

System Lens Driver Series for Digital Still Cameras/Single-lens Reflex Cameras



6ch System Lens Drivers for Digital Still Cameras / Single-lens Reflex Cameras

BD6373GW,BD6873KN,BD6753KV

No.09014EAT02

●Description

The BD6373GW motor driver provides 6 Full-ON Drive H-bridge channels. The BD6873KN motor driver provides 5 Full-ON Drive H-bridge channels and 1 Linear Constant-Current Drive H-bridge channel, while the BD6753KV provides 4 Full-ON Drive channels and 2 PWM Constant-Current Drive H-bridge channels.

Stepping motors can be used for auto focus, and either zoom or iris. A new drive type (lens barrier) is also available. Three types of drivers for shutter are offered: a simple Full-ON type, a high-precision linear constant current type, or a high-efficiency PWM constant current type, enabling selection of the ideal solution based on the application.

●Features

- 1) Subminiature 31PIN Wafer-level CSP (Chip Size Package): 2.6 x 2.6 x 0.85mm³ (BD6373GW)
- 2) DMOS output allowing a range power supply: 4.5V to 10.5V (BD6753KV; VM1), 2.0V to 10.5V (BD6753KV; VM2 to VM4)
- 3) Low ON-Resistance Power MOS output:
 Full-ON Drive block with 1.2Ω Typ. (BD6373GW)
 Full-ON Drive block with 1.2Ω Typ. and Linear Constant-Current Drive block with 1.0Ω Typ. (BD6873KN)
 Full-ON Drive block with 1.2Ω Typ. and PWM Constant-Current Drive block with 1.2Ω Typ. (BD6753KV)
- 4) Serial interface 3-line bus control input (BD6753KV)
- 5) Built-in two-step output current setting switch for the Linear Constant-Current Drive block (BD6873KN)
- 6) Drive mode switching function
- 7) 1.2V±3% high-precision reference voltage output (BD6873KN)
- 8) Constant-Current Drive block features phase compensation capacitor-free design (BD6873KN)
- 9) Built-in ±3% high-precision Linear Constant-Current Driver (BD6873KN)
- 10) Built-in peak current control PWM Constant-Current Driver (BD6753KV)
- 11) Built-in charge pump circuit for the DMOS gate voltage drive (BD6753KV)
- 12) UVLO (Under Voltage Lockout Protection) function
- 13) Built-in TSD (Thermal Shut Down) circuit
- 14) Standby current consumption: 0μA Typ.

●Absolute Maximum Ratings

| Parameter | Symbol | Limit | | | Unit |
|-----------------------------|--------|----------------------------|----------------------------|----------------------------|-------|
| | | BD6373GW | BD6873KN | BD6753KV | |
| Power supply voltage | VCC | -0.5 to +6.5 | 0 to +7.0 | -0.5 to +7.0 | V |
| Motor power supply voltage | VM | -0.5 to +6.5 | 0 to +7.0 | -0.5 to +12.5 | V |
| Charge pump voltage | VG | - | - | 18.0 | V |
| Control input voltage | VIN | -0.5 to VCC+0.5 | 0 to VCC | -0.5 to VCC+0.5 | V |
| Power dissipation | Pd | 940 ^{※1} | 950 ^{※2} | 1125 ^{※3} | mW |
| Operating temperature range | Topr | -25 to +85 | -25 to +85 | -25 to +75 | °C |
| Junction temperature | Tjmax | +150 | +150 | +150 | °C |
| Storage temperature range | Tstg | -55 to +150 | -55 to +150 | -55 to +150 | °C |
| H-bridge output current | Iout | -800 to +800 ^{※4} | -800 to +800 ^{※4} | -800 to +800 ^{※4} | mA/ch |

※1 Reduced by 7.52mW/°C over 25°C, when mounted on a glass epoxy board (50mm x 58mm x 1.75mm; 8layers).

※2 Reduced by 7.6mW/°C over 25°C, when mounted on a glass epoxy board (70mm x 70mm x 1.6mm).

※3 Reduced by 9.0mW/°C over 25°C, when mounted on a glass epoxy board (70mm x 70mm x 1.6mm).

※4 Must not exceed Pd, ASO, or Tjmax of 150°C.

