3.1.17.3	IGMP Snooping Introduction	53
3.1.18	Address Aging	56
3.1.19	Source Violation	56
3.1.20	Packet Forwarding	58
3.1.20.1	Control Table	58
3.1.20.2	Default Output Ports	58
3.1.20.3	Forwarding Algorithm	58
3.1.21	Special TAG	60
3.1.21.1	Special Tag for the Receive	60
3.1.21.2	Special Tag for the Transmit	62
3.2	Port4 and Port5 MII Connection	64
3.3	10/100M PHY Block	70
3.3.1	Auto Negotiation	71
3.3.2	Speed/Duplex Configuration	71
3.4	Hardware, EEPROM and SMI Interface for Configuration	72
3.4.1	Hardware Setting	72
3.4.2	EEPROM Interface	73
3.4.3	SMI Interface	77
3.5	The Hardware Difference between ADM6996M/MX and ADM6996F	79
4	Registers Description	80
4.1	EEPROM Basic Registers	90
4.2	EEPROM Extended Registers	139
4.3	Counter and Switch Status Registers	161
4.4	PHY Registers	186
5	Electrical Specification	198
5.1	TX/FX Interface	198
5.1.1	TP Interface	198
5.1.2	FX Interface	199
5.2	DC Characterization	199
5.3	AC Characterization	201
5.3.1	XTAL/OSC Timing	201

Table of Contents

5.3.2	Power On Reset	202
5.3.3	EEPROM Interface Timing	202
5.3.4	10Base-TX MII Input Timing	203
5.3.5	10Base-TX MII Output Timing	205
5.3.6	100Base-TX MII Input Timing	206
5.3.7	100Base-TX MII Output Timing	207
5.3.8	RMII REFCLK Input Timing	207
5.3.9	RMII REFCLK Output Timing	208
5.3.10	Reduce MII Timing	209
5.3.11	GPSI (7-wire) Input Timing	210
5.3.12	GPSI (7-wire) Output Timing	211
5.3.13	SDC/SDIO Timing	211
5.3.14	MDC/MDIO Timing	212
6	Package Outlines	213
6.1	Package Information	213
	Terminology	214

List of Figures

Figure 1	Samurai-6M/6MX (ADM6996M/MX) Block Diagram.	12
Figure 2	4 TP/FX PORT + 2 MII PORT 128 Pin Diagram.	13
Figure 3	Circuit for Single Color LED Mode	34
Figure 4	Circuit for Dual Color LED Mode	35
Figure 5	To Configure Samurai QoS Function	46
Figure 6	ADM6996M/MX to CPU with single MII Connection.	64
Figure 7	The configurations of the implementation by ADM6996M/MX Special TAG functions.	65
Figure 8	Software Operation.	66
Figure 9	ADM6996M/MX to CPU with dual MII Connection	68
Figure 10	100M Full duplex MAC to MAC MII Connection	69
Figure 11	PCS to MAC MII connection.	70
Figure 12	Interconnection between Samurai-6M/6MX (ADM6996M/MX), EEPROM and CPU	72
Figure 13	The Power-On-Sequence of Samurai.	75
Figure 14	Timing Diagram of RC, EECS and EESK (with correct signature EEPROM).	76
Figure 15	Timing Diagram of RC, EECS and EESK (without EEPROM)	77
Figure 16	SMI Interface	78
Figure 17	TP Interface	198
Figure 18	FX Interface	199
Figure 19	XTAL/OSC Timing	201
Figure 20	Power On Reset Timing	202
Figure 21	EEPROM Interface Timing	203
Figure 22	10Base-TX MII Input Timing.	204
Figure 23	10Base-TX MII Output Timing	205
Figure 24	100Base-TX MII Input Timing.	206
Figure 25	100Base-TX MII Output Timing	207
Figure 26	RMII REFCLK Input Timing	207
Figure 27	RMII REFCLK Output Timing	208
Figure 28	Reduce MII Timing (1 of 2)	209
Figure 29	Reduce MII Timing (2 of 2)	209
Figure 30	GPSI (7-wire) Input Timing	210
Figure 31	GPSI (7-wire) Output Timing	211
Figure 32	SDC/SDIO Timing.	211
Figure 33	MDC/MDIO Timing	212
Figure 34	P-PQFP-128 Outside Dimension	213

List of Tables

Table 1	Abbreviations for Pin Type	14
Table 2	Abbreviations for Buffer Type	14
Table 3	IO Signals	15
Table 4	Bandwidth Control Timer Select	31
Table 5	Smart Discard	31
Table 6	Discard Ratio	31
Table 7	Single Color LED Display	32
Table 8	Dual Color LED Display	34
Table 9	Packet Identification	35
Table 10	Packet Identification Groups	36
Table 11	Span Packet	36
Table 12	Management Packet	37
Table 13	Cross_VLAN Packet	37
Table 14	VLAN Filters	38
Table 15	VID Comparison	39
Table 16	FID Search Algorithm	39
Table 17	VLAN Boundary Search Algorithm	39
Table 18	TXTAG Carried through Samurai-6M/6MX (ADM6996M/MX)	40
Table 19	Egress Tag Result	41
Table 20	Tagged PRI Carried	42
Table 21	CFI Carried	43
Table 22	Priority Queue	44
Table 23	Queue Assigned	44
Table 24	Control Register Description for Accessing the Address Table	49
Table 25	Description for Command and Access Control	49
Table 26	Status Register Description	49
Table 27	Description for the Status Register	49
Table 28	Control Register Description for Accessing the IGMP Membership Table	52
Table 29	Description for Command and Access Control	52
Table 30	Entry Format of IGMP Membership Table	53
Table 31	IPV4/IGMP/General Query	53
Table 32	IPV4/IGMP/V1 Report	54
Table 33	IPV4/IGMP/General Query	54
Table 34	IPV4/IGMP/V1 Report	54
Table 35	IPV4/IGMP/V2 Report	54
Table 36	IPV4/IGMP/V2 Leave	54
Table 37	IPV4/IGMP/Group-Specific Query	55
Table 38	IGMP Membership Table	56
Table 39	Forwarding Algorithm	58
Table 40	Special Tag for the Receive	60
Table 41	Option for Special Tag Transmit	62
Table 42	Special Tag for the Transmit	63
Table 43	Special Tag	64
Table 44	Set WAN/LAN Group	65
Table 45	Packets Identified by ADM6996M/MX	66
Table 46	Speed/Duplex Configuration	72
Table 47	Hardware Setting	73
Table 48	(D) The Pin Type of EECS, EESK, EDI and EDO during the Operation	78
Table 49	Memory Map	79

