

TOSHIBA

Leading Innovation >>>

Microcontrollers

Toshiba Microcontrollers for Automotive Applications

~ Functions and Features~

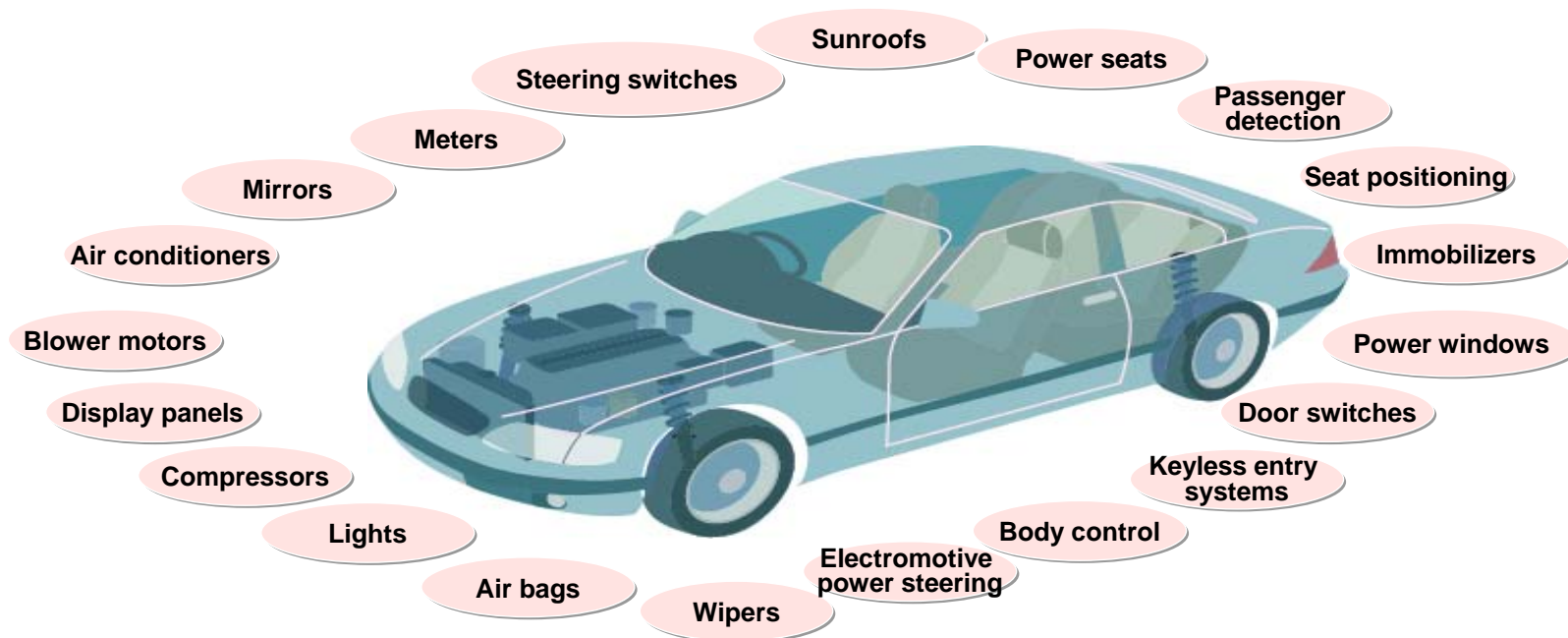
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TOSHIBA CORPORATION
Semiconductor Company

