

# TOSHIBA

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Leading Innovation >>>

## High Voltage Single Chip Inverter

- for compact BLDC Motor control

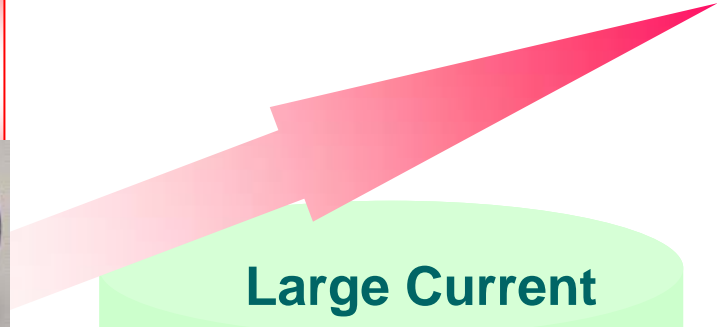
Toshiba Electronics Europe GmbH

Power Semiconductors

European Marketing & Engineering Department Q2 2011

# Target Application

BLDC-Motor demand will increase due to regulations for energy saving



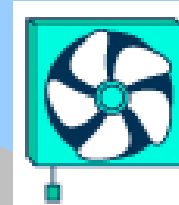
**Large Current**

Refrigerator  
Washing-Machine  
with Dryer



**For high performance systems**

Dish-Washer/Dryer  
Ventilator



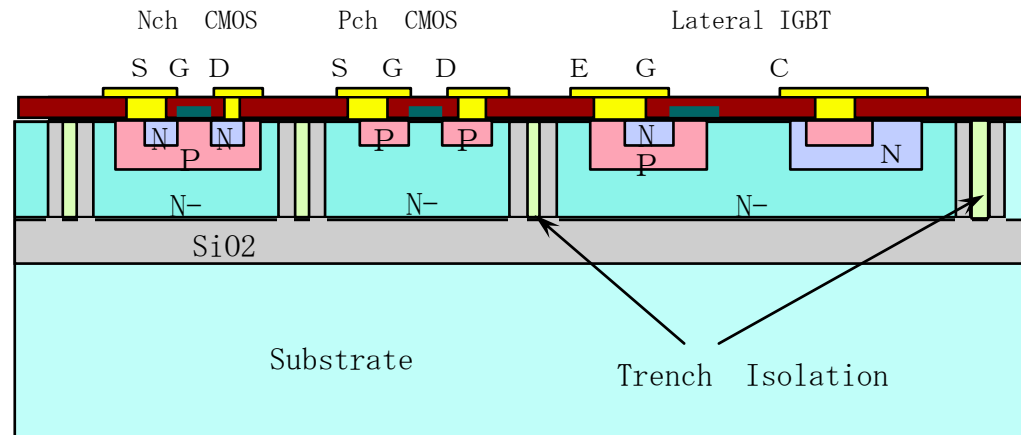
Air-Conditioner Fan  
(Room-unit/Outdoor-unit)  
Air-Refresher Pump



# Toshiba SOI technology

Toshiba has created a single chip inverter devices with 6 IGBTs, 6 FWDs and Control circuit by original SOI technology.

SOI means Silicon On Insulator.  
All of components are composed on the insulator.



- TOSHIBA has 500V type and 250V type.
- The advantage of SOI is latch up-free, since there is no parasitic thyristor in each element by the oxide layer.