List of Tables

Table 50	Pin Description(QFP128)	79
Table 51	Registers Address Space	80
Table 52	Registers Overview	80
Table 53	Register Access Types	89
Table 54	Registers Clock Domains	89
Table 55	P1~P5 Basic Control Registers	92
Table 56	Px_EC Registers	93
Table 57	PxSO Registers	107
Table 58	VFxL Registers	140
Table 59	VFxH Registers	141
Table 60	TFx Registers	142
Table 61	PFx Registers	143
Table 62	RAx Registers	152
Table 63	TUFx Registers	153
Table 64	CLx Registers	166
Table 65	CHx Registers	167
Table 66	PHY_Cx Registers	188
Table 67	PHY_Sx Registers	190
Table 68	PHY_Ix_A Registers	191
Table 69	PHY_Ix_B Registers	192
Table 70	ANAPx Registers	193
Table 71	ANLPAx Registers	194
Table 72	ANEx Registers	195
Table 73	NPTx Registers	196
Table 74	LPNPx Registers	197
Table 75	Power Consumption	199
Table 76	Absolute Maximum Ratings	200
Table 77	Recommended Operating Conditions	200
Table 78	DC Electrical Characteristics for 3.3 V Operation	201
Table 79	XTAL/OSC Timing	202
Table 80	Power On Reset Timing	202
Table 81	EEPROM Interface Timing	203
Table 82	10Base-TX MII Input Timing	204
Table 83	10-Base-TX MII Output Timing	205
Table 84	100Base-TX MII Input Timing	206
Table 85	100Base-TX MII Output Timing	207
Table 86	RMII REFCLK Input Timing	208
Table 87	RMII REFCLK Output Timing	208
Table 88	Reduce MII Timing	209
Table 89	GPSI (7-wire) Input Timing	210
Table 90	GPSI (7-wire) Output Timing	211
Table 91	SDC/SDIO Timing	212
Table 92	MDC/MDIO Timing	212

1 Product Overview

1.1 Samurai-6M/6MX (ADM6996M/MX) Overview

The Samurai-6M/6MX (ADM6996M/MX) is a high performance, low cost, highly integrated (Controller, PHY and Memory) four 10M/100M auto-detect Half/Full duplex switch ports with TX/FX interfaces and two MII port with one MII supporting GPSI/RMII. The Samurai-6M/6MX (ADM6996M/MX) is intended for applications such as stand alone bridges for the low cost SOHO markets such as 5-port switches and router applications. The Samurai-6MX (ADM6996MX) is the environmentally friendly “green” package version.

The Samurai-6M/6MX (ADM6996M/MX) provides functions such as: 802.1p(Q.O.S.), 802.1Q(VLAN), Port MAC address locking, management, port status, TP auto-MDIX, 25M crystal & extra MII port functions to meet customer requests on switch demand.

The Samurai-6M/6MX (ADM6996M/MX) also supports back pressure in Half-Duplex mode and the 802.3x Flow Control Pause packet in Full-Duplex mode to prevent packet loss when buffers are full. When Back Pressure is enabled, and there is no receive buffer available for the incoming packet, the Samurai-6M/6MX (ADM6996M/MX) will issue a JAM pattern on the receiving port in Half Duplex mode and issue the 802.3x Pause packet back to the receiving end in Full Duplex mode.

The built-in SRAM used for the packet buffer is divided into 256 bytes per block to achieve the optimized memory utilization through complicated link lists on packets with various lengths.

The Samurai-6M/6MX (ADM6996M/MX) also supports priority features using Port-Based, VLAN and IP TOS field checking. Users can easily set different priority modes in individual ports, through a small low-cost micro controller when initializing or configuring on-the-fly. Each output port supports four queues in the way of fixed N: 1 fairness queuing to fit the bandwidth demand on various types of packets such as Voice, Video and Data. 802.1Q, Tag/Untag, and up to 16 groups of VLAN are also supported.

An intelligent address recognition algorithm allows Samurai-6M/6MX (ADM6996M/MX) to recognize up to 2K different MAC addresses and enables filtering and forwarding at full wire speed.

Port MAC address Locking function is also supported by Samurai-6M/6MX (ADM6996M/MX) to use on building Internet access to prevent multiple users sharing one port.

1.2 Features

- Supports four 10M/100M auto-detect Half/Full duplex switch ports with TX/FX interfaces and two MII port with one MII supporting GPSI/RMII
- Supports four 10M/100M auto-detect Half/Full duplex switch ports with TX/FX interfaces, one MII port (for CPU LAN MII) and one isolated PHY(for CPU WAN MII).Five 10M/100M auto-detect Half/Full duplex switch ports with **TX/FX** interfaces
- 2K MAC address tables with 4-ways associative hash algorithm
- 6KX64 bits packet buffers are divided into 192 blocks of 256 bytes each
- Four queues for QoS
- Priority features by Port-Based, 802.1p, IP TOS, Diffserv, TCP/UDP Port Application-Based of packets
- Store & Forward architecture and performs forwarding and filtering at non-blocking full wire speed
- Single/Dual color LED mode with Power On auto diagnostic. Collision/Duplex LED can be separated using register setting
- 802.3x Flow Control pause packet for Full Duplex
- Back Pressure function for Half Duplex operation
- Supports packet lengths up to 1518/1522 (Default)/1536/1784 bytes in maximum
- Scalable Per Port Bandwidth Control (Both Ingress and Egress).
- Broadcast/Multicast Storm Suppression

- 802.1Q VLAN. Up to 16 VLAN groups are implemented by full 12 bits VID matching
- MAC clone function to enable multiple WAN application
- TP interface Auto MDIX function for auto TX/RX swap by strapping-pin.
- Interrupt pin, Interrupt Register and Interrupt Mask Register. Programmable interrupt polarity (Default active low)
- Easy Management 32-bit smart counter for per port RX/TX byte/packet count, 16-bit smart counter for per port ERROR count and Collision count
- Supports 32 hardware IGMP Table (Multicast Table)
- MAC Address Table is accessible
- Supports 802.1x security function
- Supports Spanning Tree Protocol
- Supports internal counter/PHY status output for management system
- 25M Crystal
- 128 QFP package with 0.18 μm technology. 1.8 V/3.3 V power supply.
- 1.0 W low power consumption.