●Operating Conditions (Ta=-25 to +85°C(BD6373GW, BD6873KN), -25 to +75°C(BD6753KV))

| Parameter | Symbol | Limit | | | Unit |
|--|--------|----------------------------|----------------------------|----------------------------|-------|
| | | BD6373GW | BD6873KN | BD6753KV | |
| Power supply voltage | VCC | 2.5 to 5.5 | 2.5 to 5.5 | 2.7 to 5.5 | V |
| Motor power supply voltage | VM | 2.5 to 5.5 | 2.5 to 5.5 | 4.5 to 10.5 (VM1) | V |
| | | | | 2.0 to 10.5 (VM2 to VM4) | |
| Control input voltage | VIN | 0 to VCC | 0 to VCC | 0 to VCC | V |
| Output current control input voltage range | VLIM | - | 0 to VCC | 0 to 0.5 | V |
| PWM signal input frequency | FPWM | - | - | 0 to 0.1 | MHz |
| H-bridge output current | Iout | -500 to +500 ^{※5} | -500 to +500 ^{※5} | -500 to +500 ^{※5} | mA/ch |

※5 Must not exceed Pd or ASO.

●Electrical Characteristics

1) BD6373GW Electrical Characteristics (Unless otherwise specified, Ta=25°C, VCC=3.0V, VM=5.0V)

| Parameter | Symbol | Limit | | | Unit | Conditions |
|--|--------|-------|------|------|------|--|
| | | Min. | Typ. | Max. | | |
| Overall | | | | | | |
| Circuit current | ICC | - | 1.0 | 1.9 | mA | no signal and no load |
| Control input (IN=ENABLExx, INPUTx, and BRAKEEx) | | | | | | |
| High level input voltage | VINH | 2.0 | - | VCC | V | |
| Low level input voltage | VINL | 0 | - | 0.7 | V | |
| High level input current | IINH | 15 | 30 | 60 | μA | VINH=3V |
| Low level input current | IINL | -1 | 0 | - | μA | VINL=0V |
| UVLO | | | | | | |
| UVLO voltage | VUVLO | 1.6 | - | 2.4 | V | |
| Full-ON Drive block (ch1 to ch6) | | | | | | |
| Output ON-Resistance 1 | RON1 | - | 1.2 | 1.5 | Ω | Io=±400mA on high and low sides In total (VM=5V) |
| Output ON-Resistance 2 | RON2 | - | 1.5 | 2.0 | Ω | Io=±400mA on high and low sides In total (VM=3V) |
| Turn on time | ton | - | 0.55 | 1.95 | μs | RL=20Ω |
| Turn off time | toff | - | 0.08 | 0.5 | μs | RL=20Ω |
| Rise time | tr | 0.1 | 0.15 | 1.0 | μs | RL=20Ω |
| Fall time | tf | - | 0.03 | 0.2 | μs | RL=20Ω |

2) BD6873KN Electrical Characteristics (Unless otherwise specified, Ta=25°C, VCC=3.0V, VM=5.0V)

| Parameter | Symbol | Limit | | | Unit | Conditions |
|---|--------|-------|------|------|------|--|
| | | Min. | Typ. | Max. | | |
| Overall | | | | | | |
| Circuit current during standby operation | ICCST | - | 0 | 10 | μA | PS=0V |
| Circuit current | ICC | - | 1.2 | 2.3 | mA | PS=VCC with no signal and no load |
| Power-saving (PS) | | | | | | |
| High level input voltage | VPSH | 2.0 | - | - | V | |
| Low level input voltage | VPSL | - | - | 0.7 | V | |
| High level input current | IPSH | 15 | 30 | 60 | μA | VPS=3V |
| Low level input current | IPSL | -1 | 0 | - | μA | VPS=0V |
| Control input (IN=IN1A to IN5B, SEL1 to 3, BRK1, EN1, IN6, and VLIMS) | | | | | | |
| High level input voltage | VINH | 2.0 | - | - | V | |
| Low level input voltage | VINL | - | - | 0.7 | V | |
| High level input current | IINH | 15 | 30 | 60 | μA | VINH=3V |
| Low level input current | IINL | -1 | 0 | - | μA | VINL=0V |
| Pull-down resistance | RIN | 50 | 100 | 200 | kΩ | |
| UVLO | | | | | | |
| UVLO voltage | VUVLO | 1.6 | - | 2.4 | V | |
| Full-ON Drive block (ch1 to ch5) | | | | | | |
| Output ON-Resistance | RON | - | 1.2 | 1.5 | Ω | Io=±400mA on high and low sides In total |
| Linear Constant-Current Drive block (ch6) | | | | | | |
| Output ON-Resistance | RON | - | 1.0 | 1.25 | Ω | Io=±400mA on high and low sides in total |
| VREF output voltage | VREF | 1.16 | 1.20 | 1.24 | V | Iout=0~1mA |
| Output limit voltage | VOL | 194 | 200 | 206 | mV | RNF=0.5Ω, VLIM=0.2V |

