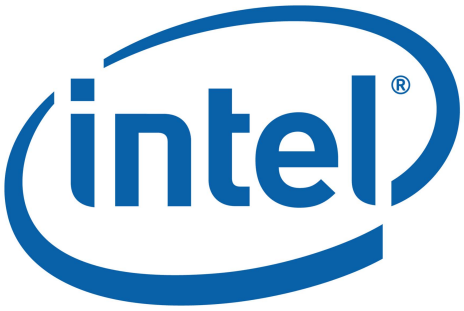


Intel® X557-AT/AT2/AT4 10 GbE PHY

Specification Update

Networking Division (ND)

August 2017

Revision 2.2
334678-002

Revision History

Revision	Date	Comments
2.2	August 25, 2017	**Specification Clarifications Added or updated:** • 1. MAC CRC Errors Resulting from Negotiated Fast Retrain Events (Added) **Errata added or updated:** • 4. 100BASE-TX ANSI X3.263 9.1.5 - Return Loss (Updated) • 6. 1000BASE-T IEEE802.3 40.6.1.2.1 – Peak Differential Output Voltage Level Violation (Added)
2.1	November 10, 2016	**Documentation Updates added or updated:** • 1. Maximum Operating Conditions Power Dissipation (Added) **Errata added or updated:** • 4. 100BASE-TX ANSI X3.263 9.1.5 - Return Loss (Added) • 5. Activity LED Blinks with No Active Link (Added) **Software Clarifications added or updated** • 3. KR Support Enabled (Added) **Miscellaneous Updates:** • Minor formatting changes to Table 1-1, "Markings" and Table 1-3, "MM Numbers".
2.0	April 17, 2015	Initial release (Intel Public).

1. Introduction

This document applies to the Intel® X557-AT/AT2/AT4 10 GbE PHY (X557).

This document is an update to a published specification, the *Intel® X557-AT/AT2/AT4 10 GbE PHY Datasheet*. It is intended for use by system manufacturers and software developers. All product documents are subject to frequent revision and new order numbers may apply. New documents may be added. Be sure you have the latest information before finalizing your design.

1.1 Product Code and Device Identification

Product Codes: EZX557-AT, EZX557-AT2, and EZX557-AT4

The following tables and drawings describe the various identifying markings on each device package:

Table 1-1 Markings

Device	Stepping	Top Marking	S-Specification	Description
X557-AT	B1	EZX557AT	S LKW4[1]	Intel® Ethernet Connection X557-AT (Single 19 x 19mm)
			S LKW5[2]	
X557-AT2	B1	EZX557AT2	S LKVX[1]	Intel® Ethernet Connection X557-AT2 (Dual 19 x 19mm)
			S LKVY[2]	
X557-AT4	B1	EZX557AT4	S LKVZ[1]	Intel® Ethernet Connection X557-AT4 (Quad 25 x 25mm)
			S LKW3[2]	

1. Tray.
2. Tape and Reel.

Table 1-2 Device ID

X557 Device	Vendor ID	Device ID
Intel® Ethernet Connection X557-AT (Single 19x19mm)	8086	0xB4A3
Intel® Ethernet Connection X557-AT2 (Dual 19x19mm)	8086	0xB4C3
Intel® Ethernet Connection X557-AT4 (Quad 25x25mm)	8086	0xB4B3

Table 1-3 MM Numbers

Product	S-Specification	Tray MM#	Tape and Reel MM#
EZX557-AT	S LKW4[1]	941979	---
	S LKW5[2]	---	942009
EZX557-AT2	S LKVX[1]	941974	---
	S LKVY[2]	---	941994
EZX557-AT4	S LKVZ[1]	941975	---
	S LKW3[2]	---	941995