Toshiba Automotive Microcontrollers

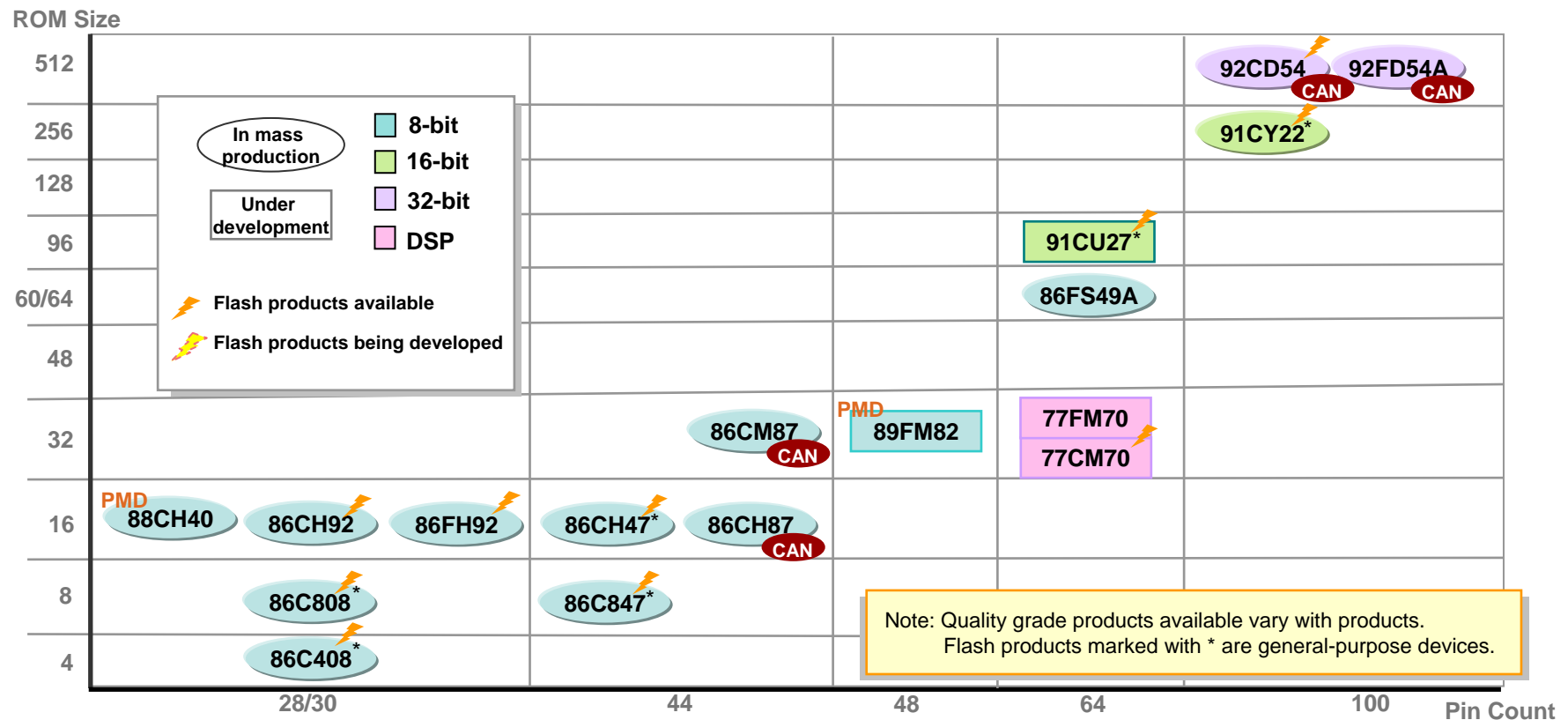
Toshiba offers a wide selection of automotive microcontrollers with motor control and CAN in a variety of packages. These microcontrollers meet Toshiba's exacting automotive grade standards to ensure high quality in a wide range of operating temperatures. ^{Note)}



Note) For details about the automotive grade products, please contact your local Toshiba sales representative.

Toshiba Automotive Microcontroller Roadmap

Building on long-time expertise in automotive microcontrollers, Toshiba offers a wide selection of high-quality grade products for powertrain, safety, and body systems.



