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Small Form Factor Three Port 10/100 Managed Ethernet Switch with Single MII/RMII/Turbo MII

PRODUCT FEATURES

Datasheet

Highlights

- Up to 200Mbps via Turbo MII Interface
- High performance, full featured 3 port switch with VLAN, QoS packet prioritization, Rate Limiting, IGMP monitoring and management functions
- Serial management via I²C or SMI
- Unique Virtual PHY feature simplifies software development by mimicking the multiple switch ports as a single port PHY

Target Applications

- Cable, satellite, and IP set-top boxes
- Digital televisions
- Digital video recorders
- VoIP/Video phone systems
- Home gateways
- Test/Measurement equipment
- Industrial automation systems

Key Benefits

- Ethernet Switch Fabric
 - 32K buffer RAM
 - 512 entry forwarding table
 - Port based IEEE 802.1Q VLAN support (16 groups)
 - Programmable IEEE 802.1Q tag insertion/removal
 - IEEE 802.1D spanning tree protocol support
 - 4 separate transmit queues available per port
 - Fixed or weighted egress priority servicing
 - QoS/CoS Packet prioritization
 - Input priority determined by VLAN tag, DA lookup, TOS, DIFFSERV or port default value
 - Programmable Traffic Class map based on input priority on per port basis
 - Remapping of 802.1Q priority field on per port basis
 - Programmable rate limiting at the ingress with coloring and random early discard, per port / priority
 - Programmable rate limiting at the egress with leaky bucket algorithm, per port / priority
 - IGMP v1/v2/v3 monitoring for Multicast packet filtering
 - Programmable broadcast storm protection with global % control and enable per port
 - Programmable buffer usage limits
 - Dynamic queues on internal memory
 - Programmable filter by MAC address

- Switch Management
 - Port mirroring/monitoring/sniffing: ingress and/or egress traffic on any port or port pair
 - Fully compliant statistics (MIB) gathering counters
 - Control registers configurable on-the-fly
- Ports
 - Port 0 - MII MAC, MII PHY, RMII PHY modes
 - 2 internal 10/100 PHYs with HP Auto-MDIX support
 - 200Mbps Turbo MII (PHY or MAC mode)
 - Fully compliant with IEEE 802.3 standards
 - 10BASE-T and 100BASE-TX support
 - Full and half duplex support
 - Full duplex flow control
 - Backpressure (forced collision) half duplex flow control
 - Automatic flow control based on programmable levels
 - Automatic 32-bit CRC generation and checking
 - 2K Jumbo packet support
 - Programmable interframe gap, flow control pause value
 - Full transmit/receive statistics
 - Full LED support per port
 - Auto-negotiation
 - Automatic polarity correction
 - Automatic MDI/MDI-X
 - Loop-back mode
- Serial Management
 - I²C (slave) access to all internal registers
 - MIIM (MDIO) access to PHY related registers
 - SMI (extended MIIM) access to all internal registers
- Other Features
 - General Purpose Timer
 - I²C Serial EEPROM interface
 - Programmable GPIOs/LEDs
- Single 3.3V power supply
- ESD Protection Levels
 - ±8kV HBM without External Protection Devices
 - ±8kV contact mode (IEC61000-4-2)
 - ±15kV air-gap discharge mode (IEC61000-4-2)
- Latch-up exceeds ±150mA per EIA/JESD 78
- 56-pin QFN (8x8 mm) Lead-Free RoHS Compliant Package
- Available in Commercial & Industrial Temp. Ranges

Order Number(s):**LAN9303-ABZJ for 56-Pin, QFN Lead-Free RoHS Compliant Package (0 to 70°C Temp Range)****LAN9303i-ABZJ for 56-Pin, QFN Lead-Free RoHS Compliant Package (-40 to 85°C Temp Range)****This product meets the halogen maximum concentration values per IEC61249-2-21****For RoHS compliance and environmental information, please visit www.smSC.com/rohs**

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Table of Contents

Chapter 1 Preface	13
1.1 General Terms	13
Chapter 2 Introduction	15
2.1 General Description	15
2.2 Block Diagram	16
2.2.1 System Clocks/Reset/PME Controller	17
2.2.2 System Interrupt Controller	17
2.2.3 Switch Fabric	17
2.2.4 Ethernet PHYs	18
2.2.5 PHY Management Interface (PMI)	18
2.2.6 I2C Slave Controller	18
2.2.7 SMI Slave Controller	18
2.2.8 EEPROM Controller/Loader	18
2.2.9 GPIO/LED Controller	19
2.3 Modes of Operation	19
2.3.1 Internal PHY Mode	19
2.3.2 MAC Mode	19
2.3.3 PHY Mode	20
2.3.4 Management Modes	20
Chapter 3 Pin Description and Configuration	23
3.1 Pin Diagram	23
3.1.1 56-QFN Pin Diagram	23
3.2 Pin Descriptions	24
3.3 Buffer Types	41
Chapter 4 Clocking, Resets, and Power Management	42
4.1 Clocks	42
4.2 Resets	42
4.2.1 Chip-Level Resets	43
4.2.1.1 Power-On Reset (POR)	43
4.2.1.2 nRST Pin Reset	43
4.2.2 Multi-Module Resets	44
4.2.2.1 Digital Reset (DIGITAL_RST)	44
4.2.3 Single-Module Resets	44
4.2.3.1 Port 2 PHY Reset	44
4.2.3.2 Port 1 PHY Reset	45
4.2.3.3 Virtual PHY Reset	45
4.2.4 Configuration Straps	46
4.2.4.1 Soft-Straps	46
4.2.4.2 Hard-Straps	52
4.3 Power Management	54
4.3.1 Port 1 & 2 PHY Power Management	54
Chapter 5 System Interrupts	55
5.1 Functional Overview	55
5.2 Interrupt Sources	55
5.2.1 Switch Fabric Interrupts	57
5.2.2 Ethernet PHY Interrupts	57
5.2.3 GPIO Interrupts	58
5.2.4 General Purpose Timer Interrupt	58

5.2.5	Software Interrupt	58
5.2.6	Device Ready Interrupt.	58

Chapter 6 Switch Fabric 60

6.1	Functional Overview	60
6.2	Switch Fabric CSRs	60
6.2.1	Switch Fabric CSR Writes	61
6.2.2	Switch Fabric CSR Reads	62
6.2.3	Flow Control Enable Logic	63
6.3	10/100 Ethernet MACs	65
6.3.1	Receive MAC	65
6.3.1.1	Receive Counters	66
6.3.2	Transmit MAC	67
6.3.2.1	Transmit Counters	67
6.4	Switch Engine (SWE)	68
6.4.1	MAC Address Lookup Table.	68
6.4.1.1	Learning/Aging/Migration	69
6.4.1.2	Static Entries	69
6.4.1.3	Multicast Pruning	69
6.4.1.4	Address Filtering	69
6.4.1.5	Spanning Tree Port State Override	69
6.4.1.6	MAC Destination Address Lookup Priority	69
6.4.1.7	Host Access	69
6.4.2	Forwarding Rules	71
6.4.3	Transmit Priority Queue Selection	72
6.4.3.1	Port Default Priority	74
6.4.3.2	IP Precedence Based Priority	74
6.4.3.3	DIFFSERV Based Priority	74
6.4.3.4	VLAN Priority	74
6.4.4	VLAN Support.	75
6.4.5	Spanning Tree Support	75
6.4.6	Ingress Flow Metering and Coloring	76
6.4.6.1	Ingress Flow Calculation	78
6.4.7	Broadcast Storm Control	80
6.4.8	IPv4 IGMP Support.	80
6.4.9	Port Mirroring	81
6.4.10	Host CPU Port Special Tagging	81
6.4.10.1	Packets from the Host CPU	81
6.4.10.2	Packets to the Host CPU	82
6.4.11	Counters	83
6.5	Buffer Manager (BM)	83
6.5.1	Packet Buffer Allocation	83
6.5.1.1	Buffer Limits and Flow Control Levels	83
6.5.2	Random Early Discard (RED).	84
6.5.3	Transmit Queues	84
6.5.4	Transmit Priority Queue Servicing	84
6.5.5	Egress Rate Limiting (Leaky Bucket)	84
6.5.6	Adding, Removing, and Changing VLAN Tags	85
6.5.7	Counters	89
6.6	Switch Fabric Interrupts	89

Chapter 7 Ethernet PHYs 90

7.1	Functional Overview	90
7.1.1	PHY Addressing	90
7.2	Port 1 & 2 PHYs	91
7.2.1	100BASE-TX Transmit	92
7.2.1.1	MII MAC Interface	92
7.2.1.2	4B/5B Encoder	92
7.2.1.3	Scrambler and PISO	94
7.2.1.4	NRZI and MLT-3 Encoding	94
7.2.1.5	100M Transmit Driver	94