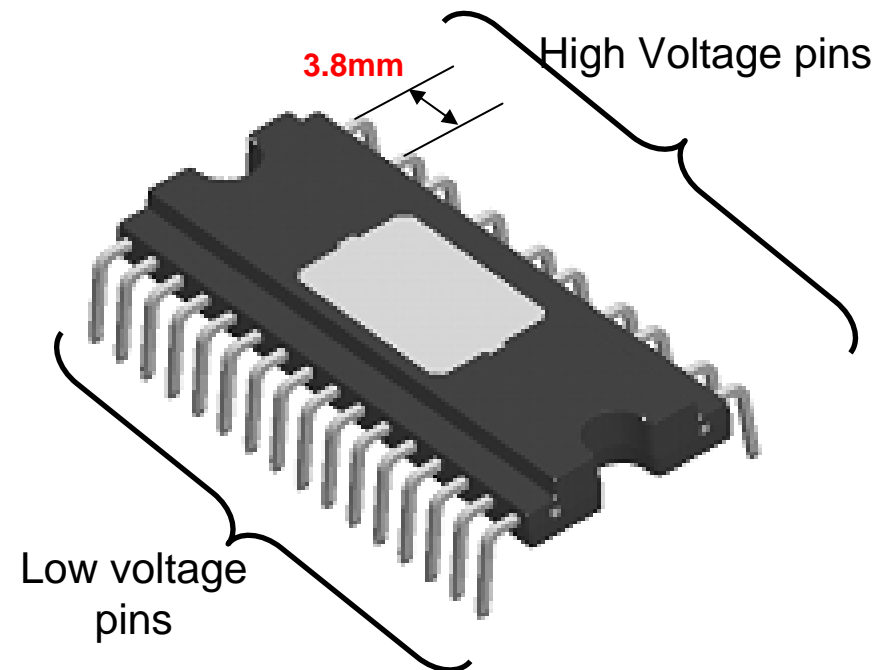
# Toshiba DIP26 Package technology

With DIP26 Package you can achieve compact PCB area, high thermal conductivity, and you are able to make an easy PCB lay-out design.

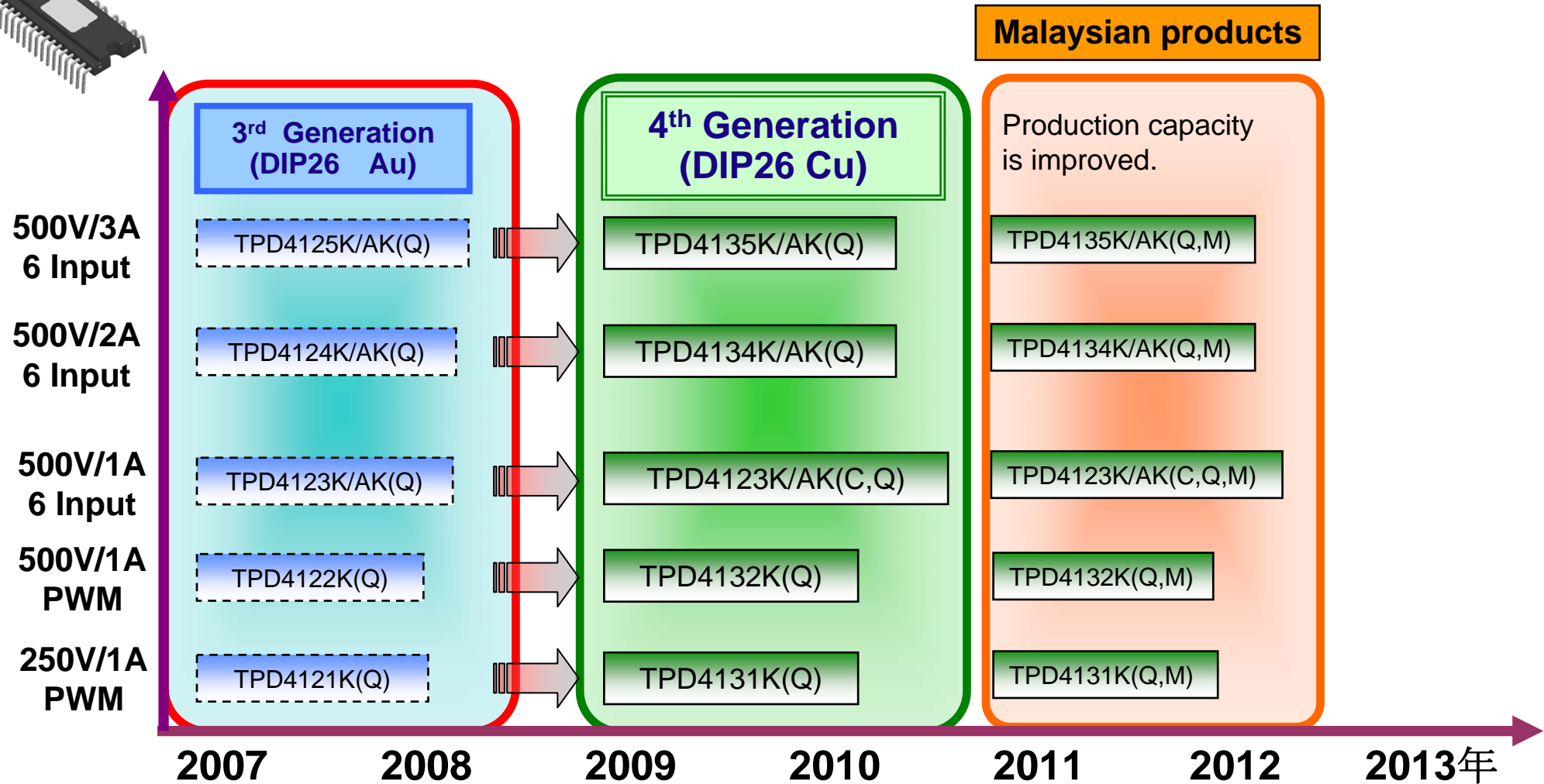
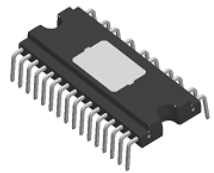
## Features