1.3 Applications

Samurai-6M/6MX (ADM6996M/MX):

- SOHO 5-port switch
- 5-port switch + Router with 2 MII CPU interface

1.4 Block Diagram

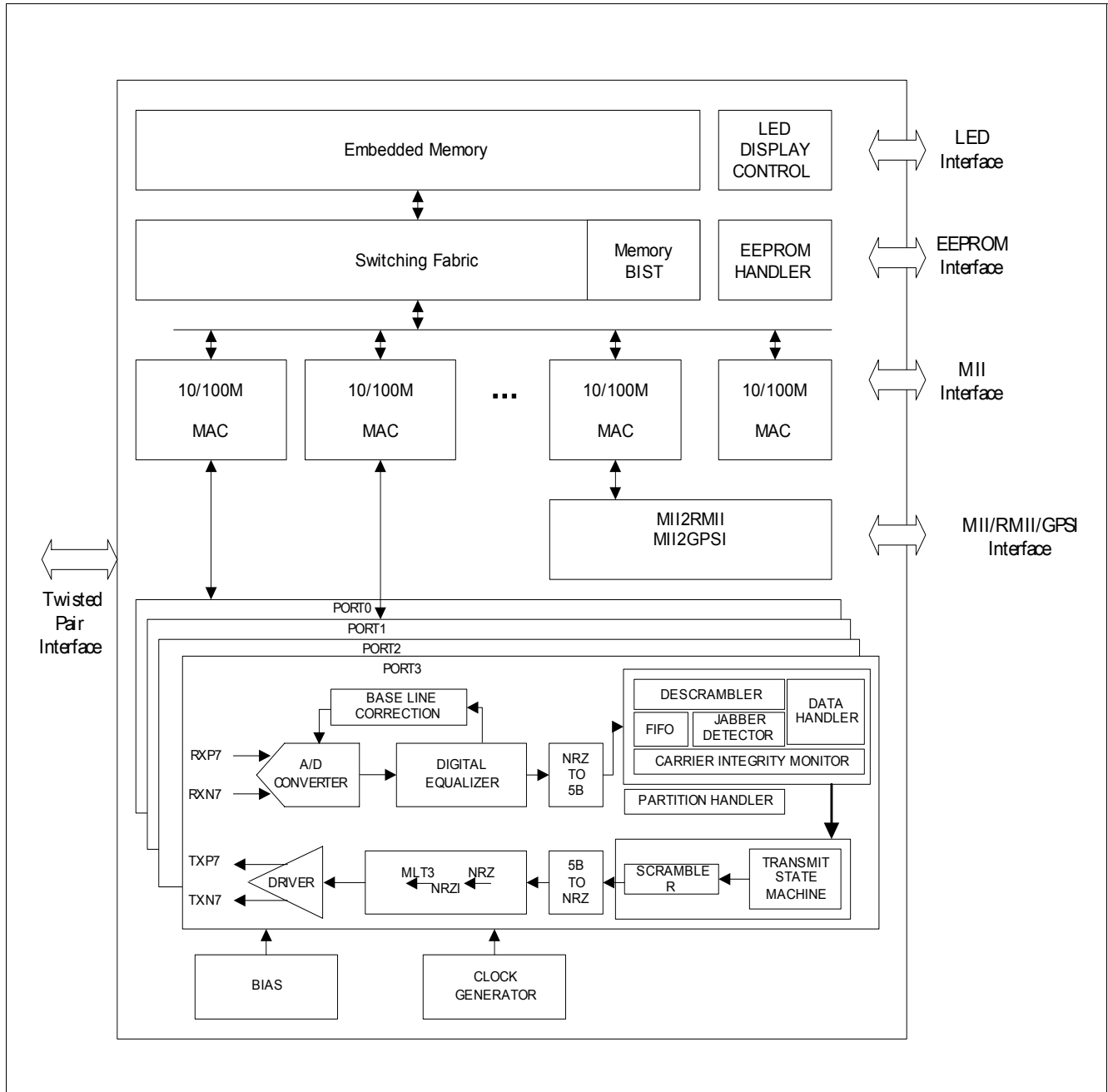


Figure 1 Samurai-6M/6MX (ADM6996M/MX) Block Diagram

1.5 Data Lengths

qword: 64 bits

dword: 32 bits

word: 16 bits

byte: 8 bits

nibble: 4 bits

2 Interface Description

This chapter describes the interface descriptions for the Samurai-6M/6MX (ADM6996M/MX)

- Pin Diagram
- Abbreviations
- Pin Description by Function

2.1 Pin Diagram

Figure 2 shows the pin diagram for the Samurai-6M/6MX (ADM6996M/MX).

