



## 90nm Single Port Embeddable Gigabit Ethernet Transceiver

Data Brief

### Main features

- Fully standards compliant: IEEE 802.3, IEEE 802.3u, IEEE 802.3z and IEEE 802.3ab
- Advanced Cable Diagnostic Features:
  - hard fault detection
  - Inter pair short
  - Excessive cable mismatch
  - Excessive cable cross-talk
- BER better than  $10^{-10}$  in 1000BASE-T mode,  $10^{-8}$  in 100BASE-TX mode, on cat5 cables exceeding 150 mt of length
- Six different operating modes
  - 1000BASE-T Full Duplex and 1000BASE-T Half Duplex
  - 100BASE-TX Full Duplex and 100BASE-TX Half Duplex
  - 10BASE-T Full Duplex and 10BASE-T Half Duplex
- Configurable MAC interface: MII, GMII or TBI
- Automatic configurable operating mode and MAC interface
- Hardware configurable default operation
- Automatic detection and correction of pair swaps (Auto-MDIX), pair skew and pair polarity
- Configuration interface
- Interrupt management
- On-chip transmit wave-shaping, hybrid circuit and base line wander compensation
- 10KB jumbo frames
- Internal, external and remote loop back
- Status LED controller
- Advanced power down mode
- Very high Cable ESD tolerance
- Low EMI emission
- JTAG (IEEE 1149.1) interface

### IP embeddability and system development

- Full support of leading edge EDA design platforms for easy integration in ST advanced System on Chip design flow and Customer Owned Tooling (COT) design environment
- Evaluation environment with LPQFP 128 pin devices available

### Operating conditions

- Supply voltage:
  - 1.0V for Digital Core
  - 2.5V and 1.0V for Analog
- Temperature range: 0-85°C
- Power consumption: < 1W (typical, inclusive of consumption from all power supplies, xtrm central taps and considering Class A driver for low EMI)

### Typical applications

- Ethernet Switches
- Hubs/Repeaters
- Up-link Interfaces
- Network Interface Cards (NICs)
- LAN on Mother board (LOM)

### General description

The GIGA090 is a high performance, low power, embeddable single port transceiver featuring all the physical layer interface functions for Gigabit Ethernet over 100-meter and above CAT 5 cabling.

100BASE-TX and 10BASE-T modes are also available, enabling a smooth transition from current 10/100 networks to 1000Mbps-based networks.

GIGA090 is based on standard STMicroelectronics' 90nm CMOS technology for low power, low cost and high integration.

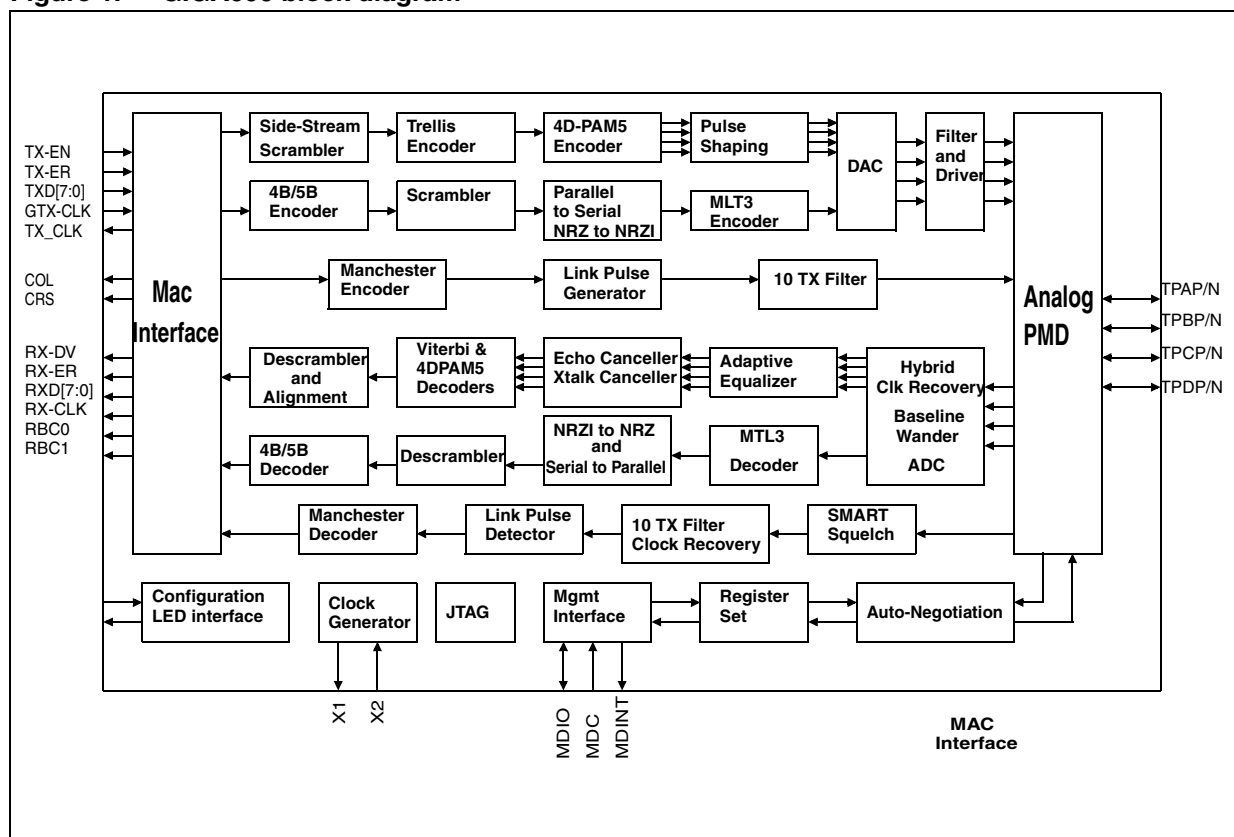
## Functional Description

GIGA090 IP supports three different Ethernet protocols: 10BASE-T, 100BASE-TX and 1000BASE-T, and can be configured to either Full Duplex or Half Duplex mode for each protocol. GIGA090 IP integrates all encoding, decoding, data recovery, clock recovery, scrambling, descrambling, digital adaptive equalization, echo cancellation, crosstalk cancellation, ADC, DAC, line transmission, link integrity, MAC and management interface functions that are required for 10Mb/s, 100Mb/s, and 1000Mb/s data transmission. It can be manually configured, be programmed or automatically determine its operating mode depending on the capabilities of the transceiver on the opposite end of the link and the capabilities of the cable.

The GIGA090 IP consists of 8 functional blocks:

- Auto-Negotiation block, which is responsible for advertising the chip's capabilities and establishing the link.
- Management Register block, which contains all the configuration registers
- Management Data Interface
- Physical Coding Sublayer block, which contains the 1000/100/10 Base T sub-blocks
- Mac Interface.
- DPMA: Digital Physical Media Attachment, which consists of 1000/100/10 Base T sub-blocks:
- Clock Distribution and Reset circuitry.
- Status LED management block.

**Figure 1. GIGA090 block diagram**



# 1 Revision history

**Table 1. Document revision history**

Date	Revision	Changes
24-Feb-2006	1	Initial release.

**Please Read Carefully:**

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

**UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.**

**UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED REPRESENTATIVE OF ST, ST PRODUCTS ARE NOT DESIGNED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS, WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE.**

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2006 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

[www.st.com](http://www.st.com)