Toshiba 8-/32-Bit CAN Microcontroller Lineup



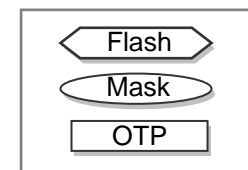
8-bit 870/C Core
Sensor/Body Systems

4 mailboxes

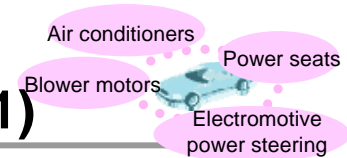
32KB/1KB	86PM87
32KB/1KB	86CM87
16KB/1KB	86CH87

32-bit 900/H1 Core
Body Systems

512KB/32KB	92FD54A
512KB/32KB	92CD54



Toshiba Microcontrollers for Automotive Motor Control (1)



Toshiba microcontrollers for automotive motor control contain hardware for coordinating motor drive signals and feedback signals from motors, making them ideal for controlling motors with light CPU load.

- The sine wave drive circuit enables automatic generation of sine wave output.
- The timer function is interlinked with the position-sensing circuit to easily realize 120-degree commutation control for three-phase motors.
- Toshiba's original PMD hardware greatly reduces the load imposed on software.

870/C1 core (8 MHz)

TMP89FM82TDUG**
PMD 1 ch

48-pin

870/X core (20 MHz)

TMP88CH40IMG
PMD 1 ch

28-pin

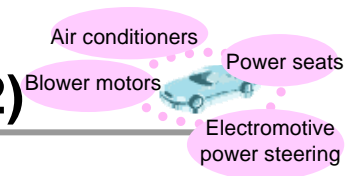
Ideal for controlling
three-phase brushless
DC motors and three-
phase AC motors.