- **Easy PCB design.** High voltage power pins and low voltage signal pins are separated.
- Wide clearance for High voltage pin to pin : **3.8mm**
- Small PKG : **32 x 13mm**
- Thin PKG : thickness=**3.8(MAX)mm**
- Low thermal resistance (Rth) :  
 $R_{th(j-c)} = \mathbf{3.5 \text{ deg/W}}$  ( @TPD4134K)

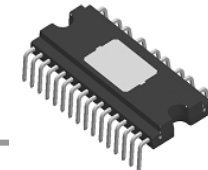
## Outline



# Development road map



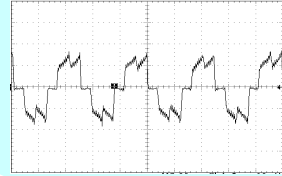
# Single Chip Inverter ICs Line up



PRODUCT NAME	RATING	FUNCTION							STATUS
		Hall SENSOR INPUT Signal	6 INPUT	3 Phase MatrixLogic PWM	LEVELSHIFT& DRIVER	OVER CURRENT	OVER TEMPERATURE	UNDER VOLTAGE	
TPD4131K(Q)	250V/1A	○	-	○	○	○	○	○	MP
TPD4132K(Q)	500V/1A	○	-	○	○	○	○	○	MP
TPD4123K(C,Q )	500V/1A	-	○	-	○	○	○	○	MP
TPD4123AK(C,Q )	500V/1A	-	○	-	○	-	○	○	MP
TPD4134K(Q)	500V/2A	-	○	-	○	○	○	○	MP
TPD4134AK(Q)	500V/2A	-	○	-	○	-	○	○	MP
TPD4135K(Q)	500V/3A	-	○	-	○	○	○	○	MP
TPD4135AK(Q)	500V/3A	-	○	-	○	-	○	○	MP