Datasheet

7.2.1.6	100M Phase Lock Loop (PLL)	94
7.2.2	100BASE-TX Receive	95
7.2.2.1	A/D Converter	95
7.2.2.2	DSP: Equalizer, BLW Correction and Clock/Data Recovery	95
7.2.2.3	NRZI and MLT-3 Decoding	96
7.2.2.4	Descrambler and SIPO	96
7.2.2.5	5B/4B Decoding	96
7.2.2.6	Receiver Errors	96
7.2.2.7	MII MAC Interface	96
7.2.3	10BASE-T Transmit	97
7.2.3.1	MII MAC Interface	97
7.2.3.2	10M TX Driver and PLL	97
7.2.4	10BASE-T Receive	97
7.2.4.1	Filter and Squelch	97
7.2.4.2	10M RX and PLL	97
7.2.4.3	MII MAC Interface	98
7.2.4.4	Jabber Detection	98
7.2.5	PHY Auto-negotiation	98
7.2.5.1	PHY Pause Flow Control	100
7.2.5.2	Parallel Detection	100
7.2.5.3	Restarting Auto-Negotiation	100
7.2.5.4	Disabling Auto-Negotiation	100
7.2.5.5	Half Vs. Full-Duplex	101
7.2.6	HP Auto-MDIX	101
7.2.7	MII MAC Interface	102
7.2.8	PHY Management Control	102
7.2.8.1	PHY Interrupts	102
7.2.9	PHY Power-Down Modes	103
7.2.9.1	PHY General Power-Down	103
7.2.9.2	PHY Energy Detect Power-Down	103
7.2.10	PHY Resets	103
7.2.10.1	PHY Software Reset via RESET_CTL	103
7.2.10.2	PHY Software Reset via PHY_BASIC_CTRL_x	104
7.2.10.3	PHY Power-Down Reset	104
7.2.11	LEDs	104
7.2.12	Required Ethernet Magnetics	104
7.3	Virtual PHY	104
7.3.1	Virtual PHY Auto-Negotiation	104
7.3.1.1	Parallel Detection	106
7.3.1.2	Disabling Auto-Negotiation	106
7.3.1.3	Virtual PHY Pause Flow Control	106
7.3.2	Virtual PHY in MAC Mode	106
7.3.2.1	Full-Duplex Flow Control	107
7.3.3	Virtual PHY Resets	107
7.3.3.1	Virtual PHY Software Reset via RESET_CTL	107
7.3.3.2	Virtual PHY Software Reset via VPHY_BASIC_CTRL	107
Chapter 8 Serial Management		108
8.1	Functional Overview	108
8.2	I2C Overview	108
8.3	I2C Master EEPROM Controller	109
8.3.1	I2C EEPROM Device Addressing	110
8.3.2	I2C EEPROM Byte Read	110
8.3.3	I2C EEPROM Sequential Byte Reads	111
8.3.4	I2C EEPROM Byte Writes	111
8.3.5	Wait State Generation	112
8.3.6	I₂C Bus Arbitration and Clock Synchronization	112
8.3.6.1	Bus Busy	112
8.3.6.2	Clock Synchronization	112
8.3.6.3	Arbitration	113
8.3.6.4	Timeout Due to Busy or Arbitration	113
8.3.7	I2C Master EEPROM Controller Operation	113
8.4	EEPROM Loader	115
8.4.1	EEPROM Loader Operation	115
8.4.2	EEPROM Valid Flag	117

8.4.3	MAC Address	117
8.4.4	Soft-Straps	117
8.4.4.1	PHY Registers Synchronization	117
8.4.4.2	Virtual PHY Registers Synchronization	118
8.4.4.3	LED and Manual Flow Control Register Synchronization	118
8.4.5	Register Data	118
8.4.6	EEPROM Loader Finished Wait-State	119
8.4.7	Reset Sequence and EEPROM Loader	119
8.5	I2C Slave Operation	120
8.5.1	I2C Slave Command Format	120
8.5.2	I2C Slave Read Sequence	120
8.5.2.1	I2C Slave Read Polling for Reset Complete	121
8.5.3	I2C Slave Write Sequence	121

Chapter 9 MII Data Interface..... 123

9.1	Port 0 MII Data Path	123
9.1.1	Port 0 MII MAC Mode	123
9.1.2	Port 0 MII PHY Mode	123
9.1.2.1	Turbo Operation	123
9.1.2.2	Clock Drive Strength	123
9.1.2.3	Signal Quality Error (SQE) Heartbeat Test	123
9.1.2.4	Collision Test	124
9.1.2.5	Loopback	124
9.1.3	Port 0 RMII PHY Mode	124
9.1.3.1	Reference Clock Selection	124
9.1.3.2	Clock Drive Strength	125
9.1.3.3	Signal Quality Error (SQE) Heartbeat Test	125
9.1.3.4	Collision Test	125
9.1.3.5	Loopback Mode	125

Chapter 10 MII Management..... 126

10.1	Functional Overview	126
10.2	SMI Slave Controller	126
10.2.1	Read Sequence	127
10.2.1.1	SMI Read Polling for Reset Complete	128
10.2.2	Write Sequence	128
10.3	PHY Management Interface (PMI)	128
10.3.1	EEPROM Loader PHY Register Access	129
10.4	MII Mode Multiplexer	130
10.4.1	Port 0 MAC Mode SMI Managed	130
10.4.2	Port 0 MAC Mode I2C Managed	131
10.4.3	Port 0 PHY Mode SMI Managed	132
10.4.4	Port 0 PHY Mode I2C Managed	133

Chapter 11 General Purpose Timer & Free-Running Clock..... 134

11.1	General Purpose Timer	134
11.2	Free-Running Clock	134

Chapter 12 GPIO/LED Controller..... 135

12.1	Functional Overview	135
12.2	GPIO Operation	135
12.2.1	GPIO Interrupts	135
12.2.1.1	GPIO Interrupt Polarity	136
12.3	LED Operation	136
12.3.1	LED Function Definitions when LED_FUN[1:0] = 00b, 01b, or 10b	137
12.3.2	LED Function Definitions when LED_FUN[1:0] = 11b	138

Chapter 13 Register Descriptions..... 139

Datasheet

13.1	Register Nomenclature	140
13.2	System Control and Status Registers	141
13.2.1	Interrupts	143
13.2.1.1	Interrupt Configuration Register (IRQ_CFG)	143
13.2.1.2	Interrupt Status Register (INT_STS)	145
13.2.1.3	Interrupt Enable Register (INT_EN)	146
13.2.2	GPIO/LED	147
13.2.2.1	General Purpose I/O Configuration Register (GPIO_CFG)	147
13.2.2.2	General Purpose I/O Data & Direction Register (GPIO_DATA_DIR)	148
13.2.2.3	General Purpose I/O Interrupt Status and Enable Register (GPIO_INT_STS_EN)	149
13.2.2.4	LED Configuration Register (LED_CFG)	150
13.2.3	EEPROM	151
13.2.3.1	EEPROM Command Register (E2P_CMD)	151
13.2.3.2	EEPROM Data Register (E2P_DATA)	154
13.2.4	Switch Fabric	155
13.2.4.1	Port 1 Manual Flow Control Register (MANUAL_FC_1)	155
13.2.4.2	Port 2 Manual Flow Control Register (MANUAL_FC_2)	157
13.2.4.3	Port 0 Manual Flow Control Register (MANUAL_FC_0)	159
13.2.4.4	Switch Fabric CSR Interface Data Register (SWITCH_CSR_DATA)	161
13.2.4.5	Switch Fabric CSR Interface Command Register (SWITCH_CSR_CMD)	162
13.2.4.6	Switch Fabric MAC Address High Register (SWITCH_MAC_ADDRH)	164
13.2.4.7	Switch Fabric MAC Address Low Register (SWITCH_MAC_ADDRL)	165
13.2.4.8	Switch Fabric CSR Interface Direct Data Registers (SWITCH_CSR_DIRECT_DATA)	167
13.2.5	PHY Management Interface (PMI)	170
13.2.5.1	PHY Management Interface Data Register (PMI_DATA)	170
13.2.5.2	PHY Management Interface Access Register (PMI_ACCESS)	171
13.2.6	Virtual PHY	172
13.2.6.1	Virtual PHY Basic Control Register (VPHY_BASIC_CTRL)	173
13.2.6.2	Virtual PHY Basic Status Register (VPHY_BASIC_STATUS)	175
13.2.6.3	Virtual PHY Identification MSB Register (VPHY_ID_MSB)	177
13.2.6.4	Virtual PHY Identification LSB Register (VPHY_ID_LSB)	178
13.2.6.5	Virtual PHY Auto-Negotiation Advertisement Register (VPHY_AN_ADV)	179
13.2.6.6	Virtual PHY Auto-Negotiation Link Partner Base Page Ability Register (VPHY_AN_LP_BASE_ABILITY)	181
13.2.6.7	Virtual PHY Auto-Negotiation Expansion Register (VPHY_AN_EXP)	184
13.2.6.8	Virtual PHY Special Control/Status Register (VPHY_SPECIAL_CONTROL_STATUS)	185
13.2.7	Miscellaneous	187
13.2.7.1	Chip ID and Revision (ID_REV)	187
13.2.7.2	Byte Order Test Register (BYTE_TEST)	188
13.2.7.3	Hardware Configuration Register (HW_CFG)	189
13.2.7.4	General Purpose Timer Configuration Register (GPT_CFG)	190
13.2.7.5	General Purpose Timer Count Register (GPT_CNT)	191
13.2.7.6	Free Running 25MHz Counter Register (FREE_RUN)	192
13.2.7.7	Reset Control Register (RESET_CTL)	193
13.3	Ethernet PHY Control and Status Registers	194
13.3.1	Virtual PHY Registers	194
13.3.2	Port 1 & 2 PHY Registers	194
13.3.2.1	Port x PHY Basic Control Register (PHY_BASIC_CONTROL_x)	196
13.3.2.2	Port x PHY Basic Status Register (PHY_BASIC_STATUS_x)	198
13.3.2.3	Port x PHY Identification MSB Register (PHY_ID_MSB_x)	200
13.3.2.4	Port x PHY Identification LSB Register (PHY_ID_LSB_x)	201
13.3.2.5	Port x PHY Auto-Negotiation Advertisement Register (PHY_AN_ADV_x)	202
13.3.2.6	Port x PHY Auto-Negotiation Link Partner Base Page Ability Register (PHY_AN_LP_BASE_ABILITY_x)	205
13.3.2.7	Port x PHY Auto-Negotiation Expansion Register (PHY_AN_EXP_x)	207
13.3.2.8	Port x PHY Mode Control/Status Register (PHY_MODE_CONTROL_STATUS_x)	208
13.3.2.9	Port x PHY Special Modes Register (PHY_SPECIAL_MODES_x)	209
13.3.2.10	Port x PHY Special Control/Status Indication Register (PHY_SPECIAL_CONTROL_STAT_IND_x)	210
13.3.2.11	Port x PHY Interrupt Source Flags Register (PHY_INTERRUPT_SOURCE_x)	212
13.3.2.12	Port x PHY Interrupt Mask Register (PHY_INTERRUPT_MASK_x)	213
13.3.2.13	Port x PHY Special Control/Status Register (PHY_SPECIAL_CONTROL_STATUS_x)	214
13.4	Switch Fabric Control and Status Registers	215
13.4.1	General Switch CSRs	226
13.4.1.1	Switch Device ID Register (SW_DEV_ID)	226
13.4.1.2	Switch Reset Register (SW_RESET)	227
13.4.1.3	Switch Global Interrupt Mask Register (SW_IMR)	228
13.4.1.4	Switch Global Interrupt Pending Register (SW_IPR)	229
13.4.2	Switch Port 0, Port 1, and Port 2 CSRs	230
13.4.2.1	Port x MAC Version ID Register (MAC_VER_ID_x)	230
13.4.2.2	Port x MAC Receive Configuration Register (MAC_RX_CFG_x)	231
13.4.2.3	Port x MAC Receive Undersize Count Register (MAC_RX_UNDSIZE_CNT_x)	232
13.4.2.4	Port x MAC Receive 64 Byte Count Register (MAC_RX_64_CNT_x)	233
13.4.2.5	Port x MAC Receive 65 to 127 Byte Count Register (MAC_RX_65_TO_127_CNT_x)	234
13.4.2.6	Port x MAC Receive 128 to 255 Byte Count Register (MAC_RX_128_TO_255_CNT_x)	235
13.4.2.7	Port x MAC Receive 256 to 511 Byte Count Register (MAC_RX_256_TO_511_CNT_x)	236