supporting sine wave drive

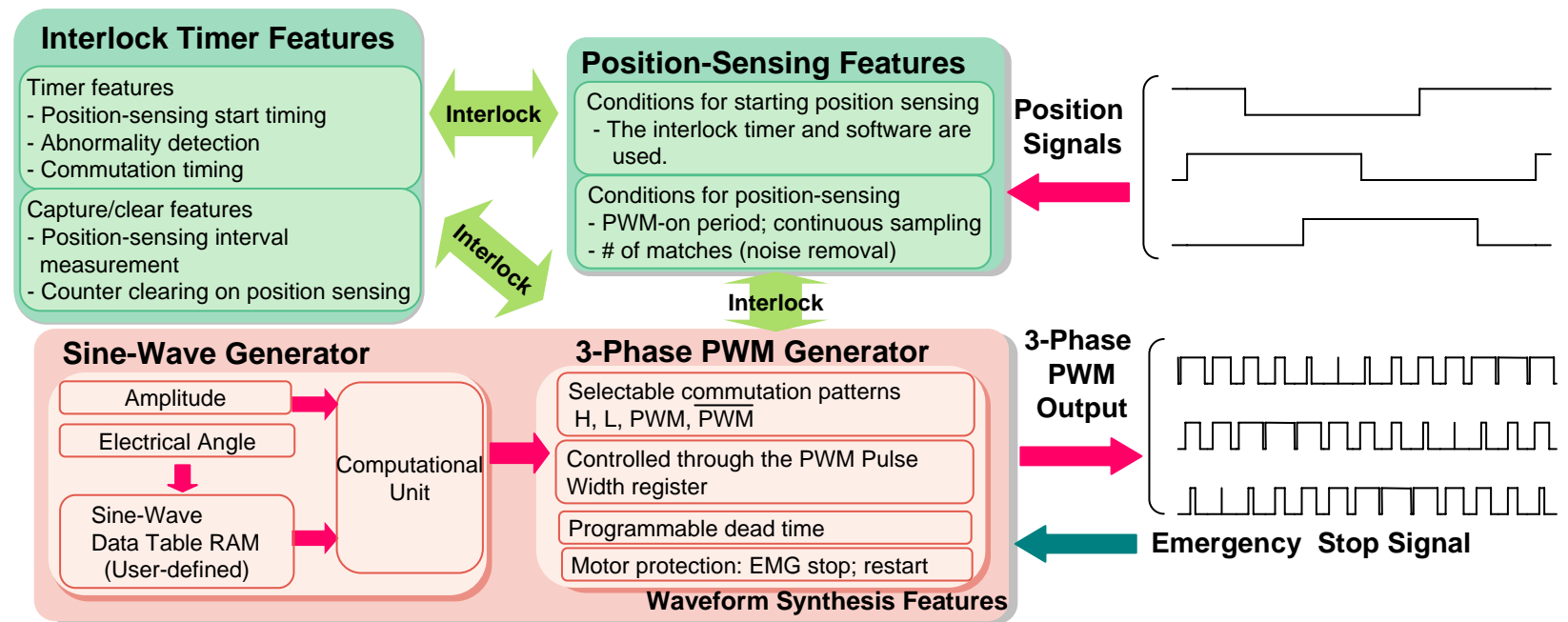
PMD: Programmable Motor Driver

** : Under development

Toshiba Microcontrollers for Automotive Motor Control (2)

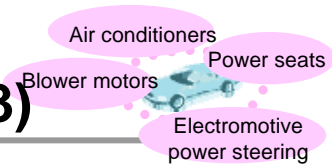


Features of PMD Microcontrollers
 Since the PMD microcontroller contains a position-sensing circuit, an interlock timer, a three-phase PWM generator and a sine-wave generator, it is possible to create a sine wave through simple register programming.



The PMD provides efficient inverter control of a three-phase motor(s).

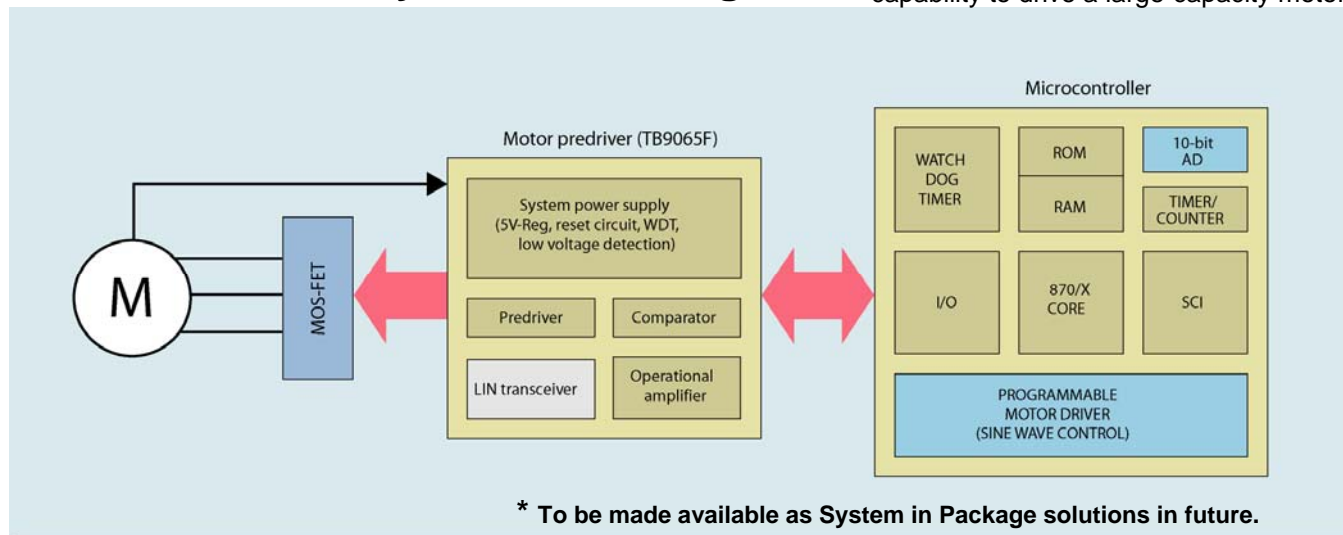
Toshiba Microcontrollers for Automotive Motor Control (3)



PMD microcontrollers are in increasing demand as the drive method of actuator motors, which are widely used in automotive applications using motors (EPS, air conditioners, radiator fans, etc.), is shifting from square wave type to sine wave type. For systems using large-capacity motors, Toshiba recommends a system consisting of a PMD microcontroller and a motor predriver.