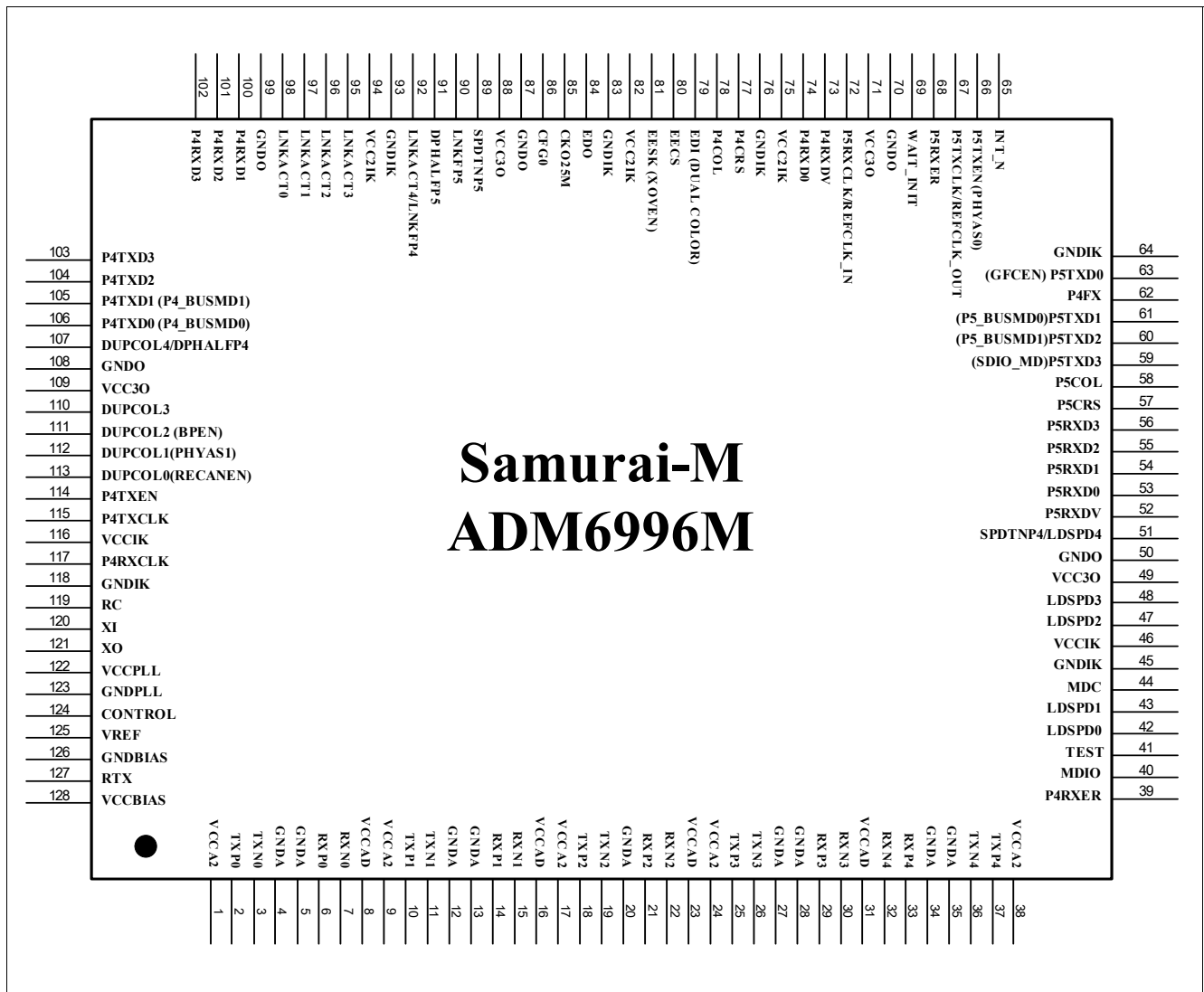


Figure 2 4 TP/FX PORT + 2 MII PORT 128 Pin Diagram

2.2 Abbreviations

Standard abbreviations for I/O tables:

Table 1 Abbreviations for Pin Type

Abbreviations	Description
I	Standard input-only pin. Digital levels.
O	Output. Digital levels.
I/O	I/O is a bidirectional input/output signal.
AI	Input. Analog levels.
AO	Output. Analog levels.
AI/O	Input or Output. Analog levels.
PWR	Power
GND	Ground
MCL	Must be connected to Low (JEDEC Standard)
MCH	Must be connected to High (JEDEC Standard)
NU	Not Usable (JEDEC Standard)
NC	Not Connected (JEDEC Standard)

Table 2 Abbreviations for Buffer Type

Abbreviations	Description
Z	High impedance
PU	Pull up, 10 k Ω
PD	Pull down, 10 k Ω
TS	Tristate capability: The corresponding pin has 3 operational states: Low, high and high-impedance.
OD	Open Drain. The corresponding pin has 2 operational states, active low and tristate, and allows multiple devices to share as a wire-OR. An external pull-up is required to sustain the inactive state until another agent drives it, and must be provided by the central resource.
OC	Open Collector
PP	Push-Pull. The corresponding pin has 2 operational states: Active-low and active-high (identical to output with no type attribute).
OD/PP	Open-Drain or Push-Pull. The corresponding pin can be configured either as an output with the OD attribute or as an output with the PP attribute.
ST	Schmitt-Trigger characteristics
TTL	TTL characteristics

2.3 Pin Description by Function

Samurai-6M/6MX (ADM6996M/MX) pins are categorized into one of the following groups:

- Network Media Connection
- Port 4 MII Interface
- Port 5 MII Interface
- LED Interface
- EEPROM Interface
- Power/Ground, 48 pins
- Miscellaneous

Note: [Table 1](#) can be used for reference.

Table 3 IO Signals

Ball No.	Name	Pin Type	Buffer Type	Function
Network Media Connection				
33	RXP_4	AI/O	ANA	Receive Pair Differential data is received on this pin.
29	RXP_3			
21	RXP_2			
14	RXP_1			
6	RXP_0			
32	RXN_4	AI/O	ANA	
30	RXN_3			
22	RXN_2			
15	RXN_1			
7	RXN_0			
37	TXP_4	AI/O	ANA	Transmit Pair Differential data is transmitted on this pin.
25	TXP_3			
18	TXP_2			
10	TXP_1			
2	TXP_0			
36	TXN_4	AI/O	ANA	
26	TXN_3			
19	TXN_2			
11	TXN_1			
3	TXN_0			
Port 4 MII Interface				
74	MMII_P4RXD0	I	PD, LVTTTL	Port 4 Receive Data Bit 0 in MAC MII Mode In MAC MII mode, the bit is the LSB of MII receive data, synchronous to the rising edge of MMII_P4RXCLK.
	PMII_P4RXD0	O	8 mA, PD, LVTTTL	Port 4 Receive Data Bit 0 in PCS MII Mode When port 4 is operating in PCS MII mode, the bit is the LSB of MII receive data output and synchronous to the rising edge of PMII_P4RXCLK.
102	MMII_P4RXD3	I	PD, LVTTTL	Port 4 Receive Data Bit 3 in MAC MII Mode In MAC MII mode, this bit is bit[3] of MII receive data, and synchronous to the rising edge of MMII_P4RXCLK.
	PMII_P4RXD3	O	8 mA, PD, LVTTTL	Port 4 Receive Data Bit 3 in PCS MII Mode When port 4 is operating in PCS MII mode, this pin is bit[3] of MII receive data output and synchronous to the rising edge of PMII_P4RXCLK.