3) BD6753KV Electrical Characteristics (Unless otherwise specified, Ta=25°C, VCC=3.3V, VM=10.5V)

| Parameter | Symbol | Limit | | | Unit | Conditions |
|---|--------|-------|------|------|------|--|
| | | Min. | Typ. | Max. | | |
| Overall | | | | | | |
| Circuit current during standby operation | ICCST | - | 0 | 10 | μA | PS=0V |
| Circuit current | ICC | - | 2.2 | 3.0 | mA | PS=VCC with no signal; CRx open |
| Power-saving (PS) | | | | | | |
| High-level input voltage | VPSH | 2.0 | - | - | V | |
| Low-level input voltage | VPSL | - | - | 0.7 | V | |
| High-level input current | IPSH | 25 | 50 | 100 | μA | VPSH=3.3V |
| Low-level input current | IPSL | -1 | 0 | - | μA | VPSL=0V |
| Control input (IN=STROBE, CLK, DATA, and PWM1 to 6) | | | | | | |
| High-level input voltage | VINH | 2.0 | - | - | V | |
| Low-level input voltage | VINL | - | - | 0.7 | V | |
| High-level input current | IINH | 16.5 | 33 | 66 | μA | VINH=3.3V |
| Low-level input current | IINL | -1 | 0 | - | μA | VINL=0V |
| Pull-down resistance | RIN | 50 | 100 | 200 | kΩ | |
| Charge pump | | | | | | |
| Charge pump voltage | VCP | 16 | 16.5 | - | V | |
| UVLO | | | | | | |
| UVLO voltage | VUVLO | 1.6 | - | 2.5 | V | |
| Full-ON Drive block (ch1 to ch4) | | | | | | |
| Output ON-Resistance | RON | - | 1.2 | 1.5 | Ω | Io=±400mA, VG=16.5V on high and low sides in total |
| PWM Linear Constant-Current Drive block (ch5 and ch6) | | | | | | |
| Output ON-Resistance | RON | - | 1.2 | 1.5 | Ω | Io=±400mA, VG=16.5V on high and low sides in total |
| VLIM pin input current | IVLIM | -1 | -0.2 | - | μA | VLIMx=0V, SENSEx=0.5V |
| SENSE pin input current | ISENSE | -1 | -0.2 | - | μA | VLIMx=0.5V, SENSEx=0V |
| Output limit voltage | VOL | 485 | 500 | 515 | mV | VLIMx=500mV |
| CR clamp voltage | VCR | 0.8 | 0.9 | 1.0 | V | R=10kΩ |
| CR switching high voltage | VCRH | 0.72 | 0.80 | 0.88 | V | |
| CR switching low voltage | VCRL | 0.36 | 0.40 | 0.44 | V | |
| Minimum ON time | TMINON | 0.1 | 0.5 | 1.0 | μs | C=470pF, R=10kΩ |
| Constant voltage power supply | | | | | | |
| VREF output voltage | VREF | 0.81 | 0.90 | 0.99 | V | Iout=0~1mA |