13.4.2.8	Port x MAC Receive 512 to 1023 Byte Count Register (MAC_RX_512_TO_1023_CNT_x).....	237
13.4.2.9	Port x MAC Receive 1024 to Max Byte Count Register (MAC_RX_1024_TO_MAX_CNT_x).....	238
13.4.2.10	Port x MAC Receive Oversize Count Register (MAC_RX_OVRsze_CNT_x).....	239
13.4.2.11	Port x MAC Receive OK Count Register (MAC_RX_PKTOK_CNT_x).....	240
13.4.2.12	Port x MAC Receive CRC Error Count Register (MAC_RX_CRCERR_CNT_x).....	241
13.4.2.13	Port x MAC Receive Multicast Count Register (MAC_RX_MULCST_CNT_x).....	242
13.4.2.14	Port x MAC Receive Broadcast Count Register (MAC_RX_BRDCST_CNT_x).....	243
13.4.2.15	Port x MAC Receive Pause Frame Count Register (MAC_RX_PAUSE_CNT_x).....	244
13.4.2.16	Port x MAC Receive Fragment Error Count Register (MAC_RX_FRAG_CNT_x).....	245
13.4.2.17	Port x MAC Receive Jabber Error Count Register (MAC_RX_JABB_CNT_x).....	246
13.4.2.18	Port x MAC Receive Alignment Error Count Register (MAC_RX_ALIGN_CNT_x).....	247
13.4.2.19	Port x MAC Receive Packet Length Count Register (MAC_RX_PKTLEN_CNT_x).....	248
13.4.2.20	Port x MAC Receive Good Packet Length Count Register (MAC_RX_GOODPKTLEN_CNT_x).....	249
13.4.2.21	Port x MAC Receive Symbol Error Count Register (MAC_RX_SYMBOL_CNT_x).....	250
13.4.2.22	Port x MAC Receive Control Frame Count Register (MAC_RX_CTLFRM_CNT_x).....	251
13.4.2.23	Port x MAC Transmit Configuration Register (MAC_TX_CFG_x).....	252
13.4.2.24	Port x MAC Transmit Flow Control Settings Register (MAC_TX_FC_SETTINGS_x).....	253
13.4.2.25	Port x MAC Transmit Deferred Count Register (MAC_TX_DEFER_CNT_x).....	254
13.4.2.26	Port x MAC Transmit Pause Count Register (MAC_TX_PAUSE_CNT_x).....	255
13.4.2.27	Port x MAC Transmit OK Count Register (MAC_TX_PKTOK_CNT_x).....	256
13.4.2.28	Port x MAC Transmit 64 Byte Count Register (MAC_TX_64_CNT_x).....	257
13.4.2.29	Port x MAC Transmit 65 to 127 Byte Count Register (MAC_TX_65_TO_127_CNT_x).....	258
13.4.2.30	Port x MAC Transmit 128 to 255 Byte Count Register (MAC_TX_128_TO_255_CNT_x).....	259
13.4.2.31	Port x MAC Transmit 256 to 511 Byte Count Register (MAC_TX_256_TO_511_CNT_x).....	260
13.4.2.32	Port x MAC Transmit 512 to 1023 Byte Count Register (MAC_TX_512_TO_1023_CNT_x).....	261
13.4.2.33	Port x MAC Transmit 1024 to Max Byte Count Register (MAC_TX_1024_TO_MAX_CNT_x).....	262
13.4.2.34	Port x MAC Transmit Undersize Count Register (MAC_TX_UNDSZE_CNT_x).....	263
13.4.2.35	Port x MAC Transmit Packet Length Count Register (MAC_TX_PKTLEN_CNT_x).....	264
13.4.2.36	Port x MAC Transmit Broadcast Count Register (MAC_TX_BRDCST_CNT_x).....	265
13.4.2.37	Port x MAC Transmit Multicast Count Register (MAC_TX_MULCST_CNT_x).....	266
13.4.2.38	Port x MAC Transmit Late Collision Count Register (MAC_TX_LATECOL_CNT_x).....	267
13.4.2.39	Port x MAC Transmit Excessive Collision Count Register (MAC_TX_EXCCOL_CNT_x).....	268
13.4.2.40	Port x MAC Transmit Single Collision Count Register (MAC_TX_SNGLECOL_CNT_x).....	269
13.4.2.41	Port x MAC Transmit Multiple Collision Count Register (MAC_TX_MULTICOL_CNT_x).....	270
13.4.2.42	Port x MAC Transmit Total Collision Count Register (MAC_TX_TOTALCOL_CNT_x).....	271
13.4.2.43	Port x MAC Interrupt Mask Register (MAC_IMR_x).....	272
13.4.2.44	Port x MAC Interrupt Pending Register (MAC_IPR_x).....	273
13.4.3	Switch Engine CSRs	274
13.4.3.1	Switch Engine ALR Command Register (SWE_ALR_CMD).....	274
13.4.3.2	Switch Engine ALR Write Data 0 Register (SWE_ALR_WR_DAT_0).....	275
13.4.3.3	Switch Engine ALR Write Data 1 Register (SWE_ALR_WR_DAT_1).....	276
13.4.3.4	Switch Engine ALR Read Data 0 Register (SWE_ALR_RD_DAT_0).....	278
13.4.3.5	Switch Engine ALR Read Data 1 Register (SWE_ALR_RD_DAT_1).....	279
13.4.3.6	Switch Engine ALR Command Status Register (SWE_ALR_CMD_STS).....	281
13.4.3.7	Switch Engine ALR Configuration Register (SWE_ALR_CFG).....	282
13.4.3.8	Switch Engine VLAN Command Register (SWE_VLAN_CMD).....	283
13.4.3.9	Switch Engine VLAN Write Data Register (SWE_VLAN_WR_DATA).....	284
13.4.3.10	Switch Engine VLAN Read Data Register (SWE_VLAN_RD_DATA).....	286
13.4.3.11	Switch Engine VLAN Command Status Register (SWE_VLAN_CMD_STS).....	288
13.4.3.12	Switch Engine DIFFSERV Table Command Register (SWE_DIFFSERV_TBL_CFG).....	289
13.4.3.13	Switch Engine DIFFSERV Table Write Data Register (SWE_DIFFSERV_TBL_WR_DATA).....	290
13.4.3.14	Switch Engine DIFFSERV Table Read Data Register (SWE_DIFFSERV_TBL_RD_DATA).....	291
13.4.3.15	Switch Engine DIFFSERV Table Command Status Register (SWE_DIFFSERV_TBL_CMD_STS).....	292
13.4.3.16	Switch Engine Global Ingress Configuration Register (SWE_GLOBAL INGRSS_CFG).....	293
13.4.3.17	Switch Engine Port Ingress Configuration Register (SWE_PORT INGRSS_CFG).....	295
13.4.3.18	Switch Engine Admit Only VLAN Register (SWE_ADMT_ONLY_VLAN).....	296
13.4.3.19	Switch Engine Port State Register (SWE_PORT_STATE).....	297
13.4.3.20	Switch Engine Priority to Queue Register (SWE_PRI_TO_QUE).....	298
13.4.3.21	Switch Engine Port Mirroring Register (SWE_PORT_MIRROR).....	299
13.4.3.22	Switch Engine Ingress Port Type Register (SWE INGRSS_PORT_TYP).....	300
13.4.3.23	Switch Engine Broadcast Throttling Register (SWE_BCST_THROT).....	301
13.4.3.24	Switch Engine Admit Non Member Register (SWE_ADMT_N_MEMBER).....	302
13.4.3.25	Switch Engine Ingress Rate Configuration Register (SWE INGRSS_RATE_CFG).....	303
13.4.3.26	Switch Engine Ingress Rate Command Register (SWE INGRSS_RATE_CMD).....	304
13.4.3.26.1	Ingress Rate Table Registers	305
13.4.3.27	Switch Engine Ingress Rate Command Status Register (SWE INGRSS_RATE_CMD_STS).....	306
13.4.3.28	Switch Engine Ingress Rate Write Data Register (SWE INGRSS_RATE_WR_DATA).....	307
13.4.3.29	Switch Engine Ingress Rate Read Data Register (SWE INGRSS_RATE_RD_DATA).....	308
13.4.3.30	Switch Engine Port 0 Ingress Filtered Count Register (SWE_FILTERED_CNT_0).....	309
13.4.3.31	Switch Engine Port 1 Ingress Filtered Count Register (SWE_FILTERED_CNT_1).....	310
13.4.3.32	Switch Engine Port 2 Ingress Filtered Count Register (SWE_FILTERED_CNT_2).....	311
13.4.3.33	Switch Engine Port 0 Ingress VLAN Priority Regeneration Table Register (SWE INGRSS_REGEN_TBL_0).....	312
13.4.3.34	Switch Engine Port 1 Ingress VLAN Priority Regeneration Table Register (SWE INGRSS_REGEN_TBL_1).....	313
13.4.3.35	Switch Engine Port 2 Ingress VLAN Priority Regeneration Table Register (SWE INGRSS_REGEN_TBL_2).....	314
13.4.3.36	Switch Engine Port 0 Learn Discard Count Register (SWE_LRN_DISCRD_CNT_0).....	315
13.4.3.37	Switch Engine Port 1 Learn Discard Count Register (SWE_LRN_DISCRD_CNT_1).....	316
13.4.3.38	Switch Engine Port 2 Learn Discard Count Register (SWE_LRN_DISCRD_CNT_2).....	317
13.4.3.39	Switch Engine Interrupt Mask Register (SWE_IMR).....	318
13.4.3.40	Switch Engine Interrupt Pending Register (SWE_IPR).....	319

