

**TOSHIBA**

BLDC: Brushless Motor

# **Proposal for Electric Motor Applications**

~ Intelligent Power ICs~

Toshiba Electronic Devices & Storage Corporation

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Value provided

## Reduction in power consumption and efficiency improvement due to **improved characteristics**

### 1 Reduces power consumption (loss)

MOSFET modules provide roughly 36% reduction in power loss compared with conventional devices that use IGBTs at output stage.

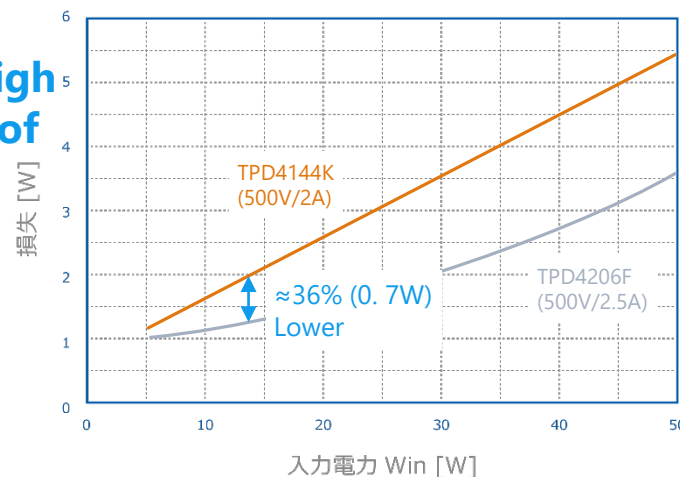
### 2 Eliminates need for power supply for high-side drive

Power supply for high-side drive is unnecessary owing to Toshiba's proprietary high-voltage SOI process and trench isolation structure as well as internal bootstrap diode.

### 3 Reduces acoustic noise

- Combination of MCU and MCD enables sine-wave drive.
- Smooth and quiet Motor operation

**HV-IPDs provide high efficiency because of improved characteristics.**



#### Customer value / Social subject contribution

- High-efficiency and high-performance Motor drive technology
- Environmental protection
- Improvement of system performance and reduction in power consumption

#### Product lineup

- MOS module-type HV-IPDs
  - TPD4204F (600 V/2.5 A, sine-wave type): Available
  - TPD4206F (500 V/2.5 A, sine-wave type): Available
  - TPD4207F (600 V/5.0 A, sine-wave type): Available

# Low-Voltage IPD for Brushless Motor Drives (LVIPD)

Value provided

Protection and a diagnostic function are built in a compact package, and it contributes to the miniaturization of a set, and quality improvement.

## 1 Various functions High performance

- Built-in charge pump circuit for driving the N-channel MOSFET on the high side.
- High current output +1A/-1.5A.
- Driver power supply voltage, output voltage diagnosis.

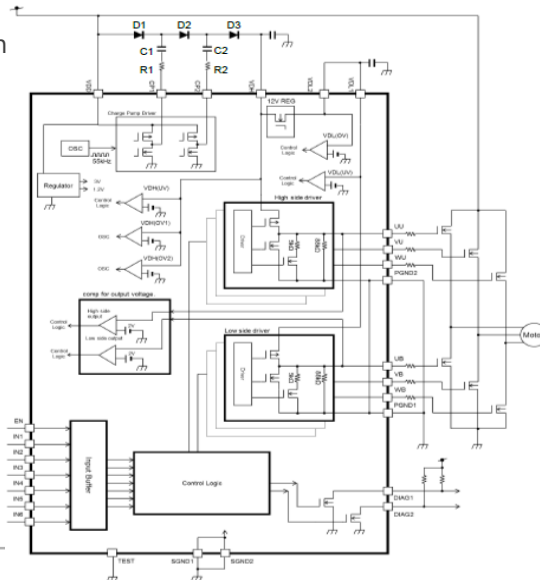
## 2 Small package

- It is lineup about a SOP type and the non lead QFN type.
- TPD7212F:WQFN32 5x5 mm (76% down)\*
- TPD7212FN:SSOP30 7.6x9.7 mm (29% down)\*
- \*: A size ratio of conventional parts TPD7210F.

## 3 High added value

- AEC-Q100 conformity (TPD7212FN)

Internal block diagram / The example of an application circuit





Since the charge pump circuit for a high side N-channel MOSFET drive is built in, a three Phase full bridged circuit can be constituted easily.

### Customer value / Social subject contribution

- A detailed process is adopted and produced commercially with a compact package from conventional parts, and it contributes to the miniaturization of a set.
- Various protection and a diagnostic function are corresponded to built-in and in-vehicle reliability, and it contributes to quality improvement of a set.

### Product lineup

Part number	TPD7210F (conventional parts) *New design deprecated	TPD7212F	TPD7212FN
Package	SSOP24 (8x13mm) 	WQFN32 (5x5mm) 	SSOP30 (7.6x9.7mm)
Power supply voltage range of operation (Power supply voltage maximum rating)	4.5 to 18V (40V@pulse)	4.5 to 18V (40V@pulse)	4.5 to 18V (40V@pulse)
Output current	±1A	+1A/-1.5A	+1A/-1.5A
Operational temperature range (Junction temperature maximum rating)	-40 to 125°C (150°C)	-40 to 150°C (175°C)	-40 to 150°C (175°C)

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