●Electrical Characteristic Diagrams

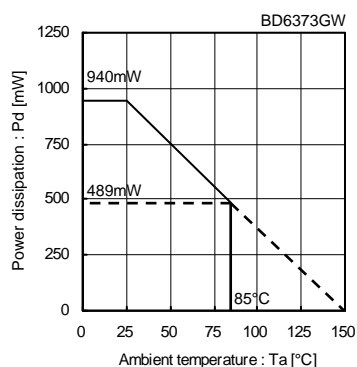


Fig.1 Power Dissipation Reduction

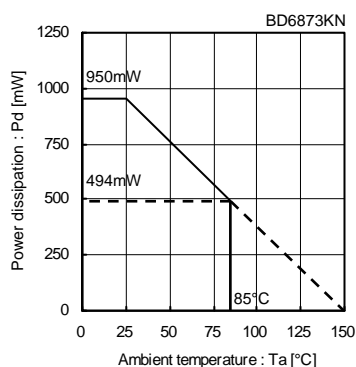


Fig.2 Power Dissipation Reduction

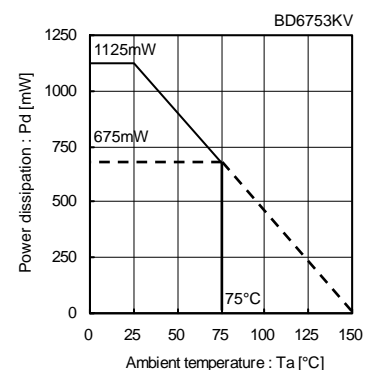


Fig.3 Power Dissipation Reduction

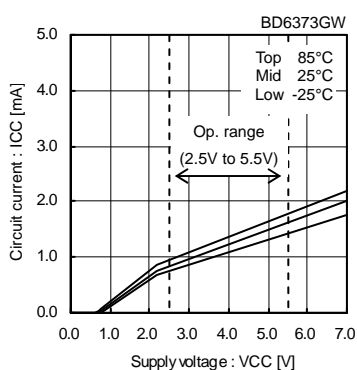


Fig.4 Circuit current

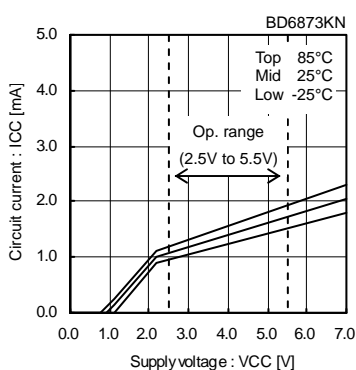


Fig.5 Circuit current

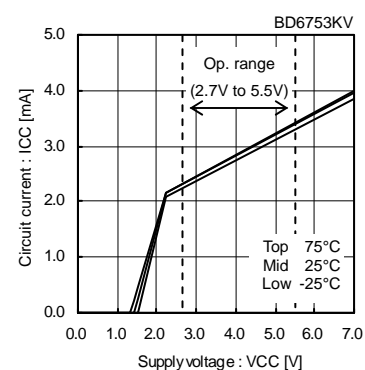
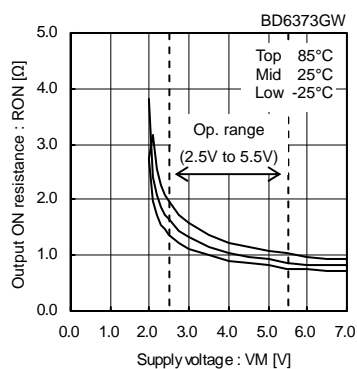
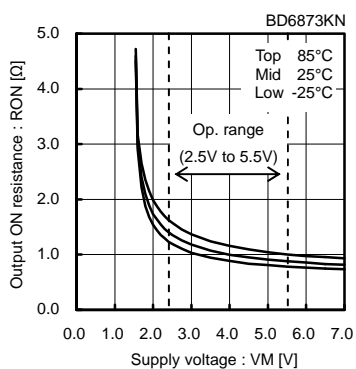
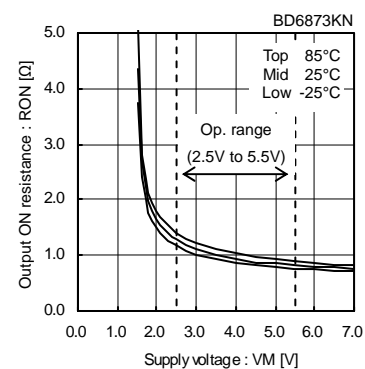
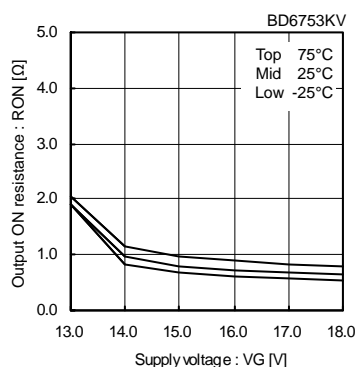
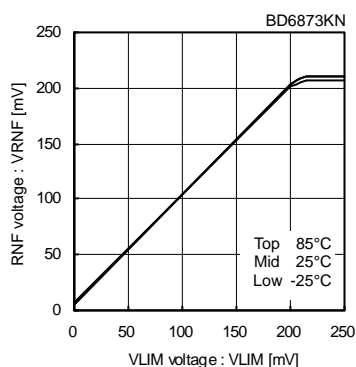