Table 3 IO Signals (cont'd)

Ball No.	Name	Pin Type	Buffer Type	Function
101	MMII_P4RXD2	I	PD, LVTTTL	Port 4 Receive Data Bit 2 in MAC MII Mode In MAC MII mode, this pin is bit[2] of MII receive data, and synchronous to the rising edge of MMII_P4RXCLK.
	PMII_P4RXD2	O	8 mA, PD, LVTTTL	Port 4 Receive Data Bit 2 in PCS MII Mode When port 4 is operating in PCS MII mode, this pin is bit[2] of MII receive data output and synchronous to the rising edge of PMII_P4RXCLK.
100	MMII_P4RXD1	I	PD, LVTTTL	Port 4 Receive Data Bit 1 in MAC MII Mode In MAC MII mode, this pin is bit[1] of MII receive data, and synchronous to the rising edge of MMII_P4RXCLK.
	PMII_P4RXD1	O	8 mA, PD, LVTTTL	Port 4 Receive Data Bit 1 in PCS MII Mode When port 4 is operating in PCS MII mode, this pin is bit[1] of MII receive data output and synchronous to the rising edge of PMII_P4RXCLK.
73	MMII_P4RXDV	I	PD, LVTTTL	Port 4 Receive Data Valid in MAC MII Mode Active high to indicate that the data on MMII_P4RXD[3:0] is valid. Synchronous to the rising edge of MMII_P4RXCLK.
	PMII_P4RXDV	O	8 mA, PD, LVTTTL	Port 4 Receive Data Valid in PCS MII Mode When port 4 is operating in PCS MII mode, this pin is an active high output signal to indicate PMII_P4RXD[3:0] is valid. Synchronous to the rising edge of PMII_P4RXCLK.
39	MII_P4RXER	I	PD, LVTTTL	Port 4 Receive Error in MAC MII Mode Active high to indicate that there is symbol error on the MII_P4RXD[3:0]. Only valid in 100M operation.
77	MMII_P4CRS	I	PD, LVTTTL	Port 4 Carrier Sense in MAC MII Mode In full duplex mode, MMII_P4CRS reflects the receive carrier sense situation on medium only; In Half Duplex, CRS will be high both in receive and transmit condition.
	PMII_P4CRS	O	8 mA, PD, LVTTTL	Port 4 Carrier Sense in PCS MII Mode When port 4 is operating in PCS MII mode, this pin is used to output Carrier Sense status.
78	MMII_P4COL	I	PD, LVTTTL	Port 4 Collision input in MAC MII Mode Active high to indicate that there is collision on the medium. Stay low in full duplex operation.
	PMII_P4COL	O	8 mA, PD, LVTTTL	Port 4 Collision output in PCS MII Mode When port 4 is operating in PCS MII mode, this pin is used to output collision status.

Table 3 IO Signals (cont'd)

Ball No.	Name	Pin Type	Buffer Type	Function
106	P4_BUSMD0	I	PD, LVTTTL	Port 4 Bus Type Configuration 0 Value on this pin will be latched by Samurai-6M/6MX (ADM6996M/MX) at the rising edge of RESETL(RC) for Port 4 Configuration Bit 0. Combined with CFG0 and P4_BUSMD1 , Samurai-6M/6MX (ADM6996M/MX) provides 4 bus type for port 4. See CFG0 pin description for more details. <i>Note: Power On Setting</i>
	MMII_P4TXD0	O	8 mA, PD, LVTTTL	Port 4 Transmit Data Bit 0 in MAC MII Mode The LSB bit of MAC MII Transmit data of port 4. Synchronous to the rising edge of MMII_P4TXCLK.
	PMII_P4TXD0	I	PD, LVTTTL	Port 4 Transmit Data Bit 0 in PCS MII Mode When port 4 is operating in PCS MII mode, this pin is the LSB of MII transmit data input and synchronous to the rising edge of PMII_P4TXCLK.
105	P4_BUSMD1	I	PD, LVTTTL	Port 4 Bus Type Configuration 1 Value on this pin will be latched by Samurai-6M/6MX (ADM6996M/MX) at the rising edge of RESETL(RC) for Port 4 Configuration Bit 1. Combined with CFG0 and P4_BUSMD0 , Samurai-6M/6MX (ADM6996M/MX) provides 4 bus type for port 4. See CFG0 for more details. <i>Note: Power On Setting</i>
	MMII_P4TXD1	O	8 mA, PD, LVTTTL	Port 4 Transmit Data Bit 1 in MAC MII Mode The bit[1] of MAC MII Transmit data of port 4. Synchronous to the rising edge of MMII_P4TXCLK.
	PMII_P4TXD1	I	PD, LVTTTL	Port 4 Transmit Data Bit 1 in PCS MII Mode When port 4 is operating in PCS MII mode, this pin is bit[1] of MII transmit data input and synchronous to the rising edge of PMII_P4TXCLK.
103	MMII_P4TXD3	O	8 mA, PD, LVTTTL	Port 4 Transmit Data Bit 3 in MAC MII Mode The bit[3] of MAC MII Transmit data of port 4. Synchronous to the rising edge of MMII_P4TXCLK.
	PMII_P4TXD3	I	PD, LVTTTL	Port 4 Transmit Data Bit 3 in PCS MII Mode When port 4 is operating in PCS MII mode, this pin is bit[3] of MII transmit data input and synchronous to the rising edge of PMII_P4TXCLK.
104	MMII_P4TXD2	O	8 mA, PD, LVTTTL	Port 4 Transmit Data Bit 2 in MAC MII Mode The bit[2] of MAC MII Transmit data of port 4. Synchronous to the rising edge of MMII_P4TXCLK.
	PMII_P4TXD2	I	PD, LVTTTL	Port 4 Transmit Data Bit 2 in PCS MII Mode When port 4 is operating in PCS MII mode, this pin is bit[2] of MII transmit data input and synchronous to the rising edge of PMII_P4TXCLK.

