

TMP86FS49BUG
TMP86FS49BFG
NEW **TMP86FS49BNG**

FLASH

**8-bit microcontroller with flash memory, various serial interfaces
and enhanced 10-bit AD converter**

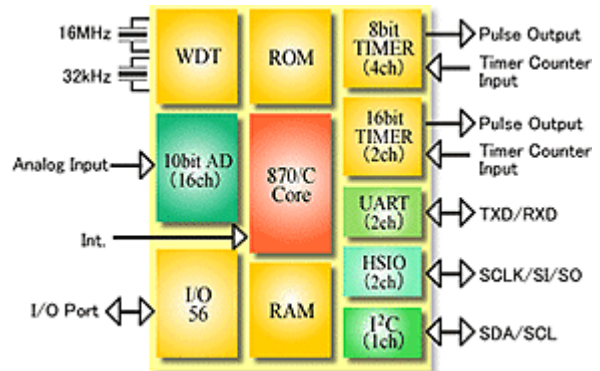
Features

TLCS-870/C CPU Core

- ▶ Operating voltage
 - 4.5 to 5.5 V at 16 MHz (erase/write)
 - 4.5 to 5.5 V at 16 MHz (read)
 - 2.7 to 5.5 V at 8 MHz (read)
 - 2.7 to 5.5 V at 32 KHz (read)

Built-in Functions

- ▶ I/O ports : 56 pins
- ▶ 16-bit timer : 2 channels
- ▶ 8-bit timer : 4 channels
- ▶ UART : 2 channels
- ▶ High-speed SIO : 2 channels
- ▶ I²C : 1 channel
- ▶ 10-bit AD converter : 16 channels
- ▶ Key-on wake-up : 4 channels



Memory Size

Part number	ROM (Flash)	RAM
TMP86FS49BUG	60 Kbytes	2048 bytes
TMP86FS49BFG	60 Kbytes	2048 bytes
TMP86FS49BNG	60 Kbytes	2048 bytes

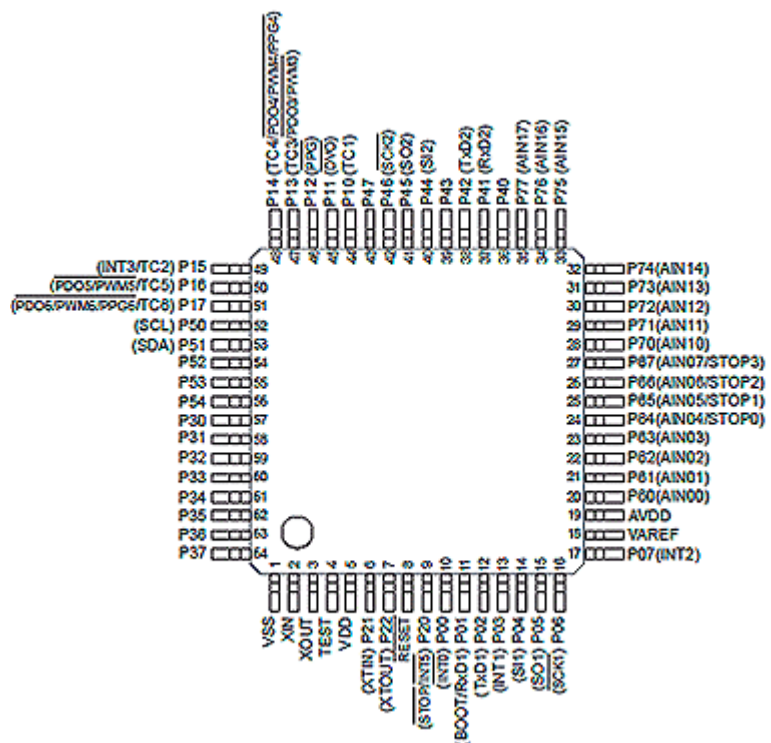
Product Lineup

Part number	ROM	RAM
TMP86CH49FG	16 Kbytes	512 bytes
TMP86CM49FG	32 Kbytes	1 Kbyte
TMP86CM49UG	32 Kbytes	1 Kbyte
TMP86CS49FG	60 Kbytes	2 Kbytes
TMP86CS49UG	60 Kbytes	2 Kbytes
TMP86PM49FG	32 Kbytes(OTP)	1 Kbyte
TMP86PM49UG	32 Kbytes(OTP)	1 Kbyte

* This product uses the SuperFlash® technology under license of Silicon Storage Technology, Inc. Super Flash® is a registered trademark of Silicon Storage Technology, Inc.