Fig.6 Circuit current

Fig.7 Output ON-Resistance
(Full-ON Drive block)Fig.8 Output ON-Resistance
(Full-ON Drive block)Fig.9 Output ON-Resistance
(Linear Constant-Current Drive)Fig.10 Output ON-Resistance
(VM=10.5V)Fig.11 Output limit voltage
(RNF=0.5Ω)

●Block Diagram, Pin Arrangement, and Pin Function

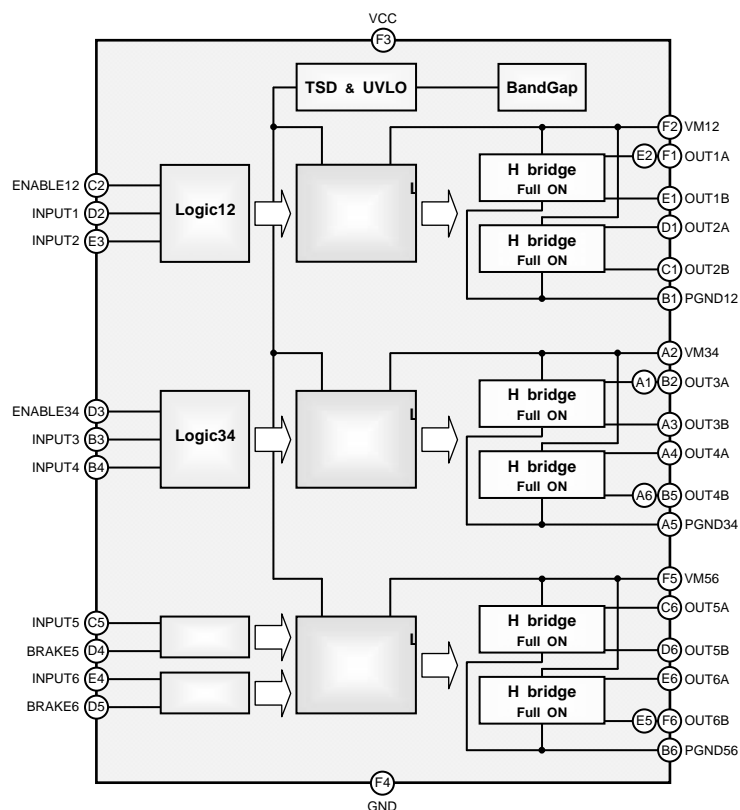


Fig.12 BD6373GW Block Diagram

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|--------|----------|------------|--------|--------|--------|
| A | OUT3A | VM34 | OUT3B | OUT4A | PGND34 | OUT4B |
| B | PGND12 | OUT3A | INPUT3 | INPUT4 | OUT4B | PGND56 |
| C | OUT2B | ENABLE12 | INDEX POST | | INPUT5 | OUT5A |
| D | OUT2A | INPUT1 | ENABLE34 | BRAKE5 | BRAKE6 | OUT5B |
| E | OUT1B | OUT1A | INPUT2 | INPUT6 | OUT6B | OUT6A |
| F | OUT1A | VM12 | VCC | GND | VM56 | OUT6B |

OUT3A, OUT4B, OUT1A, and OUT6B, which are 2 function pins, are shorted on printed circuit boards.