Datasheet

13.4.4	Buffer Manager CSRs	321
13.4.4.1	Buffer Manager Configuration Register (BM_CFG)	321
13.4.4.2	Buffer Manager Drop Level Register (BM_DROP_LVL)	322
13.4.4.3	Buffer Manager Flow Control Pause Level Register (BM_FC_PAUSE_LVL)	323
13.4.4.4	Buffer Manager Flow Control Resume Level Register (BM_FC_RESUME_LVL)	324
13.4.4.5	Buffer Manager Broadcast Buffer Level Register (BM_BCST_LVL)	325
13.4.4.6	Buffer Manager Port 0 Drop Count Register (BM_DRP_CNT_SRC_0)	326
13.4.4.7	Buffer Manager Port 1 Drop Count Register (BM_DRP_CNT_SRC_1)	327
13.4.4.8	Buffer Manager Port 2 Drop Count Register (BM_DRP_CNT_SRC_2)	328
13.4.4.9	Buffer Manager Reset Status Register (BM_RST_STS)	329
13.4.4.10	Buffer Manager Random Discard Table Command Register (BM_RNDM_DSCRD_TBL_CMD)	330
13.4.4.11	Buffer Manager Random Discard Table Write Data Register (BM_RNDM_DSCRD_TBL_WDATA)	331
13.4.4.12	Buffer Manager Random Discard Table Read Data Register (BM_RNDM_DSCRD_TBL_RDATA)	332
13.4.4.13	Buffer Manager Egress Port Type Register (BM_EGRSS_PORT_TYPE)	333
13.4.4.14	Buffer Manager Port 0 Egress Rate Priority Queue 0/1 Register (BM_EGRSS_RATE_00_01)	335
13.4.4.15	Buffer Manager Port 0 Egress Rate Priority Queue 2/3 Register (BM_EGRSS_RATE_02_03)	336
13.4.4.16	Buffer Manager Port 1 Egress Rate Priority Queue 0/1 Register (BM_EGRSS_RATE_10_11)	337
13.4.4.17	Buffer Manager Port 1 Egress Rate Priority Queue 2/3 Register (BM_EGRSS_RATE_12_13)	338
13.4.4.18	Buffer Manager Port 2 Egress Rate Priority Queue 0/1 Register (BM_EGRSS_RATE_20_21)	339
13.4.4.19	Buffer Manager Port 2 Egress Rate Priority Queue 2/3 Register (BM_EGRSS_RATE_22_23)	340
13.4.4.20	Buffer Manager Port 0 Default VLAN ID and Priority Register (BM_VLAN_0)	341
13.4.4.21	Buffer Manager Port 1 Default VLAN ID and Priority Register (BM_VLAN_1)	342
13.4.4.22	Buffer Manager Port 2 Default VLAN ID and Priority Register (BM_VLAN_2)	343
13.4.4.23	Buffer Manager Port 0 Ingress Rate Drop Count Register (BM_RATE_DRP_CNT_SRC_0)	344
13.4.4.24	Buffer Manager Port 1 Ingress Rate Drop Count Register (BM_RATE_DRP_CNT_SRC_1)	345
13.4.4.25	Buffer Manager Port 2 Ingress Rate Drop Count Register (BM_RATE_DRP_CNT_SRC_2)	346
13.4.4.26	Buffer Manager Interrupt Mask Register (BM_IMR)	347
13.4.4.27	Buffer Manager Interrupt Pending Register (BM_IPR)	348

Chapter 14 Operational Characteristics **350**

14.1	Absolute Maximum Ratings*	350
14.2	Operating Conditions**	350
14.3	Power Consumption	351
14.4	DC Specifications	352
14.5	AC Specifications	354
14.5.1	Equivalent Test Load	354
14.5.2	Reset and Configuration Strap Timing	355
14.5.3	Power-On Configuration Strap Valid Timing	356
14.5.4	MII Interface Timing (MAC Mode)	357
14.5.5	MII Interface Timing (PHY Mode)	359
14.5.6	Turbo MII Interface Timing (MAC Mode)	361
14.5.7	Turbo MII Interface Timing (PHY Mode)	363
14.5.8	RMII Interface Timing	365
14.5.9	SMI Timing	367
14.6	Clock Circuit	369

Chapter 15 Package Outline **370**

15.1	56-QFN Package Outline	370
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Chapter 16 Datasheet Revision History **372**

List of Figures

Figure 2.1	Internal Block Diagram	16
Figure 2.2	MII MAC Mode	20
Figure 2.3	MII/RMII PHY Mode	20
Figure 2.4	Port 0 MAC/PHY Management Modes	22
Figure 3.1	Pin Assignments (TOP VIEW)	23
Figure 5.1	Functional Interrupt Register Hierarchy	56
Figure 6.1	Switch Fabric CSR Write Access Flow Diagram	62
Figure 6.2	Switch Fabric CSR Read Access Flow Diagram	63
Figure 6.3	ALR Table Entry Structure	68
Figure 6.4	Switch Engine Transmit Queue Selection	72
Figure 6.5	Switch Engine Transmit Queue Calculation	73
Figure 6.6	VLAN Table Entry Structure	75
Figure 6.7	Switch Engine Ingress Flow Priority Selection	78
Figure 6.8	Switch Engine Ingress Flow Priority Calculation	79
Figure 6.9	Hybrid Port Tagging and Un-tagging	88
Figure 7.1	Port x PHY Block Diagram	91
Figure 7.2	100BASE-TX Transmit Data Path	92
Figure 7.3	100BASE-TX Receive Data Path	95
Figure 7.4	Direct Cable Connection vs. Cross-Over Cable Connection	101
Figure 8.1	I2C Cycle	109
Figure 8.2	I2C EEPROM Addressing	110
Figure 8.3	I2C EEPROM Byte Read	110
Figure 8.4	I2C EEPROM Sequential Byte Reads	111
Figure 8.5	I2C EEPROM Byte Write	112
Figure 8.6	EEPROM Access Flow Diagram	114
Figure 8.7	EEPROM Loader Flow Diagram	116
Figure 8.8	I2C Slave Addressing	120
Figure 8.9	I2C Slave Reads	121
Figure 8.10	I2C Slave Writes	122
Figure 10.1	MII Mux Management Path Connections - MAC Mode SMI Managed	130
Figure 10.2	MII Mux Management Path Connections - MAC Mode I2C Managed	131
Figure 10.3	MII Mux Management Path Connections - PHY Mode SMI Managed	132
Figure 10.4	MII Mux Management Path Connections - PHY Mode I2C Managed	133
Figure 13.1	Base Register Memory Map	139
Figure 13.2	Example SWITCH_MAC_ADDRL, SWITCH_MAC_ADDRH, and EEPROM Setup	166
Figure 14.1	Output Equivalent Test Load	354
Figure 14.2	nRST Reset Pin Timing	355
Figure 14.3	Power-On Configuration Strap Latching Timing	356
Figure 14.4	MII Output Timing (MAC Mode)	357
Figure 14.5	MII Input Timing (MAC Mode)	358
Figure 14.6	MII Output Timing (PHY Mode)	359
Figure 14.7	MII Input Timing (PHY Mode)	360
Figure 14.8	Turbo MII Output Timing (MAC Mode)	361
Figure 14.9	Turbo MII Input Timing (MAC Mode)	362
Figure 14.10	Turbo MII Output Timing (PHY Mode)	363
Figure 14.11	Turbo MII Input Timing (PHY Mode)	364
Figure 14.12	RMII P0_OUTCLK Output Mode Timing	365
Figure 14.13	RMII P0_OUTCLK Input Mode Timing	366
Figure 14.14	SMI Timing	367
Figure 15.1	56-QFN Package Definition	370
Figure 15.2	56-QFN Recommended PCB Land Pattern	371