Package Information

Pin Assignments



Package UG: LQFP64 (10 × 10 mm) FG: QFP64 (14 × 14 mm)

P30	1	64	P54
P31	2	63	P53
P32	3	62	P52
P33	4	61	P51 (SDA)
P34	5	60	P50 (SCL)
P35	6	59	P17 (TC6/PDO6/PWM6/PPG6)
P36	7	58	P16 (TC5/PDO5/PWM5)
P37	8	57	P15 (TC2/INT3)
VSS	9	56	P14 (TC4/PDO4/PWM4/PPG4)
XIN	10	55	P13 (TC3/PDO3/PWM3)
XOUT	11	54	P12 (PPG)
TEST	12	53	P11 (DVO)
VDD	13	52	P10 (TC1)
(XTIN) P21	14	51	P47
(XTOUT) P22	15	50	P46 (SCK2)
RESET	16	49	P45 (SO2)
(STOP/INT5) P20	17	48	P44 (SI2)
(INT0) P00	18	47	P43
(BOOT/RXD1) P01	19	46	P42 (TXD2)
(TXD1) P02	20	45	P41 (RXD2)
(INT1) P03	21	44	P40
(SI1) P04	22	43	P77 (AIN15)
(SO1) P05	23	42	P76 (AIN14)
(SCK1) P06	24	41	P75 (AIN13)
(INT2) P07	25	40	P74 (AIN12)
VAREF	26	39	P73 (AIN11)
AVDD	27	38	P72 (AIN10)
(AIN0) P60	28	37	P71 (AIN9)
(AIN1) P61	29	36	P70 (AIN8)
(AIN2) P62	30	35	P67 (AIN7/STOP3)
(AIN3) P63	31	34	P66 (AIN6/STOP2)
(STOP0/AIN4) P64	32	33	P65 (AIN5/STOP1)

Package NG: SDIP64

Development Systems

Software Products

Toshiba Integrated Development Environment	C Compiler	SW89CN0-ZCC: 1 license SW89CN3-ZCC: 10 licenses
	Integrated Development Environment	SW00MN0-ZCC: 1 license SW00MN3-ZCC: 10 licenses The controller and emulator comes with a single-seat download license.

Hardware Products Emulator

RTE870/C model 15 In-Circuit Emulation System	Controller	BM1040R0B-G
	Interface module	BMP86A100010B
	Emulation module	BMP86A200010B
	Target connection board	BMP86D064DG0A: LQFP64 (10×10) / BMP86D064DE0A: QFP64 (14×14)
	Emulation chip	TMP86C949XB
RTE870/C In-Circuit Emulation System	Emulator	HW86EG000AG
	Emulation chip	TMP86C949XBG

* Select either RTE870/C model 15 In-Circuit Emulation System or RTE870/C In-Circuit Emulation system. The RTE870/C In-Circuit Emulation System is, however, the only emulation system that can be employed for debugging and evaluating target systems based on the TMP86FS49BNG.

* As to hardware products, additional accessories are also needed.

» For further information about Toshiba microcomputers and Toshiba microcomputer development systems, please visit <http://www.semicon.toshiba.co.jp/eng/product/micro/index.html>