Fig.13 BD6373GW Pin Arrangement (Top View)
UCSP75M2 Package

BD6373GW Pin Function Table

| No. | Pin Name | Function | No. | Pin Name | Function |
|-----|------------|--------------------------------------|-----|----------|--------------------------------------|
| A1 | OUT3A | H-bridge output pin ch3 A | D1 | OUT2A | H-bridge output pin ch2 A |
| A2 | VM34 | Motor power supply pin ch3 and ch4 | D2 | INPUT1 | Control input pin ch1 INPUT |
| A3 | OUT3B | H-bridge output pin ch3 B | D3 | ENABLE34 | Control input pin ch3 and ch4 ENABLE |
| A4 | OUT4A | H-bridge output pin ch4 A | D4 | BRAKE5 | Control input pin ch5 BRAKE |
| A5 | PGND34 | Motor ground pin ch3 and ch4 | D5 | BRAKE6 | Control input pin ch6 BRAKE |
| A6 | OUT4B | H-bridge output pin ch4 B | D6 | OUT5B | H-bridge output pin ch5 B |
| B1 | PGND12 | Motor ground pin ch1 and ch2 | E1 | OUT1B | H-bridge output pin ch1 B |
| B2 | OUT3A | H-bridge output pin ch3 A | E2 | OUT1A | H-bridge output pin ch1 A |
| B3 | INPUT3 | Control input pin ch3 INPUT | E3 | INPUT2 | Control input pin ch2 INPUT |
| B4 | INPUT4 | Control input pin ch4 INPUT | E4 | INPUT6 | Control input pin ch6 INPUT |
| B5 | OUT4B | H-bridge output pin ch4 B | E5 | OUT6B | H-bridge output pin ch6 B |
| B6 | PGND56 | Motor ground pin ch5 and ch6 | E6 | OUT6A | H-bridge output pin ch6 A |
| C1 | OUT2B | H-bridge output pin ch2 B | F1 | OUT1A | H-bridge output pin ch1 A |
| C2 | ENABLE12 | Control input pin ch1 and ch2 ENABLE | F2 | VM12 | Motor power supply pin ch1 and ch2 |
| C3 | INDEX POST | - | F3 | VCC | Power supply pin |
| C4 | | - | F4 | GND | Ground pin |
| C5 | INPUT5 | Control input pin ch5 | F5 | VM56 | Motor power supply pin ch5 and ch6 |
| C6 | OUT5A | H-bridge output pin ch5 A | F6 | OUT6B | H-bridge output pin ch6 B |

OUT3A, OUT4B, OUT1A, and OUT6B, which are 2 function pins, are shorted on printed circuit boards.