List of Tables

Table 2.1	Device Modes	21
Table 3.1	LAN Port 1 Pins	24
Table 3.2	LAN Port 2 Pins	24
Table 3.3	LAN Port 1 & 2 Power and Common Pins	25
Table 3.4	Port 0 MII/RMII Pins	25
Table 3.5	GPIO/LED/Configuration Straps	32
Table 3.6	Serial Management/EEPROM Pins	38
Table 3.7	Miscellaneous Pins	38
Table 3.8	PLL Pins	39
Table 3.9	Core and I/O Power and Ground Pins	39
Table 3.10	LAN9303/LAN9303i 56-QFN Package Pin Assignments	40
Table 3.11	Buffer Types	41
Table 4.1	Reset Sources and Affected Device Circuitry	43
Table 4.2	Soft-Strap Configuration Strap Definitions	47
Table 4.3	Hard-Strap Configuration Strap Definitions	52
Table 4.4	PIN/Shared Strap Mapping	54
Table 6.1	Switch Fabric Flow Control Enable Logic	64
Table 6.2	Spanning Tree States	75
Table 6.3	Typical Ingress Rate Settings	77
Table 6.4	Typical Broadcast Rate Settings	80
Table 6.5	Typical Egress Rate Settings	85
Table 7.1	Default PHY Serial MII Addressing	90
Table 7.2	4B/5B Code Table	93
Table 7.3	PHY Interrupt Sources	102
Table 8.1	I2C EEPROM Size Ranges	109
Table 8.2	EEPROM Contents Format Overview	115
Table 8.3	EEPROM Configuration Bits	117
Table 10.1	SMI Frame Format	127
Table 10.2	MII Management Frame Format	128
Table 12.1	LED Operation as a Function of LED_FUN[1:0]	136
Table 13.1	Register Bit Types	140
Table 13.2	System Control and Status Registers	141
Table 13.3	SWITCH_MAC_ADDR_L, SWITCH_MAC_ADDR_H, and EEPROM Byte Ordering	165
Table 13.4	Switch Fabric CSR to SWITCH_CSR_DIRECT_DATA Address Range Map	167
Table 13.5	Virtual PHY MII Serially Addressable Register Index	172
Table 13.6	Emulated Link Partner Pause Flow Control Ability Default Values	182
Table 13.7	Emulated Link Partner Default Advertised Ability	183
Table 13.8	Port 1 & 2 PHY MII Serially Addressable Registers	194
Table 13.9	10BASE-T Full Duplex Advertisement Default Value	203
Table 13.10	10BASE-T Half Duplex Advertisement Bit Default Value	204
Table 13.11	MODE[2:0] Definitions	209
Table 13.12	Auto-MDIX Enable and Auto-MDIX State Bit Functionality	211
Table 13.13	MDIX Strap Functionality	211
Table 13.14	Indirectly Accessible Switch Control and Status Registers	215
Table 13.15	Metering/Color Table Register Descriptions	305
Table 14.1	Supply and Current (10BASE-T Full-Duplex)	351
Table 14.2	Supply and Current (100BASE-TX Full-Duplex)	351
Table 14.3	Supply and Current (Power Management)	351
Table 14.4	I/O Buffer Characteristics	352
Table 14.5	100BASE-TX Transceiver Characteristics	353
Table 14.6	10BASE-T Transceiver Characteristics	353

Table 14.7 nRST Reset Pin Timing Values	355
Table 14.8 Power-On Configuration Strap Latching Timing Values	356
Table 14.9 MII Output Timing Values (MAC Mode).	357
Table 14.10 MII Input Timing Values (MAC Mode)	358
Table 14.11 MII Output Timing Values (PHY Mode)	359
Table 14.12 MII Input Timing Values (PHY Mode).	360
Table 14.13 Turbo MII Output Timing Values (MAC Mode)	361
Table 14.14 Turbo MII Input Timing Values (MAC Mode)	362
Table 14.15 Turbo MII Output Timing Values (PHY Mode)	363
Table 14.16 Turbo MII Input Timing Values (PHY Mode).	364
Table 14.17 RMII P0_OUTCLK Output Mode Timing Values	365
Table 14.18 RMII P0_OUTCLK Input Mode Timing Values	366
Table 14.19 SMI Timing Values	367
Table 14.20 Crystal Specifications	369
Table 15.1 56-QFN Dimensions	370
Table 16.1 Customer Revision History	372

Chapter 1 Preface

1.1 General Terms

10BASE-T	10BASE-T (10Mbps Ethernet, IEEE 802.3)
100BASE-TX	100BASE-TX (100Mbps Fast Ethernet, IEEE 802.3u)
ADC	Analog-to-Digital Converter
ALR	Address Logic Resolution
BLW	Baseline Wander
BM	Buffer Manager - Part of the switch fabric
BPDU	Bridge Protocol Data Unit - Messages which carry the Spanning Tree Protocol information
Byte	8-bits
CSMA/CD	Carrier Sense Multiple Access / Collision Detect
CSR	Control and Status Registers
CTR	Counter
DA	Destination Address
DWORD	32-bits
EPC	EEPROM Controller
FCS	Frame Check Sequence - The extra checksum characters added to the end of an Ethernet frame, used for error detection and correction.
FIFO	First In First Out buffer
FSM	Finite State Machine
GPIO	General Purpose I/O
Host	External system (Includes processor, application software, etc.)
IGMP	Internet Group Management Protocol
Inbound	Refers to data input to the device from the host
Level-Triggered Sticky Bit	This type of status bit is set whenever the condition that it represents is asserted. The bit remains set until the condition is no longer true, and the status bit is cleared by writing a zero.
lsb	Least Significant Bit
LSB	Least Significant Byte
MDI	Medium Dependant Interface
MDIX	Media Independent Interface with Crossover
MII	Media Independent Interface

MIIM	Media Independent Interface Management
MIL	MAC Interface Layer
MLT-3	Multi-Level Transmission Encoding (3-Levels). A tri-level encoding method where a change in the logic level represents a code bit “1” and the logic output remaining at the same level represents a code bit “0”.
msb	Most Significant Bit
MSB	Most Significant Byte
NRZI	Non Return to Zero Inverted. This encoding method inverts the signal for a “1” and leaves the signal unchanged for a “0”
N/A	Not Applicable
NC	No Connect
OUI	Organizationally Unique Identifier
Outbound	Refers to data output from the device to the host
PISO	Parallel In Serial Out
PLL	Phase Locked Loop
PTP	Precision Time Protocol
RESERVED	Refers to a reserved bit field or address. Unless otherwise noted, reserved bits must always be zero for write operations. Unless otherwise noted, values are not guaranteed when reading reserved bits. Unless otherwise noted, do not read or write to reserved addresses.
RTC	Real-Time Clock
SA	Source Address
SFD	Start of Frame Delimiter - The 8-bit value indicating the end of the preamble of an Ethernet frame.
SIPO	Serial In Parallel Out
SMI	Serial Management Interface
SQE	Signal Quality Error (also known as “heartbeat”)
SSD	Start of Stream Delimiter
UDP	User Datagram Protocol - A connectionless protocol run on top of IP networks
UUID	Universally Unique Identifier
WORD	16-bits

Chapter 2 Introduction

2.1 General Description

The LAN9303/LAN9303i is a full featured, 3 port 10/100 managed Ethernet switch designed for embedded applications where performance, flexibility, ease of integration and system cost control are required. The LAN9303/LAN9303i combines all the functions of a 10/100 switch system, including the Switch Fabric, packet buffers, Buffer Manager, Media Access Controllers (MACs), PHY transceivers, and serial management. The LAN9303/LAN9303i complies with the IEEE 802.3 (full/half-duplex 10BASE-T and 100BASE-TX) Ethernet protocol specification and 802.1D/802.1Q network management protocol specifications, enabling compatibility with industry standard Ethernet and Fast Ethernet applications.