# 2 solutions of output currents

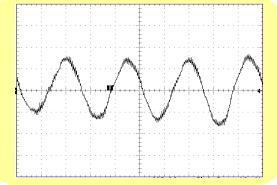
Square-Wave control type



TPD4131K/TPD4132K

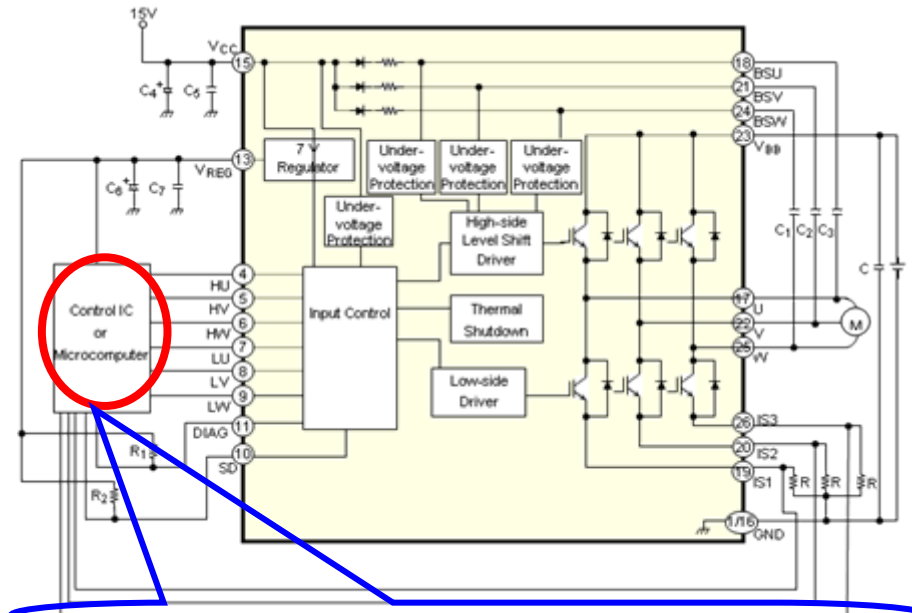
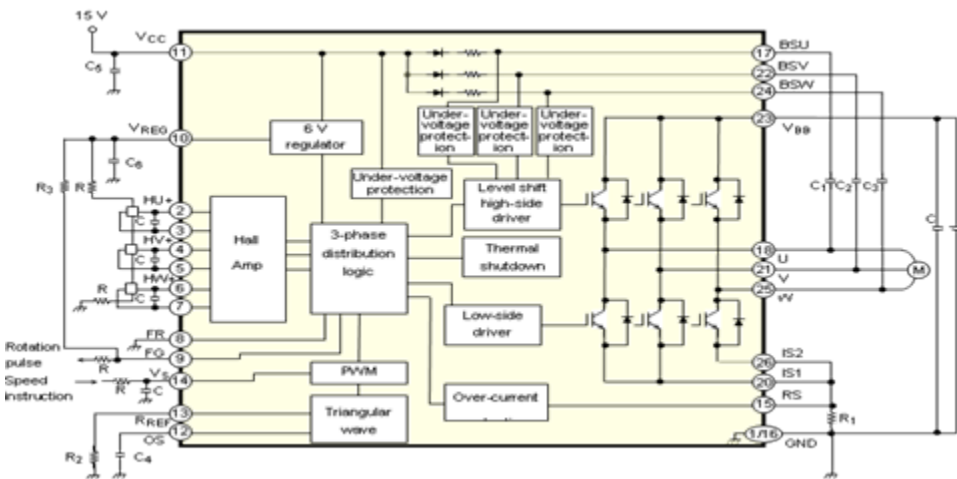
- Variable-speed drive of a DC brushless motor is possible by microcomputer control.
- Built in Hall amp, Possible to use Hall element.

Sine-Wave control type



TPD4123AK/TPD4134AK/TPD4135AK+ TC7600 etc

- Device is suitable for Sine -wave control.
- current sensing is possible for each phase by three shunt resistance.