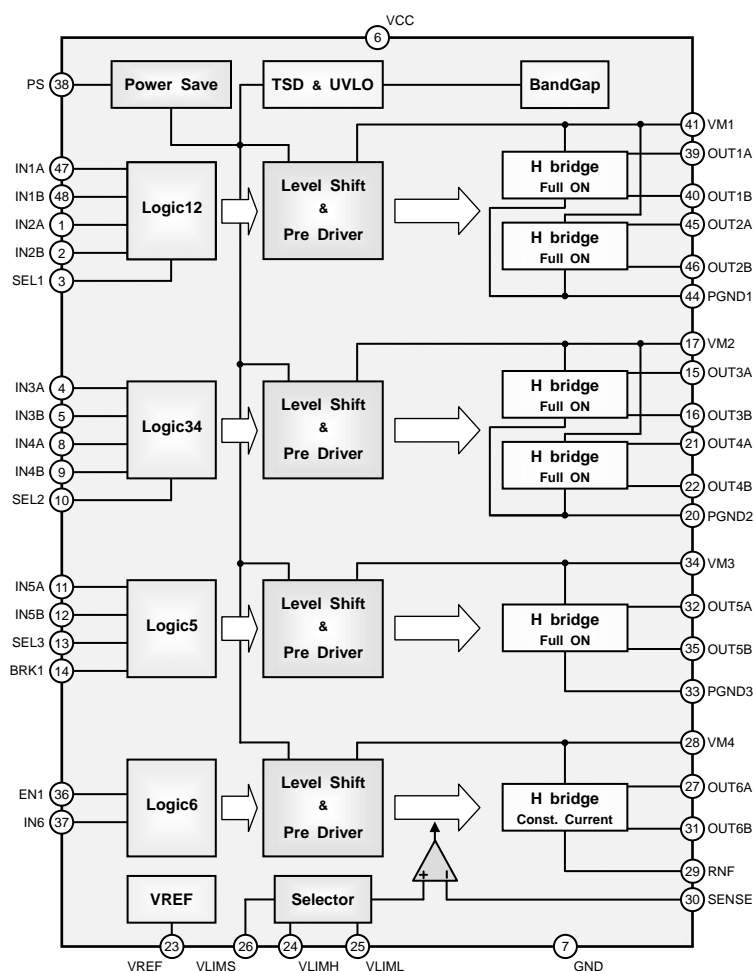
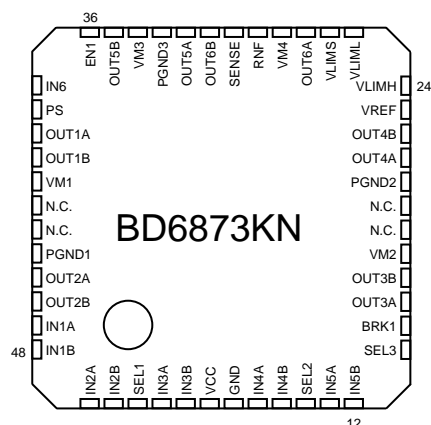


Fig.14 BD6873KN Block Diagram

Fig.15 BD6873KN Pin Arrangement (Top View)
UQFN48 Package

BD6873KN Pin Function Table

| No. | Pin name | Function | No. | Pin name | Function |
|-----|----------|--------------------------------------|-----|----------|--|
| 1 | IN2A | Control input pin ch2 A | 25 | VLIML | Output current setting pin 2 ch6 |
| 2 | IN2B | Control input pin ch2 B | 26 | VLIMS | Output current selection pin ch6 |
| 3 | SEL1 | Input mode selection pin ch1 and ch2 | 27 | OUT6A | H-bridge output pin ch6 A |
| 4 | IN3A | Control input pin ch3 A | 28 | VM4 | Motor power supply pin ch6 |
| 5 | IN3B | Control input pin ch3 B | 29 | RNF | Resistance connection pin for output current detection ch6 |
| 6 | VCC | Power supply pin | 30 | SENSE | Output current detection pin ch6 |
| 7 | GND | Ground pin | 31 | OUT6B | H-bridge output pin ch6 B |
| 8 | IN4A | Control input pin ch4 A | 32 | OUT5A | H-bridge output pin ch5 A |
| 9 | IN4B | Control input pin ch4 B | 33 | PGND3 | Motor ground pin ch5 |
| 10 | SEL2 | Input mode selection pin ch3 and ch4 | 34 | VM3 | Motor power supply pin ch5 |
| 11 | IN5A | Control input pin ch5 A | 35 | OUT5B | H-bridge output pin ch5 B |
| 12 | IN5B | Control input pin ch5 B | 36 | EN1 | Control input pin ch6 ENABLE |
| 13 | SEL3 | Input mode selection pin ch5 | 37 | IN6 | Control input pin ch6 INPUT |
| 14 | BRK1 | Control input pin ch5 BRAKE | 38 | PS | Power-saving pin |
| 15 | OUT3A | H-bridge output pin ch3 A | 39 | OUT1A | H-bridge output pin ch1 A |
| 16 | OUT3B | H-bridge output pin ch3 B | 40 | OUT1B | H-bridge output pin ch1 B |
| 17 | VM2 | Motor power supply pin ch3 and ch4 | 41 | VM1 | Motor power supply pin ch1 and ch2 |
| 18 | N.C. | - | 42 | N.C. | - |
| 19 | N.C. | - | 43 | N.C. | - |
| 20 | PGND2 | Motor ground pin ch3 and ch4 | 44 | PGND1 | Motor ground pin ch1 and ch2 |
| 21 | OUT4A | H-bridge output pin ch4 A | 45 | OUT2A | H-bridge output pin ch2 A |
| 22 | OUT4B | H-bridge output pin ch4 B | 46 | OUT2B | H-bridge output pin ch2 B |
| 23 | VREF | Reference voltage output pin | 47 | IN1A | Control input pin ch1 A |
| 24 | VLIMH | Output current setting pin 1 ch6 | 48 | IN1B | Control input pin ch1 B |