At the core of the device is the high performance, high efficiency 3 port Ethernet Switch Fabric. The Switch Fabric contains a 3 port VLAN layer 2 Switch Engine that supports untagged, VLAN tagged, and priority tagged frames. The Switch Fabric provides an extensive feature set which includes spanning tree protocol support, multicast packet filtering and Quality of Service (QoS) packet prioritization by VLAN tag, destination address, port default value or DIFFSERV/TOS, allowing for a range of prioritization implementations. 32K of buffer RAM allows for the storage of multiple packets while forwarding operations are completed, and a 512 entry forwarding table provides ample room for MAC address forwarding tables. Each port is allocated a cluster of 4 dynamic QoS queues which allow each queue size to grow and shrink with traffic, effectively utilizing all available memory. This memory is managed dynamically via the Buffer Manager block within the Switch Fabric. All aspects of the Switch Fabric are managed via the Switch Fabric configuration and status registers, which are indirectly accessible via the system control and status registers.

The LAN9303/LAN9303i provides 3 switched ports. Each port is fully compliant with the IEEE 802.3 standard and all internal MACs and PHYs support full/half duplex 10BASE-T and 100BASE-TX operation. The LAN9303/LAN9303i provides 2 on-chip PHYs, 1 Virtual PHY and 3 MACs. The Virtual PHY and the third MAC are used to connect the Switch Fabric to an external MAC or PHY. In MAC mode, the device can be connected to an external PHY via the MII/Turbo MII interface. In PHY mode, the device can be connected to an external MAC via the MII/RMII/Turbo MII interface. All ports support automatic or manual full duplex flow control or half duplex backpressure (forced collision) flow control. 2K jumbo packet (2048 byte) support allows for oversized packet transfers, effectively increasing throughput while decreasing CPU load. All MAC and PHY related settings are fully configurable via their respective registers within the device.

The integrated I²C and SMI slave controllers allow for full serial management of the device via the integrated I²C or MII interface, respectively. The inclusion of these interfaces allows for greater flexibility in the incorporation of the device into various designs. It is this flexibility which allows the device to operate in 2 different modes and under various management conditions. In both MAC and PHY modes, the device can be SMI managed or I²C managed. This flexibility in management makes the LAN9303/LAN9303i a candidate for virtually all switch applications.

The LAN9303/LAN9303i contains an I²C master EEPROM controller for connection to an optional EEPROM. This allows for the storage and retrieval of static data. The internal EEPROM Loader can be optionally configured to automatically load stored configuration settings from the EEPROM into the device at reset. The I²C management slave and master EEPROM controller share common pins.

In addition to the primary functionality described above, the LAN9303/LAN9303i provides additional features designed for extended functionality. These include a configurable 16-bit General Purpose Timer (GPT), a 32-bit 25MHz free running counter, and 6-bit configurable GPIO/LED interface.

The LAN9303/LAN9303i's performance, features and small size make it an ideal solution for many applications in the consumer electronics and industrial automation markets. Targeted applications include: set top boxes (cable, satellite and IP), digital televisions, digital video recorders, voice over IP and video phone systems, home gateways, and test and measurement equipment.

2.2.1 System Clocks/Reset/PME Controller

A clock module generates all the system clocks required by the device. This module interfaces directly with the external 25MHz crystal/oscillator to generate the required clock divisions for each internal module. A 16-bit general purpose timer and 32-bit free-running clock are provided by this module for general purpose use. The Port 1 & 2 PHYs provide general power-down and energy detect power-down modes, which allow a reduction in PHY power consumption.

The device reset events are categorized as chip-level resets, multi-module resets, and single-module resets. These reset events are summarized below:

- **Chip Level Resets**
 - Power-On Reset (Entire chip reset)
 - nRST Pin Reset (Entire chip reset)
- **Multi-Module Reset**
 - Digital Reset (All sub-modules except Ethernet PHYs)
- **Single-Module Resets**
 - Port 2 PHY Reset
 - Port 1 PHY Reset
 - Virtual PHY Reset

2.2.2 System Interrupt Controller

The device provides a multi-tier programmable interrupt structure which is controlled by the System Interrupt Controller. Top level interrupt registers aggregate and control all interrupts from the various sub-modules. The device is capable of generating interrupt events from the following:

- **Switch Fabric**
- **Ethernet PHYs**
- **GPIOs**
- **General Purpose Timer**
- **Software (general purpose)**

A dedicated programmable IRQ interrupt output pin is provided for external indication of any device interrupts. The IRQ buffer type, polarity, and de-assertion interval are register configurable.

2.2.3 Switch Fabric

The Switch Fabric consists of the following major function blocks:

- **10/100 MACs**

There is one 10/100 Ethernet MAC per Switch Fabric port, which provides basic 10/100 Ethernet functionality, including transmission deferral, collision back-off/retry, TX/RX FCS checking/generation, TX/RX pause flow control, and transmit back pressure. The 10/100 MACs act as an interface between the Switch Engine and the 10/100 PHYs (for ports 1 and 2). The port 0 10/100 MAC interfaces the Switch Engine to the external MAC/PHY (see [Section 2.3, "Modes of Operation"](#)). Each 10/100 MAC includes RX and TX FIFOs and per port statistic counters.
- **Switch Engine**

This block, consisting of a 3 port VLAN layer 2 switching engine, provides the control for all forwarding/filtering rules and supports untagged, VLAN tagged, and priority tagged frames. The Switch Engine provides an extensive feature set which includes spanning tree protocol support, multicast packet filtering and Quality of Service (QoS) packet prioritization by VLAN tag, destination address, and port default value or DIFFSERV/TOS, allowing for a range of prioritization implementations. A 512 entry forwarding table provides ample room for MAC address forwarding tables.

- **Buffer Manager**
This block controls the free buffer space, multi-level transmit queues, transmission scheduling, and packet dropping of the Switch Fabric. 32K of buffer RAM allows for the storage of multiple packets while forwarding operations are completed. Each port is allocated a cluster of 4 dynamic QoS queues which allow each queue size to grow and shrink with traffic, effectively utilizing all available memory. This memory is managed dynamically via the Buffer Manager block.
- **Switch CSRs**
This block contains all switch related control and status registers, and allows all aspects of the Switch Fabric to be managed. These registers are indirectly accessible via the system control and status registers.

2.2.4 Ethernet PHYs

The device contains three PHYs: Port 1 PHY, Port 2 PHY and a Virtual PHY. The Port 1 & 2 PHYs are identical in functionality and each connect their corresponding Ethernet signal pins to the Switch Fabric MAC of their respective port. These PHYs interface with their respective MAC via an internal MII interface. The Virtual PHY provides the virtual functionality of a PHY and allows connection of an external MAC to port 0 of the Switch Fabric as if it was connected to a single port PHY. All PHYs comply with the IEEE 802.3 Physical Layer for Twisted Pair Ethernet and can be configured for full/half duplex 100 Mbps (100BASE-TX) or 10Mbps (10BASE-T) Ethernet operation. All PHY registers follow the IEEE 802.3 (clause 22.2.4) specified MII management register set.

2.2.5 PHY Management Interface (PMI)

The PHY Management Interface (PMI) is used to serially access the internal PHYs as well as the external PHY on the MII pins (in MAC mode only, see [Section 2.3, "Modes of Operation"](#)). The PMI implements the IEEE 802.3 management protocol, providing read/write commands for PHY configuration.

2.2.6 I²C Slave Controller

This module provides an I²C slave interface which can be used for CPU serial management of the device. The I²C slave controller implements the low level I²C slave serial interface (start and stop condition detection, data bit transmission/reception, and acknowledge generation/reception), handles the slave command protocol, and performs system register reads and writes. The I²C slave controller conforms to the NXP *I²C-Bus Specification*. A list of management modes and configurations settings for these modes is discussed in [Section 2.3, "Modes of Operation"](#)

2.2.7 SMI Slave Controller

This module provides a SMI slave interface which can be used for CPU management of the device via the MII pins, and allows CPU access to all system CSRs. SMI uses the same pins and protocol of the IEEE MII management function, and differs only in that SMI provides access to all internal registers by using a non-standard extended addressing map. The SMI protocol co-exists with the MII management protocol by using the upper half of the PHY address space (16 through 31). A list of management modes and configurations settings for these modes is discussed in [Section 2.3, "Modes of Operation"](#)

2.2.8 EEPROM Controller/Loader

The EEPROM Controller is an I²C master module which interfaces an optional external EEPROM with the system register bus and the EEPROM Loader. Multiple sizes of external EEPROMs are supported along with various EEPROM commands, allowing for the efficient storage and retrieval of static data. The I²C interface conforms to the NXP *I²C-Bus Specification*.

The EEPROM Loader module interfaces to the EEPROM Controller, Ethernet PHYs, and the system CSRs. The EEPROM Loader provides the automatic loading of configuration settings from the

EEPROM into the device at reset, allowing the device to operate unmanaged. The EEPROM Loader runs upon a pin reset (nRST), power-on reset (POR), digital reset, or upon the issuance of a EEPROM RELOAD command.

2.2.9 GPIO/LED Controller

Six configurable general-purpose input/output pins are provided which are controlled via this module. These pins can be individually configured via the GPIO/LED CSRs to function as inputs, push-pull outputs, or open drain outputs and each is capable of interrupt generation with configurable polarity. The GPIO pins can be alternatively configured as LED outputs to drive Ethernet status LEDs for external indication of various attributes of the switch ports.