1. Tray.
2. Tape and Reel.

1.2 Marking Diagram

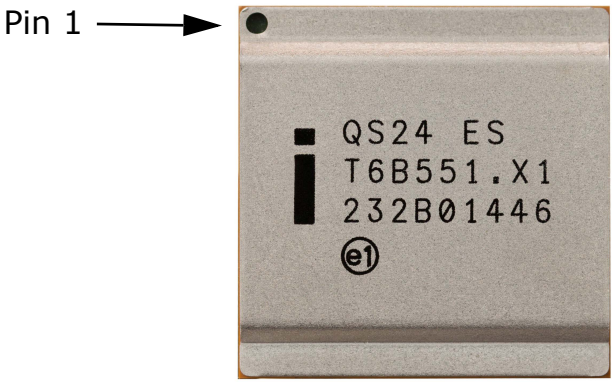
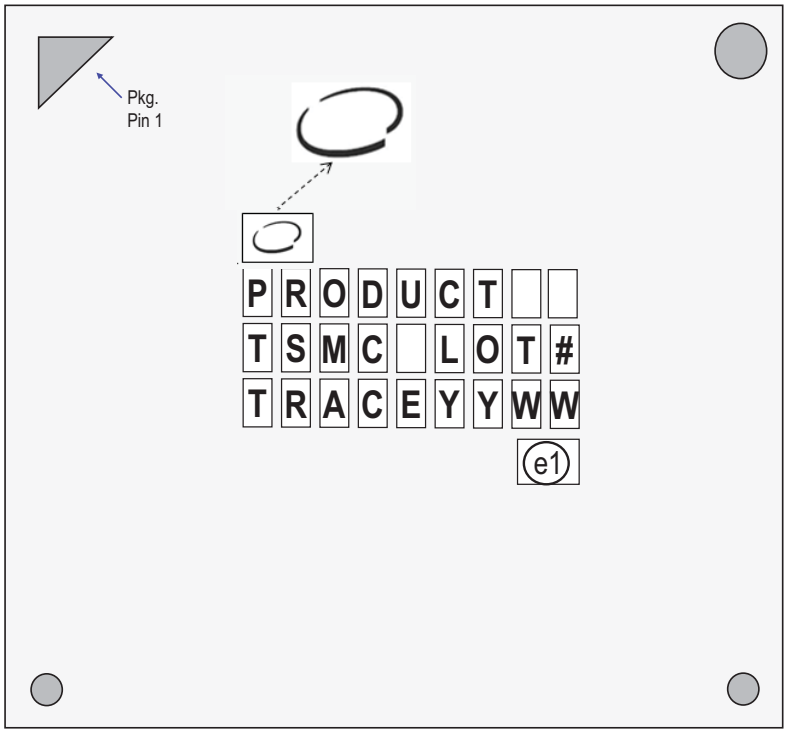


Figure 1-1 Example with Identifying Marks



- LINE 1: Product code or Q spec
- LINE 2: TSMC Lot#
- LINE 3: Trace code, Assy YYWW
- LINE 4: Pb-free mark

1.3 Nomenclature Used in This Document

This document uses specific terms, codes, and abbreviations to describe changes, errata, and/or clarifications that apply to silicon/steppings. See Table 1-4 for a description.

Table 1-4 Nomenclature

Name	Description
Specification Clarifications	Greater detail or further highlights concerning a specification's impact to a complex design situation. These clarifications will be incorporated in the next release of the specifications.
Specification Changes	Modifications to the current published specifications. These changes will be incorporated in the next release of the specifications.
Errata	Design defects or errors. Errata may cause device behavior to deviate from published specifications. Hardware and software designed to be used with any given stepping must assume that all errata documented for that stepping are present on all devices.
Software Clarifications	Applies to Intel drivers, EEPROM loads.
Documentation Changes	Typos, errors, or omissions from the current published specifications. These changes will be incorporated in the next release of the specifications.
A0, B0, etc.	Stepping to which the status applies.
Doc	Document change or update that will be implemented.
Fixed	This erratum has been fixed.
Fix Planned	This erratum is intended to be fixed in a future stepping of the component.
NoFix	There are no plans to fix this erratum.
Eval	Plans to fix this erratum are under evaluation.