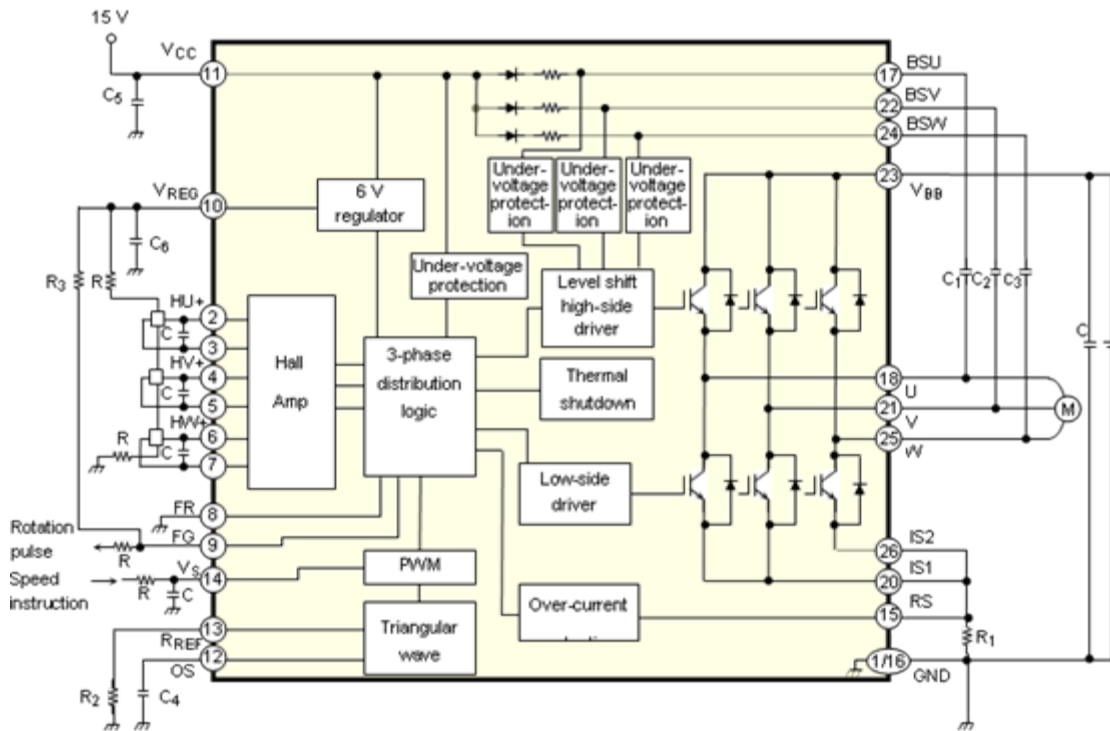
TB6551 or TB6556 or TC7600 etc

# TPD4131K/TPD4132K



- ☑ Variable-speed drive of a DC brushless motor is possible by microcomputer control.
- ☑ Hall amp built in, and the Hall sensor can be used.
- ☑ A direct replace which corresponds to AC100V/AC200V is possible.
- ☑ Application : Air conditioner/Air cleaner/Pump etc

## < Application Circuit Example >



## Ratings

	TPD4131K	TPD4132K
Output Voltage	250V	500V
Output Current	1A	1A

## Function

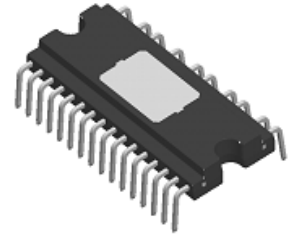
	TPD4131K	TPD4132K
PWM & 3Phase Matrix Decoder	○	○
Under Voltage	○	○
Over Current	○	○
Over Temperature	○	○
Regulator	○	○

# TPD4123K/AK, TPD4134K/AK, TPD4135K/AK

- ✓ It is suitable the best for a Sine-wave from drive.
- ✓ It is the current sensing in three shunt resistance.
- ✓ A direct replace which corresponds to motor output is possible.
- ✓ Application : Air conditioner/Refrigerator/Dish Washer/Washing machine/Pump etc

## Ratings

	TPD4123K/AK	TPD4134K/AK	TPD4135K/AK
Output Voltage	500V	500V	500V
Output Current	1A	2A	3A



## Function

	TPD4123K/TPD4134K/TPD4135K	TPD4123AK/TPD4134AK/TPD4135AK
PWM & 3Phase Matrix Decoder	×	×
Under Voltage	○	○
Over Current	○	×
Over Temperature	○	○
Regulator	○	○