2.3 Modes of Operation

The LAN9303/LAN9303i is designed to integrate into various embedded environments. To accomplish compatibility with a wide range of applications, the LAN9303/LAN9303i ports can operate in the following modes:

- Port 0 - Independently configured for MII MAC, MII PHY, RMII PHY modes
- Port 1 - Internal PHY mode
- Port 2 - Internal PHY mode

The mode of the device is determined by the P0_MODE[2:0] (Port 0) pin straps.

The device can also be placed into the following management modes:

- SMI managed
- I²C managed

The management mode is determined by the MNGT1_LED4P and MNGT0_LED3P pin straps. These modes are detailed in the following sections. [Figure 2.4](#) displays a typical system configuration for each Port 0 mode and management type supported by the device. Refer to [Chapter 9, "MII Data Interface," on page 123](#) for additional information on the usage of MII signals in each supported mode.

2.3.1 Internal PHY Mode

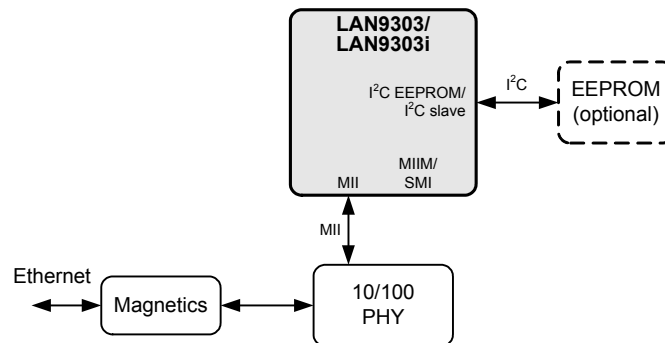
Internal PHY mode (Port 1 and Port 2) utilizes the internal PHY for the network connection. The Switch Engine MAC's MII port is connected internally to the internal PHY in this mode. Internal PHY mode can operate at 10Mbps or 100Mbps.

When an EEPROM is connected, the EEPROM loader can be used to load the initial device configuration from the external EEPROM via the I²C interface. Once operational, if managed, the CPU can use the I²C interface to read or write the EEPROM.

2.3.2 MAC Mode

MAC mode utilizes an external PHY, which is connected to the Port 0 MII pins, to provide an Ethernet network connection. In this mode, the port acts as a MAC, providing a communication path between the Switch Fabric and the external PHY. MAC mode can operate at 10, 100, or 200Mbps (Turbo mode). In MAC mode, the device may be SMI managed or I²C managed as detailed in [Section 2.3.4, "Management Modes"](#).

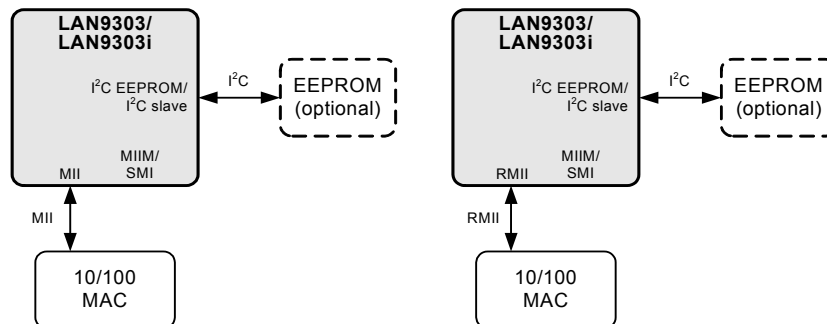
When an EEPROM is connected, the EEPROM loader can be used to load the initial device configuration from the external EEPROM via the I²C interface. Once operational, if managed, the CPU can use the I²C interface to read or write the EEPROM.


Figure 2.2 MII MAC Mode

2.3.3 PHY Mode

PHY mode utilizes an external MAC to provide a network path for the CPU. PHY mode supports MII and RMII interfaces. The external MII/RMII pins must be connected to an external MAC, providing a communication path to the Switch Fabric. MII PHY mode can operate at 10, 100, or 200Mbps (Turbo mode). RMII PHY mode can operate at 10 or 100Mbps. In PHY mode, the device may be SMI managed or I²C managed as detailed in [Section 2.3.4, "Management Modes"](#).

When an EEPROM is connected, the EEPROM loader can be used to load the initial device configuration from the external EEPROM via the I²C interface. Once operational, if managed, the CPU can use the I²C interface to read or write the EEPROM.


Figure 2.3 MII/RMII PHY Mode

2.3.4 Management Modes

Various modes of management are provided in both MAC and PHY modes of operation. Two separate interfaces may be used for management: the I²C interface or the SMI/MIIM (Media Independent Interface Management) slave interface.

The I²C interface runs as an I²C slave. The slave mode is used as a register access path for an external CPU. The I²C slave and I²C master EEPROM interface are shared interfaces.

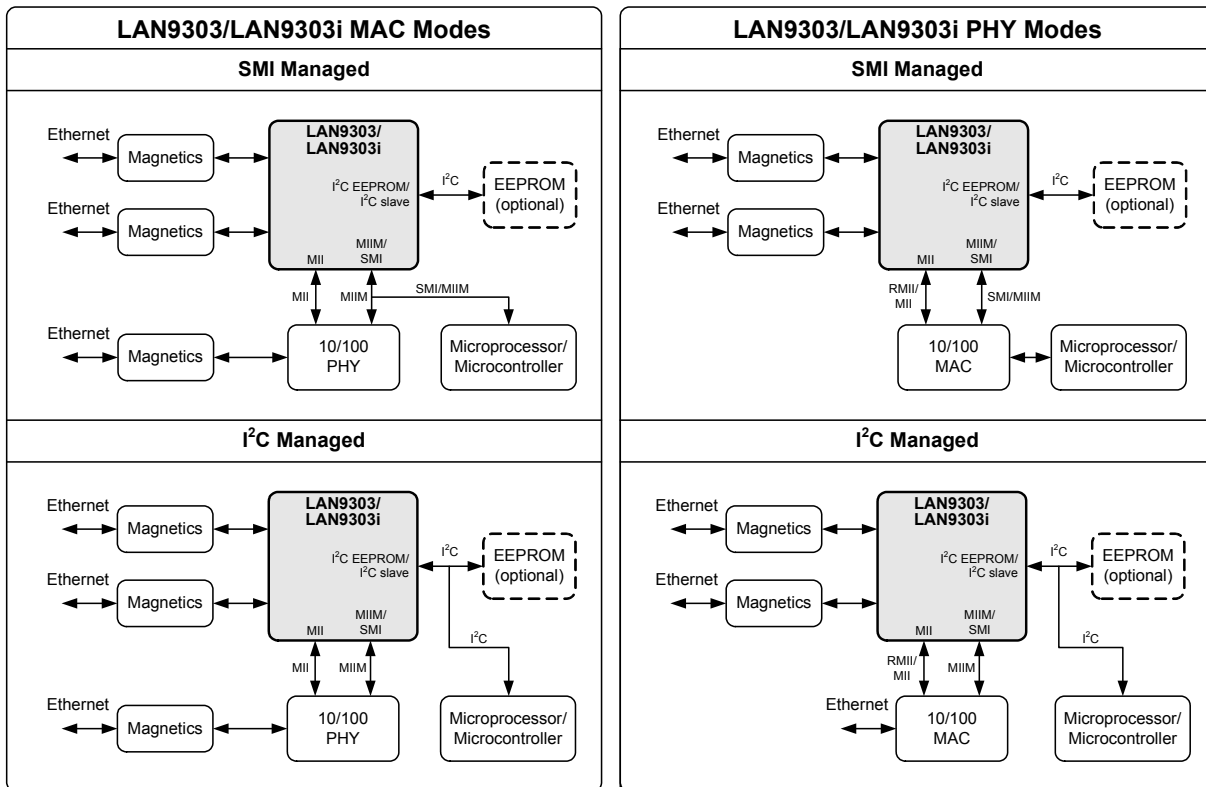
Datasheet

The SMI/MIIM interface runs as either an SMI/MIIM slave or MIIM master. The master mode is used to access an external PHYs registers under CPU control (assuming the CPU is using I²C). The slave mode is used for register access by the CPU or external MAC and provides access to either the internal Port 1&2 PHY registers or to all non-PHY registers (using addresses 16-31 and a non-standard extended address map). MIIM and SMI use the same pins and protocol and differ only in that SMI provides access to all internal registers while MIIM provides access to only the Port 1&2 PHY registers. A special mode provides access to the Virtual PHY, which mimics the register operation of a single port standalone PHY. This is used for software compatibility in managed operation.

The selection of management modes is determined at startup via the P0_MODE[2:0], MNGT1_LED4P, and MNGT0_LED3P straps as detailed in [Table 2.1](#). System configuration diagrams for each mode are provided in [Figure 2.4](#).