Table 3 IO Signals (cont'd)

Ball No.	Name	Pin Type	Buffer Type	Function
114	MMII_P4TXEN	O	8 mA, PD, LVTTTL	Port 4 Transmit Enable in MAC MII Mode Output by Samurai-6M/6MX (ADM6996M/MX) at the rising edge of MMII_P4TXCLK when Samurai-6M/6MX (ADM6996M/MX) is programmed to MAC Type MII.
	PMII_P4TXEN	I	PD, LVTTTL	Port 4 Transmit Enable in PCS MII Mode It is the MII Transmit Enable input to Samurai-6M/6MX (ADM6996M/MX) when programmed to PCS Type MII.
117	MMII_P4RXCLK	I	PD, LVTTTL	Port 4 Receive Clock in MAC MII Mode 25MHz Free Running clock in 100M Mode and 2.5 MHz free running clock in 10M Mode. MMII_P4RXDV and MMII_P4RXD[3:0] should be synchronous to the rising edge of this clock
	PMII_P4RXCLK	O	8 mA, PD, LVTTTL	Port 4 Receive Clock in PCS MII Mode 25MHz Free Running clock in 100M Mode and 2.5 MHz free running clock in 10M Mode. PMII_P4RXDV and PMII_P4RXD[3:0] should be synchronous to the rising edge of this clock
115	MMII_P4TXCLK	I	PD, LVTTTL	Port 4 Transmit Clock in MAC MII Mode 25MHz Free Running clock in 100M Mode and 2.5 MHz free running clock in 10M Mode. MMII_P4TXEN and MMII_P4TXD[3:0] should be synchronous to the rising edge of this clock
	PMII_P4TXCLK	O	8 mA, PD, LVTTTL	Port 4 Transmit Clock in PCS MII Mode 25MHz Free Running clock in 100M Mode and 2.5 MHz free running clock in 10M Mode. PMII_P4TXEN and PMII_P4TXD[3:0] should be synchronous to the rising edge of this clock
62	P4FX	I	PD, LVTTTL	Port 4 Fiber Selection for PCS MII/PHY mode During power on reset, value will be latched by Samurai-6M/6MX (ADM6996M/MX) at the rising edge of RESETL(RC) as port 4 Fiber select. 0 _B Twisted Pair Mode 1 _B Fiber Mode

Table 3 IO Signals (cont'd)

Ball No.	Name	Pin Type	Buffer Type	Function
Port 5 MII Interface				
63	GFCEN	I	PU, LVTTTL	<p>Global Flow Control Enable Value on this pin will be latched by Samurai-6M/6MX (ADM6996M/MX) at the rising edge of RESETL(RC) as Flow control enable.</p> <p><i>Note: Power On Setting</i></p> <p>0_B Flow Control Capability is depended upon the register setting in corresponding port's Basic Control Register</p> <p>1_B All ports flow control capability is enabled</p>
	MII_P5TXD0	O	4 mA, PU, LVTTTL	<p>Port 5 Transmit Data Bit 0 in MII Mode The LSB bit of MII Transmit data of port 5. Synchronous to the rising edge of MII_P5TXCLK.</p>
	GPSI_P5TXD	O	4 mA, PU, LVTTTL	<p>Port 5 Transmit Data in GPSI Mode When port 5 is operating in GPSI mode, this pin acts as GPSI Transmit Data. Synchronous to the rising edge of GPSI_P5TXCLK.</p>
	RMII_P5TXD0	O	4 mA, PU, LVTTTL	<p>Port 5 Transmit Data Bit 0 in RMII Mode When port 5 is operating in RMII mode, this pin acts as RMII Transmit Data Bit[0]. Synchronous to the rising edge of REFCLK_IN.</p>
61	P5_BUSMD0	I	PD, LVTTTL	<p>Port 5 Bus Mode Selection Bit 0 Value on this pin will be latched by Samurai-6M/6MX (ADM6996M/MX) at the rising edge of RESETL(RC) as port 5 bus mode selection bit 0. Combined with P5_BUSMD1, Samurai-6M/6MX (ADM6996M/MX) provides 3 bus types for port 5. P5_BUSMD[1:0], Interface</p> <p><i>Note: Power On Setting</i></p> <p>00_B MII</p> <p>01_B GPSI</p> <p>10_B RMII</p> <p>11_B Reserved and not allowed</p>
	MII_P5TXD1	O	4 mA, PD, LVTTTL	<p>Port 5 Transmit Data Bit 1 in MII Mode The bit[1] of MII Transmit data of port 5. Synchronous to the rising edge of MII_P5TXCLK.</p>
	RMII_P5TXD1	O	4 mA, PD, LVTTTL	<p>Port 5 Transmit Data Bit 1 in RMII Mode The bit[1] of RMII Transmit data of port 5. Synchronous to the rising edge of REFCLK_IN.</p>

Table 3 IO Signals (cont'd)

Ball No.	Name	Pin Type	Buffer Type	Function
60	P5_BUSMD1	I	PD, LVTTTL	Port 5 Bus Mode Selection Bit 1 Value on this pin will be latched by Samurai-6M/6MX (ADM6996M/MX) at the rising edge of RESETL(RC) as port 5 bus mode selection bit 1. See P5_BUSMD0 for more details. <i>Note: Power On Setting</i>
	MII_P5TXD2	O	4 mA, PD, LVTTTL	Port 5 Transmit Data Bit 2 in MII Mode The bit[2] of MII Transmit data of port 5. Synchronous to the rising edge of MII_P5TXCLK.
59	SDIO_MD	I	PD, LVTTTL	SDC/SDIO Mode Selection Value on this pin will be latched by Samurai-6M/6MX (ADM6996M/MX) at the rising edge of RESETL(RC) as SDC/SDIO control signal which is used to select 16 bit mode. <i>Note: Power On Setting</i> 0_B 16 bits mode, MDC/MDIO timing compatible
	MII_P5TXD3	O	4 mA, PD, LVTTTL	Port 5 Transmit Data Bit 3 in MII Mode The MSB bit of MII Transmit data of port 5. Synchronous to the rising edge of MII_P5TXCLK.
66	PHYAS0	I	PD, LVTTTL	PHY Address MSB Bit 0 During power on reset, value will be latched by Samurai-6M/6MX (ADM6996M/MX) at the rising edge of RESETL(RC) as PHY start address select. PHYAS[1:0] = 00_B and PHY address starts from 01000_B . <i>Note: Power On Setting</i>
	MII_P5TXEN	O	8 mA, PD, LVTTTL	Port 5 Transmit Enable TXEN in MII Mode Active high to indicate that the data on MII_P5TXD[3:0] is valid. Synchronous to the rising edge of MII_P5TXCLK.
	GPSI_P5TXEN	O	8 mA, PD, LVTTTL	Port 5 Transmit Enable TXEN in GPSI Mode Active high to indicate that the data on GPSI_P5TXD is valid. Synchronous to the rising edge of GPSI_P5TXCLK.
	RMII_P5TXEN	O	8 mA, PD, LVTTTL	Port 5 Transmit Enable TXEN in RMII Mode Active high to indicate that the data on RMII_P5TXD[1:0] is valid. Synchronous to the rising edge of REFCLK_IN.
53	MII_P5RXD0	I	PD, LVTTTL	Port 5 Receive Data Bit 0 in MII Mode In MII mode, the bit is the LSB of MII receive data, synchronous to the rising edge of MII_P5RXCLK.
	GPSI_P5RXD	I	PD, LVTTTL	Port 5 Receive Data in GPSI Mode In GPSI Mode, this acts as Receive Data Input, synchronous to the rising edge of GPSI_P5RXCLK.
	RMII_P5RXD0	I	PD, LVTTTL	Port 5 Receive Data Bit 0 in RMII Mode In RMII mode, the bit is the LSB of RMII receive data, synchronous to the rising edge of REFCLK_IN.