# Difference between K type and AK type

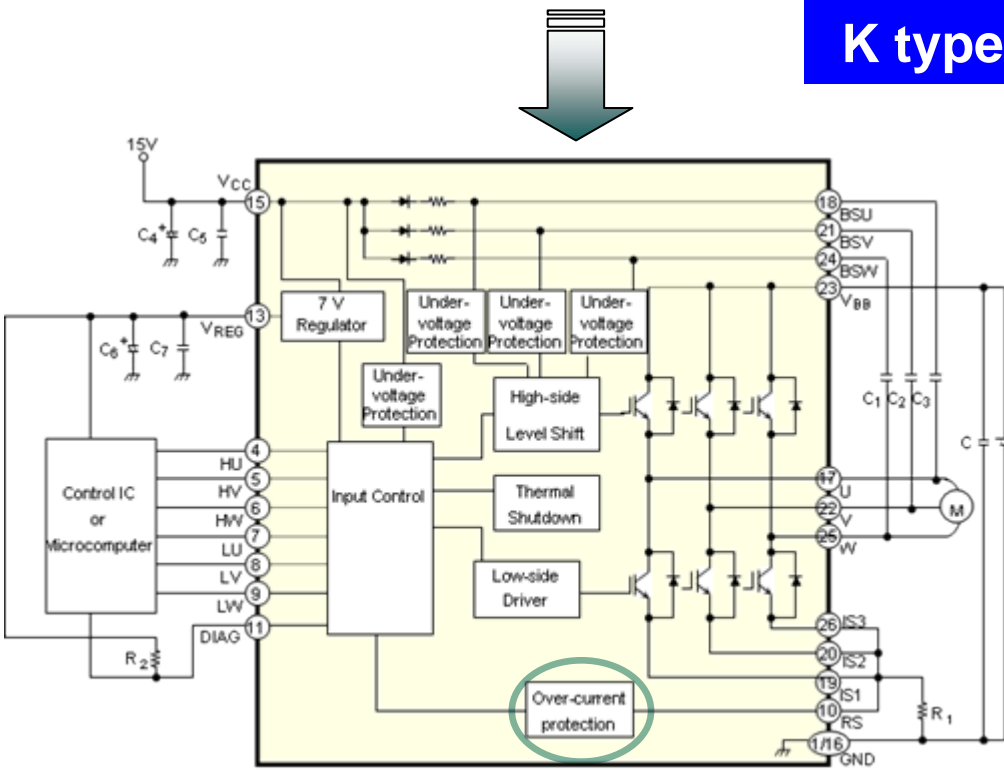
## <Application Circuit Example>

☑ Control IC or Microcomputer

(Without Over-current protection)

+ TPD4123K/TPD4134K/TPD4135K

**K type**



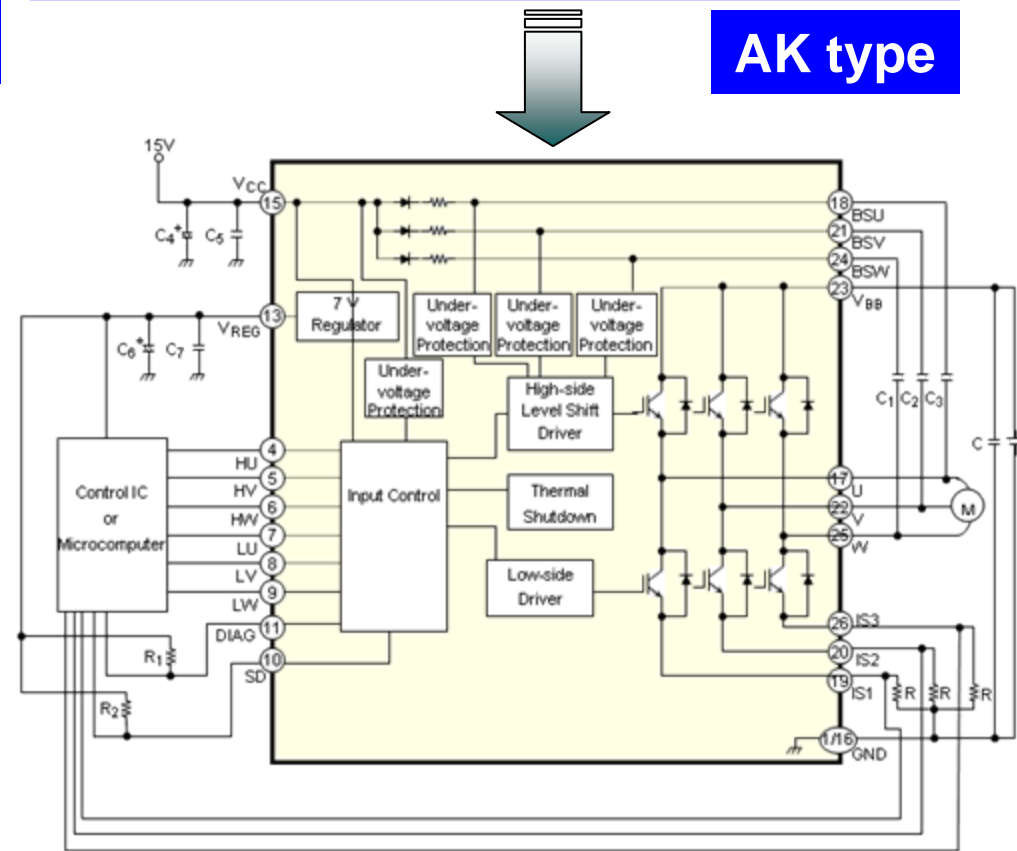
## <Application Circuit Example>

☑ Control IC or Microcomputer

(Within Over-current protection)

+ TPD4123AK/TPD4134AK/TPD4135AK

**AK type**





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