Automotive motor system block diagram

Use of a large-current motor predriver ensures ample capability to drive a large-capacity motor.

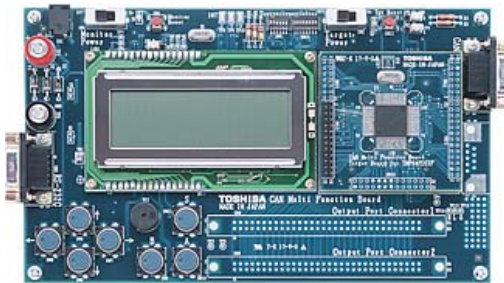


Toshiba CAN Evaluation Boards (1)



Toshiba offers total solutions from development to delivery by providing an integrated suite of development tools with highly enhanced operability.

- **A wide variety of support as a microcontroller vendor**
- **Optimized solutions based on extensive experience**
- **Support for performance evaluation and operation check environments**



CAN Multifunction Board ▲

Customers can quickly perform performance evaluations and operation checks in-house.

Shorter time-to-market

An illustration of a black microcontroller chip with "TOSHIBA" printed on it, positioned above a silver car.

Toshiba is committed to helping customers develop safe products with greater facility and in minimum time.

Toshiba CAN Evaluation Boards (2)



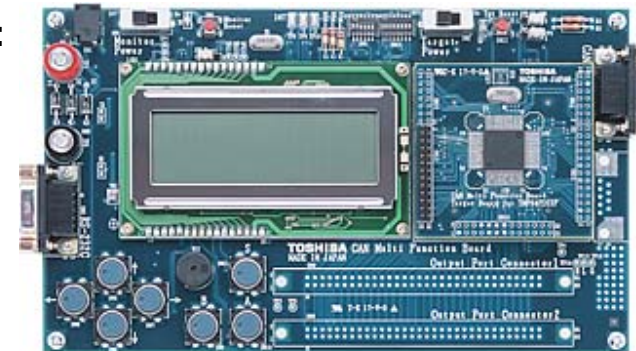
CAN Multifunction Board

Outline The CAN multifunction board is a development support board for software using CAN communications.

Function Simple evaluations of CAN communications software

● **The CAN bus monitoring function enables users to:**

- Log CAN messages.
- Display received messages in real time.
- Transmit messages using various triggers.
(Trigger types: Message transmission/receive, external edge input, board switch, cyclic transmission using timer, etc.)



● **A target board supporting Toshiba CAN microcontrollers is included.** ▲ CAN Multifunction Board

- Main components such as power supply and CAN bus are prewired.

Operating Temperatures and Part Numbers

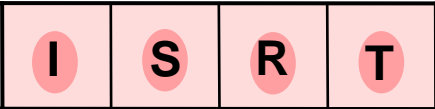
Operating Temperatures and Corresponding Part Numbers

Grade	Operating Temperatures (°C)	Example Part Number
A	-40 to 125	TMP91CMxx T
	-40 to 85	TMP91CMxx R
B	-40 to 125	TMP91CMxx S
	-40 to 85	TMP91CMxx I

In part numbers, the suffix “T” or “R” indicates Grade A products and “S” or “I” indicates Grade B products.



Quality Grade



Grade A: Recommended for automotive powertrain and safety systems.

Grade B: Recommended for automotive accessories.

Toshiba offers quality grade products for automotive applications. Note)

Note) For details about the automotive grade products, please contact your local Toshiba sales representative.

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