Table 3 IO Signals (cont'd)

Ball No.	Name	Pin Type	Buffer Type	Function
54	MII_P5RXD1	I	PD, LVTTTL	Port 5 Receive Data Bit 1 in MII Mode In MII mode, the bit is the bit[1] of MII receive data, synchronous to the rising edge of MII_P5RXCLK.
	RMII_P5RXD1	I	PD, LVTTTL	Port 5 Receive Data Bit 1 in RMII Mode In RMII mode, the bit is the MSB of RMII receive data, synchronous to the rising edge of REFCLK_IN.
55	MII_P5RXD2	I	PD, LVTTTL	Port 5 Receive Data Bit 2 in MII Mode In MII mode, the bit is the bit[2] of MII receive data. Synchronous to the rising edge of MII_P5RXCLK.
56	MII_P5RXD3	I	PD, LVTTTL	Port 5 Receive Data Bit 3 in MII Mode In MII mode, the bit is the bit[3] of MII receive data. Synchronous to the rising edge of MII_P5RXCLK.
52	MII_P5RXDV	I	PD, LVTTTL	Port 5 Receive Data Valid in MII Mode Active high to indicate that the data on MII_P5RXD[3:0] is valid. Synchronous to the rising edge of MII_P5RXCLK.
	RMII_P5CRSDV	I	PD, LVTTTL	Port 5 Carrier Sense and Receive Data Valid in RMII Mode Active high to indicate that the data on RMII_P5RXD[1:0] is valid. Synchronous to the rising edge of REFCLK_IN.
68	MII_P5RXER	I	PD, LVTTTL	Port 5 Receive Error in MII Mode Active high to indicate that there is symbol error on the MII_P5RXD[3:0]. Only valid in 100M operation.
	RMII_P5RXER	I	PD, LVTTTL	Port 5 Receive Error in RMII Mode Active high to indicate that there is symbol error on the RMII_P5RXD[1:0]. Only valid in 100M operation.
57	MII_P5CRS	I	PD, LVTTTL	Port 5 Carrier Sense in MII Mode In full duplex mode, MII_P5CRS reflects the receive carrier sense situation on medium only; In Half Duplex, MII_P5CRS will be high both in receive and transmit condition.
	GPSI_P5CRS	I	PD, LVTTTL	Port 5 Carrier Sense in GPSI Mode In full duplex mode, GPSI_P5CRS reflects the receive carrier sense situation on medium only; In Half Duplex, GPSI_P5CRS will be high both in receive and transmit condition.
58	MII_P5COL	I	PD, LVTTTL	Port 5 Collision Input in MII Mode Active high to indicate that there is collision on the medium. Stay low in full duplex operation.
	GPSI_P5COL	I	PD, LVTTTL	Port 5 Collision Input in GPSI Mode Active high to indicate that there is collision on the medium. Stay low in full duplex operation.

Table 3 IO Signals (cont'd)

Ball No.	Name	Pin Type	Buffer Type	Function
72	MII_P5RXCLK	I	PD, LVTTTL	Port 5 Receive Clock Input in MII Mode MII_P5RXDV and MII_P5RXD[3:0] are synchronous to the rising edge of this clock. It is free running 25 MHz clock in 100M mode and 2.5 MHz clock in 10M mode.
	GPSI_P5RXCLK	I	PD, LVTTTL	Port 5 Receive Clock Input in GPSI Mode GPSI_P5RXD are synchronous to the rising edge of this clock. It is non-continuous 10 MHz Clock input.
	REFCLK_IN	I	PD, LVTTTL	50MHz Reference Clock Input in RMII Mode RMII_P5RXD[1:0], RMII_P5TXD[1:0], RMII_P5TXEN and RMII_P5CRSDV are synchronous to the rising edge of this clock.
67	MII_P5TXCLK	I	PD, LVTTTL	Port 5 Transmit Clock Input in MII Mode MII_P5TXEN and MII_P5TXD[3:0] are output at the rising edge of this clock. It is free running 25 MHz clock in 100M mode and 2.5 MHz clock in 10M mode.
	GPSI_P5TXCLK	I	PD, LVTTTL	Port 5 Transmit Clock Input in GPSI Mode GPSI_P5TXEN and GPSI_P5TXD are synchronous to the rising edge of this clock. It is continuous 10 MHz Clock input.
	REFCLK_OUT	O	8 mA, PD, LVTTTL	50MHz Reference Clock Output in RMII Mode This pin is used as 50 MHz reference clock signal output pin when port 5 operates in RMII mode.
89	SPDTNP5	I	PD, LVTTTL	Port 5 Speed Input This pin is used to select the speed mode of Port 5. 0 _B 100M 1 _B 10M
90	LNKFP5	I	PD, LVTTTL	Port 5 Link Fail Status Input This pin is used as link control of Port 5. 0 _B Link Up 1 _B Link Failed
91	DPHALFP5	I	PD, LVTTTL	Port 5 Duplex Status Input This pin is used to select the duplex mode of Port 5. 0 _B Full Duplex 1 _B Half Duplex

LED Interface

Table 3 IO Signals (cont'd)