2. Hardware Clarifications, Changes, Updates and Errata

See Section 1.3 for an explanation of terms, codes, and abbreviations.

Table 2-1 Summary of Specification Clarifications

Specification Clarification	Status
1. MAC CRC Errors Resulting from Negotiated Fast Retrain Events	N/A

Table 2-2 Summary of Specification Changes

Specification Change	Status
None	N/A

Table 2-3 Summary of Documentation Changes

Documentation Update	Status
1. Maximum Operating Conditions Power Dissipation	N/A

Table 2-4 Summary of Errata; Errata Include Steppings

Erratum	Status
1. MDC/MDIO Maximum Operating Frequency	B1=Yes; NoFix
2. 100BASE-TX Amplitude	B1=Yes; NoFix
3. RST_N Pin Triggering Levels for Power On Reset (POR)	B1=Yes; NoFix
4. 100BASE-TX ANSI X3.263 9.1.5 - Return Loss	B1=Yes; NoFix
5. Activity LED Blinks with No Active Link	B1=Yes; Eval
6. 1000BASE-T IEEE802.3 40.6.1.2.1 – Peak Differential Output Voltage Level Violation	B1=Yes; NoFix

2.1 Specification Clarifications

1. MAC CRC Errors Resulting from Negotiated Fast Retrain Events

Electromagnetic Interference (EMI) or Radio Frequency Interference (RFI) events that trigger the Negotiated Fast Retrain protocol within the device result in MAC layer CRC errors at a rate of approximately 1-2 errors per event. The Negotiated Fast Retrain event results in a minor interruption of the data stream (up to 280 milliseconds), and some packet loss at the physical layer is to be expected. Higher layer protocols are expected to request replays of data that is missing.

Bit Error Ratio (BER) tests that are executed in more challenging environments where EMI/RFI is present or transient may experience errors at the MAC layer. Environmental chambers where the heating and cooling elements are in the same cabinet as the DUT are an example of this. If the target usage environment is one where significant EMI/RFI transients are present, and there is a desire to limit or eliminate errors as a result of these transients, then it may be necessary to utilize F/STP CAT6a cables and ensure that chassis design sufficiently shields the device from these events.

2.2 Specification Changes

None.

2.3 Documentation Updates

1. Maximum Operating Conditions Power Dissipation

Updated Power Dissipation table to accurately reflect the Maximum Functional Operating conditions of the X557. The following changes will be reflected in the *Intel® X557-AT/AT2/AT4 10 GbE PHY Datasheet*, Revision 2.3:

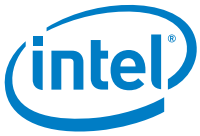
6.4.1 Power Consumption

Power Numbers are based on estimation data and related to single, dual or quad PHY.

- Maximum Functional power mode: FAST material, Vnom, TJ-max (105 °C)
- Maximum Recommended power mode: FAST material, Vnom, TJ-max (85 °C)
- Other operational modes: Typical material, Vnom, TJ-max (80 °C)

6.4.1.1 X557-AT

X557-AT	Device Total Power (W)
10 GbE Max Functional Active	4.2
10 GbE Max Recommended Active	3.85
10 GbE Max 30 m Reach	3.22
1 GbE Active	1.97
100 Mb/s Active	1.4
Low Power Mode (no WoL)	1.3



6.4.1.3 X557-AT Peak Current Consumption During 10GBASE-T Training

2.5 V	2.1 V	1.2 V	0.83 V
100 mA	500 mA	400 mA	4100 mA

6.4.1.4 X557-AT2

X557-AT2	Device Total Power (W)
10 GbE Max Functional Active	8.4
10 GbE Max Recommended Active	7.7
10 GbE Max 30 m Reach	6.44
1 GbE Active	3.94
100 Mb/s Active	2.8
Low Power Mode (no WoL)	2.6