Table 2.1 Device Modes

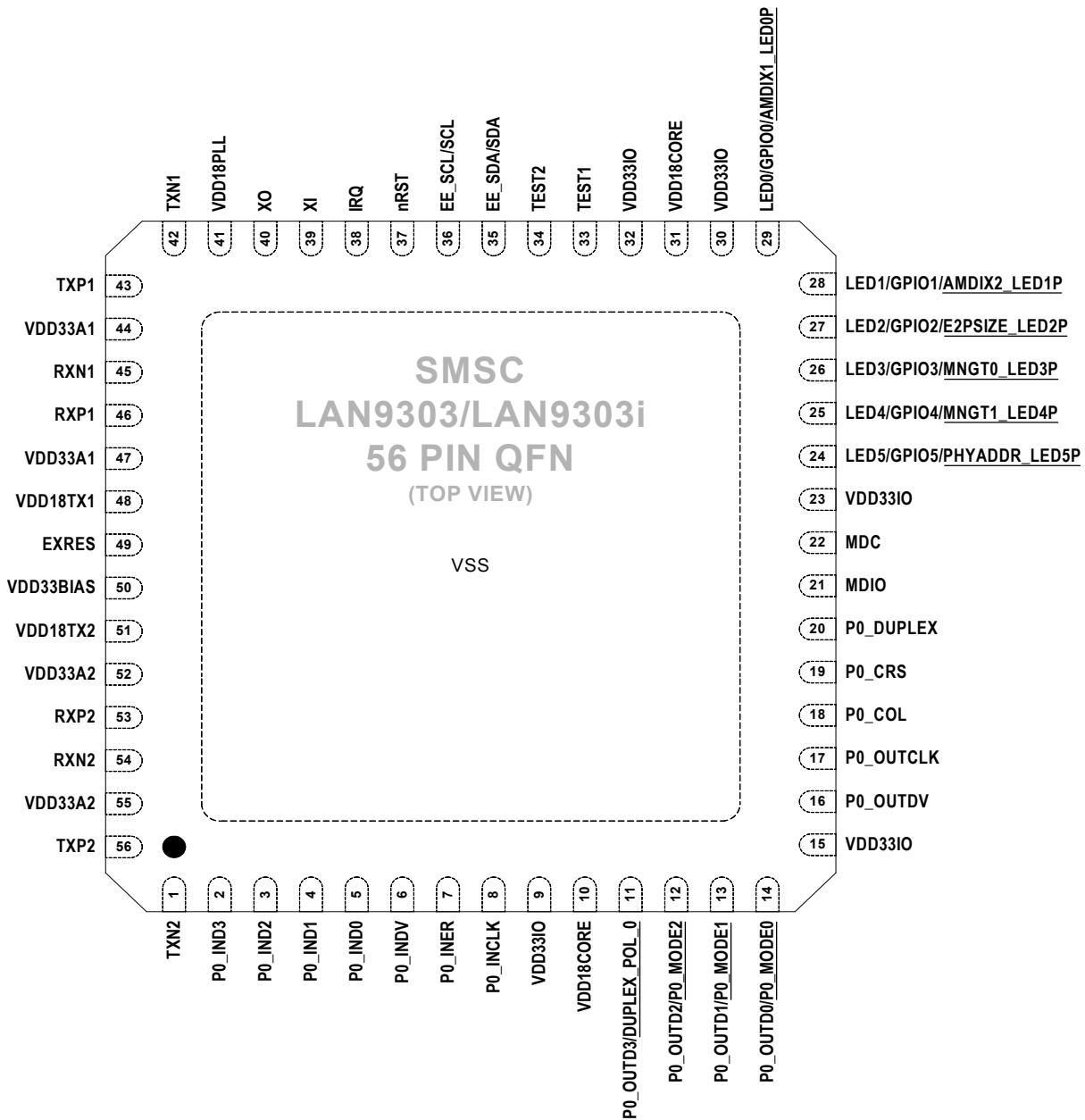
MODE	I²C INTERFACE (MASTER/SLAVE)	SMI/MIIM INTERFACE	P0_MODE[2:0] STRAP VALUE	<u>MNGT1_LED4P</u>, <u>MNGT0_LED3P</u> RAP VALUE
MAC SMI	I ² C master used to load initial configuration from EEPROM and for CPU R/W access to EEPROM	SMI/MIIM slave, used for CPU access to internal PHYs and non-PHY registers	000	01
MAC I ² C	I ² C master used to load initial configuration from EEPROM and for CPU R/W access to EEPROM I ² C slave used for management	MIIM master, used for CPU access to external PHY registers	000	10
PHY SMI	I ² C master used to load initial configuration from EEPROM and for CPU R/W access to EEPROM	SMI/MIIM slave, used for CPU access to internal PHYs, Virtual PHY, and non-PHY registers	001, 010, 011, 100, 101, or 110	01
PHY I ² C	I ² C master used to load initial configuration from EEPROM and for CPU R/W access to EEPROM I ² C slave used for management	Virtual MIIM slave, used for external MAC access to Virtual PHY registers	001, 010, 011, 100, 101, or 110	10


Figure 2.4 Port 0 MAC/PHY Management Modes

Chapter 3 Pin Description and Configuration

3.1 Pin Diagram

3.1.1 56-QFN Pin Diagram



NOTE: When HP Auto-MDIX is activated, the TXN/TXP pins can function as RXN/RXP and vice-versa

NOTE: Exposed pad (VSS) on bottom of package must be connected to ground

Figure 3.1 Pin Assignments (TOP VIEW)

3.2 Pin Descriptions

This section contains the descriptions of the device pins. The pin descriptions have been broken into functional groups as follows:

- [LAN Port 1 Pins](#)
- [LAN Port 2 Pins](#)
- [LAN Port 1 & 2 Power and Common Pins](#)
- [Port 0 MII/RMII Pins](#)
- [GPIO/LED/Configuration Straps](#)
- [Serial Management/EEPROM Pins](#)
- [Miscellaneous Pins](#)
- [PLL Pins](#)
- [Core and I/O Power and Ground Pins](#)

Note: A list of buffer type definitions is provided in [Section 3.3, "Buffer Types,"](#) on page 41.

Note: Please refer to the LAN9303/LAN9303i Reference Schematic and LANCheck Schematic Checklist on the SMSC website for additional connection information.

Table 3.1 LAN Port 1 Pins

NUM PINS	NAME	SYMBOL	BUFFER TYPE	DESCRIPTION
1	Port 1 Ethernet TX Negative	TXN1	AIO	Negative output of Port 1 Ethernet transmitter. See Note 3.1 .
1	Port 1 Ethernet TX Positive	TXP1	AIO	Positive output of Port 1 Ethernet transmitter. See Note 3.1 .
1	Port 1 Ethernet RX Negative	RXN1	AIO	Negative input of Port 1 Ethernet receiver. See Note 3.1 .
1	Port 1 Ethernet RX Positive	RXP1	AIO	Positive input of Port 1 Ethernet receiver. See Note 3.1 .

Note 3.1 The pin names for the twisted pair pins apply to a normal connection. If HP Auto-MDIX is enabled and a reverse connection is detected or manually selected, the RX and TX pins will be swapped internally.

Table 3.2 LAN Port 2 Pins

NUM PINS	NAME	SYMBOL	BUFFER TYPE	DESCRIPTION
1	Port 2 Ethernet TX Negative	TXN2	AIO	Negative output of Port 2 Ethernet transmitter. See Note 3.2 .
1	Port 2 Ethernet TX Positive	TXP2	AIO	Positive output of Port 2 Ethernet transmitter. See Note 3.2 .
1	Port 2 Ethernet RX Negative	RXN2	AIO	Negative input of Port 2 Ethernet receiver. See Note 3.2 .
1	Port 2 Ethernet RX Positive	RXP2	AIO	Positive input of Port 2 Ethernet receiver. See Note 3.2 .

Datasheet

Note 3.2 The pin names for the twisted pair pins apply to a normal connection. If HP Auto-MDIX is enabled and a reverse connection is detected or manually selected, the RX and TX pins will be swapped internally.

Table 3.3 LAN Port 1 & 2 Power and Common Pins

NUM PINS	NAME	SYMBOL	BUFFER TYPE	DESCRIPTION
1	Bias Reference	EXRES	AI	Used for internal bias circuits. Connect to an external 12.4K ohm, 1% resistor to ground.
2	+3.3V Port 1 Analog Power Supply	VDD33A1	P	See Note 3.3 .
2	+3.3V Port 2 Analog Power Supply	VDD33A2	P	See Note 3.3 .
1	+3.3V Master Bias Power Supply	VDD33BIAS	P	See Note 3.3 .
1	Port 2 Transmitter +1.8V Power Supply	VDD18TX2	P	This pin is supplied from the internal PHY voltage regulator. This pin must be tied to the VDD18TX1 pin for proper operation. See Note 3.3 .
1	Port 1 Transmitter +1.8V Power Supply	VDD18TX1	P	This pin must be connected directly to the VDD18TX2 pin for proper operation. See Note 3.3 .

Note 3.3 Please refer to the LAN9303/LAN9303i Reference Schematic and LANCheck Schematic Checklist on the SMSC website for additional connection information.

Table 3.4 Port 0 MII/RMII Pins

NUM PINS	NAME	SYMBOL	BUFFER TYPE	DESCRIPTION
1	Port 0 MII Input Data 3	P0_IND3	IS (PD)	MII MAC Mode: This pin is the receive data 3 bit from the external PHY to the switch.
			IS (PD)	MII PHY Mode: This pin is the transmit data 3 bit from the external MAC to the switch. The pull-down and input buffer are disabled when the Isolate (VPHY_ISO) bit is set in the Virtual PHY Basic Control Register (VPHY_BASIC_CTRL) .
			-	RMII PHY Mode: This pin is not used.