Ball No.	Name	Pin Type	Buffer Type	Function
107	DPHALFP4	I	PD, LVTTL	Port 4 Duplex status Input When Port 4 operates under MAC MII mode (see CFG0 for more details), this pins is used to select the duplex mode of Port 4. 0_B Full Duplex 1_B Half Duplex
	DUPCOL4	O	8 mA, PD, LVTTL	Port 4 Duplex /Collision LED When Port 4 operates under PHY or PCS MII mode (see CFG0 for more details), in Full duplex mode, this pin acts as DUPLEX LED for Port 4; in half duplex mode, it is collision LED for each port. See Chapter 3.1.12 LED Display for more details.
110	DUPCOL3	O	8 mA, PD, LVTTL	Port 3 Duplex /Collision LED In Full duplex mode, this pin acts as DUPLEX LED for Port 3; in half duplex mode, it is collision LED for each port. See Chapter 3.1.12 LED Display for more details.
111	BPEN	I	PU, LVTTL	Recommend Back-Pressure in Half-Duplex Value on this pin will be latched by Samurai-6M/6MX (ADM6996M/MX) during power on reset as the back-pressure enable in half-duplex mode. <i>Note: Power On Setting</i> 0_B Disable Back-Pressure 1_B Enable Back-Pressure
	DUPCOL2	O	8 mA, PU, LVTTL	Port 2 Duplex-collision LED In Full duplex mode, this pin acts as Port 2 DUPLEX LED; in half duplex mode, it is collision LED for Port 2. See Chapter 3.1.12 LED Display for more details.
112	PHYAS1	I	PD, LVTTL	Recommend PHY Address Bit 1 Value on this pin will be latched by Samurai-6M/6MX (ADM6996M/MX) during power on reset as the PHY address recommends value bit 1. See PHYAS0 description for more details. <i>Note: Power On Setting</i>
	DUPCOL1	O	8 mA, PD, LVTTL	Port 1 Duplex-collision LED In Full duplex mode, this pin acts as port 1 DUPLEX LED; in half duplex mode, it is collision LED for Port 1. See Chapter 3.1.12 LED Display for more details.

Table 3 IO Signals (cont'd)

Ball No.	Name	Pin Type	Buffer Type	Function
113	RECANEN	I	PU, LVTTTL	Recommend Auto Negotiation Enable Only valid for Twisted pair interface. Programmed this bit to 1 has no effect to Fiber port. <i>Note: Power On Setting.</i> 0 _B Disable all TP port auto negotiation capability 1 _B Enable all TP port auto negotiation capability
	DUPCOL0	O	8 mA, PU, LVTTTL	Port 0 Duplex-collision LED In Full duplex mode, this pin acts as port 0 DUPLEX LED; in half duplex mode, it is collision LED for Port 0. See Chapter 3.1.12 LED Display for more details.
92	LNKFP4	I	PD, LVTTTL	Port 4 Link Fail Status Input When Port 4 operates under MAC MII mode (see CFG0 for more details), this pin is used as link control of Port 4. 0 _B Link Up 1 _B Link Failed
	LNKACT_4	O	8 mA, PD, LVTTTL	LINK/Activity LED of Port 4 When Port 4 operates under PHY or PCS MII mode (see CFG0 for more details), this pin is used to indicate the link/activity status of Port 4, see Chapter 3.1.12 LED Display for more details.
95	LNKACT_3	O	8 mA, PD, LVTTTL	LINK/Activity LED of Port 3 to 0 Used to indicate corresponding port' s link/activity status, see Chapter 3.1.12 LED Display for more details.
96	LNKACT_2			
97	LNKACT_1			
98	LNKACT_0			
51	SPDTNP4	I	PD, LVTTTL	Port 4 Speed Input When Port 4 operates under MAC MII mode (see CFG0 for more details), this pin is used to select the operating speed of Port 4. 0 _B 100M 1 _B 10M
	LDSPD_4	O	8 mA, PD, LVTTTL	Port 4 Speed LED When Port 4 operates under PHY or PCS MII mode (see CFG0 for more details), this pin is used to indicate the speed status of Port 4, see Chapter 3.1.12 LED Display for more details.
48	LDSPD_3	O	8 mA, PD, LVTTTL	Port 3 to Port 0 Speed LED Used to indicate corresponding port' s speed status, see Chapter 3.1.12 LED Display for more details.
47	LDSPD_2			
43	LDSPD_1			
42	LDSPD_0			

EEPROM Interface

Table 3 IO Signals (cont'd)

Ball No.	Name	Pin Type	Buffer Type	Function
84	EDO	I	PU, LVTTTL	EEPROM Data Output This pin is used to input EEPROM data when reading EEPROM. During Samurai-6M/6MX (ADM6996M/MX) initialisation, Samurai-6M/6MX (ADM6996M/MX) will drive EEPROM interface signal to read settings from EEPROM. Any other devices attached to EEPROM interface SHOULD drive Hi-Z or keep tristate during this period. See Chapter 3.4.2 EEPROM Interface for more details.
80	IFSEL	I	PD, LVTTTL	Interface Selection After Samurai-6M/6MX (ADM6996M/MX) initialization process is done, this pin is used to select using EEPROM interface or SDC/SDIO interface. EECS/IFSEL interface 0 _B SDC/SDIO interface 1 _B EEPROM interface
	EECS	O	4 mA, PD, LVTTTL	EEPROM Chip Select During Samurai-6M/6MX (ADM6996M/MX) initialisation, this pin is used as EEPROM chip select signal. During Samurai-6M/6MX (ADM6996M/MX) initialize itself, Samurai-6M/6MX (ADM6996M/MX) will drive EEPROM interface signal to read settings from EEPROM. Any other devices attached to EEPROM interface SHOULD drive Hi-Z or keep tristate during this period. See Chapter 3.4.2 EEPROM Interface for more details.
81	XOVEN	I	PD, LVTTTL	Cross Over Enable Value on this pin (active low) will be latched by Samurai-6M/6MX (ADM6996M/MX) at the rising edge of RESETL(RC) for Port 4~0 crossover auto detect (Only available in TP interface). <i>Note: Power On Setting.</i> 0 _B Disable 1 _B Enable
	EESK	I/O	4 mA, PD, LVTTTL	EEPROM Serial Clock During Samurai-6M/6MX (ADM6996M/MX) initialisation, this pin is used to output clock to EEPROM. After Samurai-6M/6MX (ADM6996M/MX) initialization process is done, this pin is used as EEPROM interface clock input if IFSEL = 1.
	SDC	I	PD, LVTTTL	Serial Management interface Clock input If IFSEL = 0, this pin is used as serial management interface clock input.