6.4.1.6 X557-AT2 Peak Current Consumption During 10GBASE-T Training

2.5 V	2.1 V	1.2 V	0.83 V
200 mA	1000 mA	800 mA	8200 mA

6.4.1.7 X557-AT4

X557-AT4	Device Total Power (W)
10 GbE Max Functional Active	16.8
10 GbE Max Recommended Active	15.4
10 GbE Max 30 m Reach	12.88
1 GbE Active	7.88
100 Mb/s Active	5.6
Low Power Mode (no WoL)	5.2

6.4.1.10 X557-AT4 Peak Current Consumption During 10GBASE-T Training

2.5 V	2.1 V	1.2 V	0.83 V
400 mA	2000 mA	1600 mA	16400 mA

2.4 Errata

1. MDC/MDIO Maximum Operating Frequency

Problem:

The MDIO's Hi-Z to output valid time is higher than expected.

Implication:

The recommended maximum operating frequency for the MDC/MDIO interface is 10.5 MHz when its operating voltage level is set to VDD_IO of 2.5 V. The recommended maximum operating frequency for the MDC/MDIO interface is 2 MHz when its operating voltage level is set to 1.2 V.

Workaround:

None.

Status: B1=Yes; NoFix

2. 100BASE-TX Amplitude

Problem:

100BASE-TX amplitude might be out of specification during corner case testing.

Implication:

No performance impact.

Workaround:

None.

Status: B1=Yes; NoFix

3. RST_N Pin Triggering Levels for Power On Reset (POR)

Problem:

RST_N pin triggering levels for POR does not meet the hysteresis specification requirement.

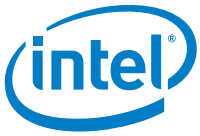
Implication:

Unintended rest condition might occur under noisy signaling environments. This failure mode has not been seen while following the detail reference design recommendations.

Workaround:

None.

Status: B1=Yes; NoFix



4. 100BASE-TX ANSI X3.263 9.1.5 - Return Loss

Problem:

100BASE-TX return loss test may violate the ANSI X3.263 9.1.5 specification during conformance testing. The violation may be observed when testing 115 Ω return loss.

Implication:

There is no expected performance impact.

Workaround:

None.

Status: B1=Yes; NoFix

5. Activity LED Blinks with No Active Link

Problem:

The Activity LED blinks intermittently even in the absence of link.

Implication:

None.

Workaround:

None.

Status: B1=Yes; Eval

6. 1000BASE-T IEEE802.3 40.6.1.2.1 – Peak Differential Output Voltage Level Violation

Problem:

1000BASE-T output voltage level generated by Test Mode 1 may violate the IEEE 802.3 40.6.1.2.1 specification at points A and B.

This issue applies only to firmware versions in the range 2.B.2.A - 2.B.9.A.

Implication:

There is no expected performance impact.

Workaround:

None.

Status: B1=Yes; NoFix

3. Software Clarifications

Table 3-1 Summary of Software Clarifications

Software Clarification	Status
1. Energy Efficient Ethernet (EEE) Support	N/A
2. Thermal Sensor Support	N/A
3. KR Support Enabled	N/A

1. Energy Efficient Ethernet (EEE) Support

EEE interface mode is not available at initial X557 release. As a result, 1 GbE and 10 GbE power is not optimized.

Contact your local Intel representative for details about EEE support in the future.

2. Thermal Sensor Support

X557 temperature reporting to appropriately adjust system fans through the related Media Access Controller (MAC) NC-SI/SMBus capability is not available at initial X557 release.

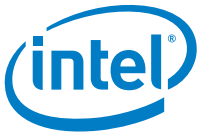
X557 autonomous software (out-of-band) thermal shutdown capability is not available at initial X557 release.

Note: In-band (software device driver controlled) thermal shutdown capability is supported.

Contact your local Intel representative for details about thermal sensor support in the future.

3. KR Support Enabled

The X557 KR interface is now enabled as of firmware version 2.B.3.



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