- Toshiba Corporation, and its subsidiaries and affiliates (collectively "TOSHIBA"), reserve the right to make changes to the information in this document, and related hardware, software and systems (collectively "Product") without notice.
 - This document and any information herein may not be reproduced without prior written permission from TOSHIBA. Even with TOSHIBA's written permission, reproduction is permissible only if reproduction is without alteration/omission.
 - Though TOSHIBA works continually to improve Product's quality and reliability, Product can malfunction or fail. Customers are responsible for complying with safety standards and for providing adequate designs and safeguards for their hardware, software and systems which minimize risk and avoid situations in which a malfunction or failure of Product could cause loss of human life, bodily injury or damage to property, including data loss or corruption. Before customers use the Product, create designs including the Product, or incorporate the Product into their own applications, customers must also refer to and comply with (a) the latest versions of all relevant TOSHIBA information, including without limitation, this document, the specifications, the data sheets and application notes for Product and the precautions and conditions set forth in the "TOSHIBA Semiconductor Reliability Handbook" and (b) the instructions for the application with which the Product will be used with or for. Customers are solely responsible for all aspects of their own product design or applications, including but not limited to (a) determining the appropriateness of the use of this Product in such design or applications; (b) evaluating and determining the applicability of any information contained in this document, or in charts, diagrams, programs, algorithms, sample application circuits, or any other referenced documents; and (c) validating all operating parameters for such designs and applications. **TOSHIBA ASSUMES NO LIABILITY FOR CUSTOMERS' PRODUCT DESIGN OR APPLICATIONS.**
 - Product is intended for use in general electronics applications (e.g., computers, personal equipment, office equipment, measuring equipment, industrial robots and home electronics appliances) or for specific applications as expressly stated in this document. Product is neither intended nor warranted for use in equipment or systems that require extraordinarily high levels of quality and/or reliability and/or a malfunction or failure of which may cause loss of human life, bodily injury, serious property damage or serious public impact ("Unintended Use"). Unintended Use includes, without limitation, equipment used in nuclear facilities, equipment used in the aerospace industry, medical equipment, equipment used for automobiles, trains, ships and other transportation, traffic signaling equipment, equipment used to control combustions or explosions, safety devices, elevators and escalators, devices related to electric power, and equipment used in finance-related fields. Do not use Product for Unintended Use unless specifically permitted in this document.
 - Do not disassemble, analyze, reverse-engineer, alter, modify, translate or copy Product, whether in whole or in part.
 - Product shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable laws or regulations.
 - The information contained herein is presented only as guidance for Product use. No responsibility is assumed by TOSHIBA for any infringement of patents or any other intellectual property rights of third parties that may result from the use of Product. No license to any intellectual property right is granted by this document, whether express or implied, by estoppel or otherwise.
 - **ABSENT A WRITTEN SIGNED AGREEMENT, EXCEPT AS PROVIDED IN THE RELEVANT TERMS AND CONDITIONS OF SALE FOR PRODUCT, AND TO THE MAXIMUM EXTENT ALLOWABLE BY LAW, TOSHIBA (1) ASSUMES NO LIABILITY WHATSOEVER, INCLUDING WITHOUT LIMITATION, INDIRECT, CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES OR LOSS, INCLUDING WITHOUT LIMITATION, LOSS OF PROFITS, LOSS OF OPPORTUNITIES, BUSINESS INTERRUPTION AND LOSS OF DATA, AND (2) DISCLAIMS ANY AND ALL EXPRESS OR IMPLIED WARRANTIES AND CONDITIONS RELATED TO SALE, USE OF PRODUCT, OR INFORMATION, INCLUDING WARRANTIES OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, ACCURACY OF INFORMATION, OR NONINFRINGEMENT.**
 - Do not use or otherwise make available Product or related software or technology for any military purposes, including without limitation, for the design, development, use, stockpiling or manufacturing of nuclear, chemical, or biological weapons or missile technology products (mass destruction weapons). Product and related software and technology may be controlled under the Japanese Foreign Exchange and Foreign Trade Law and the U.S. Export Administration Regulations. Export and re-export of Product or related software or technology are strictly prohibited except in compliance with all applicable export laws and regulations.
 - Product may include products subject to foreign exchange and foreign trade control laws.
 - Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. Please use Product in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. TOSHIBA assumes no liability for damages or losses occurring as a result of noncompliance with applicable laws and regulations.
- In addition to the above, the following are applicable only to development tools.
- Though TOSHIBA works continually to improve Product's quality and reliability, Product can malfunction or fail. Use the Product in a way which minimizes risk and avoid situations in which a malfunction or failure of Product could cause loss of human life, bodily injury or damage to property, including data loss or corruption. For using the Product, customers must also refer to and comply with the latest versions of all relevant TOSHIBA information, including without limitation, this document, the instruction manual, the specifications, the data sheets for Product.
 - Product is provided solely for the purpose of performing the functional evaluation of a semiconductor product. Please do not use Product for any other purpose, including without limitation, evaluation in high or low temperature or humidity, and verification of reliability.
 - Do not incorporate Product into your products or system. Products are for your own use and not for sale, lease or other transfer.

TOSHIBA
TOSHIBA CORPORATION
Semiconductor Company

<http://www.semicon.toshiba.co.jp/eng/>

Copyright © 1995-2011 TOSHIBA CORPORATION, All Rights Reserved.