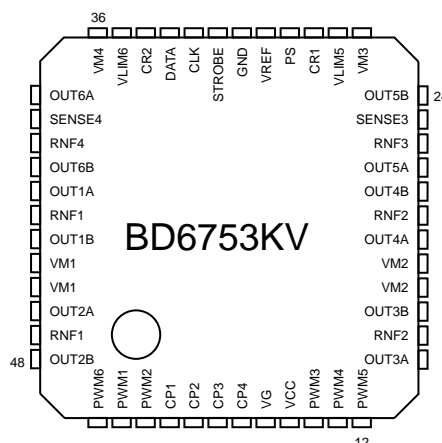


Fig.17 BD6753KV Pin Arrangement (Top View)
VQFP8C Package

| No. | Pin name | Function | No. | Pin name | Function |
|-----|----------|--|-----|----------|--|
| 1 | PWM6 | PWM control input pin ch6 | 25 | VM3 | Motor power supply pin ch5 |
| 2 | PWM1 | PWM control input pin ch1 | 26 | VLIM5 | Output current setting pin ch5 |
| 3 | PWM2 | PWM control input pin ch2 | 27 | CR1 | CR timer setting element connection pin ch5 |
| 4 | CP1 | Charge pump capacitor connection pin 1 | 28 | PS | Power-saving pin |
| 5 | CP2 | Charge pump capacitor connection pin 2 | 29 | VREF | Reference voltage output pin |
| 6 | CP3 | Charge pump capacitor connection pin 3 | 30 | GND | Ground pin |
| 7 | CP4 | Charge pump capacitor connection pin 4 | 31 | STROBE | Serial enable input pin |
| 8 | VG | Charge pump output pin | 32 | CLK | Serial clock input pin |
| 9 | VCC | Power supply pin | 33 | DATA | Serial data input pin |
| 10 | PWM3 | PWM control input pin ch3 | 34 | CR2 | CR timer setting element connection pin ch6 |
| 11 | PWM4 | PWM control input pin ch4 | 35 | VLIM6 | Output current setting pin ch6 |
| 12 | PWM5 | PWM control input pin ch5 | 36 | VM4 | Motor power supply pin ch6 |
| 13 | OUT3A | H-bridge output pin ch3 A | 37 | OUT6A | H-bridge output pin ch6 A |
| 14 | RNF2 | Motor ground pin ch3 and ch4 | 38 | SENSE4 | Output current detection pin ch6 |
| 15 | OUT3B | H-bridge output pin ch3 B | 39 | RNF4 | Resistance connection pin for output current detection ch6 |
| 16 | VM2 | Motor power supply pin ch3 and ch4 | 40 | OUT6B | H-bridge output pin ch6 B |
| 17 | VM2 | Motor power supply pin ch3 and ch4 | 41 | OUT1A | H-bridge output pin ch1 A |
| 18 | OUT4A | H-bridge output pin ch4 A | 42 | RNF1 | Motor ground pin ch1 and ch2 |
| 19 | RNF2 | Motor ground pin ch3 and 4 | 43 | OUT1B | H-bridge output pin ch1 B |
| 20 | OUT4B | H-bridge output pin ch4 B | 44 | VM1 | Motor power supply pin ch1 and ch2 |
| 21 | OUT5A | H-bridge output pin ch5 A | 45 | VM1 | Motor power supply pin ch1 and ch2 |
| 22 | RNF3 | Resistance connection pin for output current detection ch5 | 46 | OUT2A | H-bridge output pin ch2 A |
| 23 | SENSE3 | Output current detection pin ch5 | 47 | RNF1 | Motor ground pin ch1 and ch2 |
| 24 | OUT5B | H-bridge output pin ch5 B | 48 | OUT2B | H-bridge output pin ch2 B |

●Application Circuit Diagram and Function Explanation

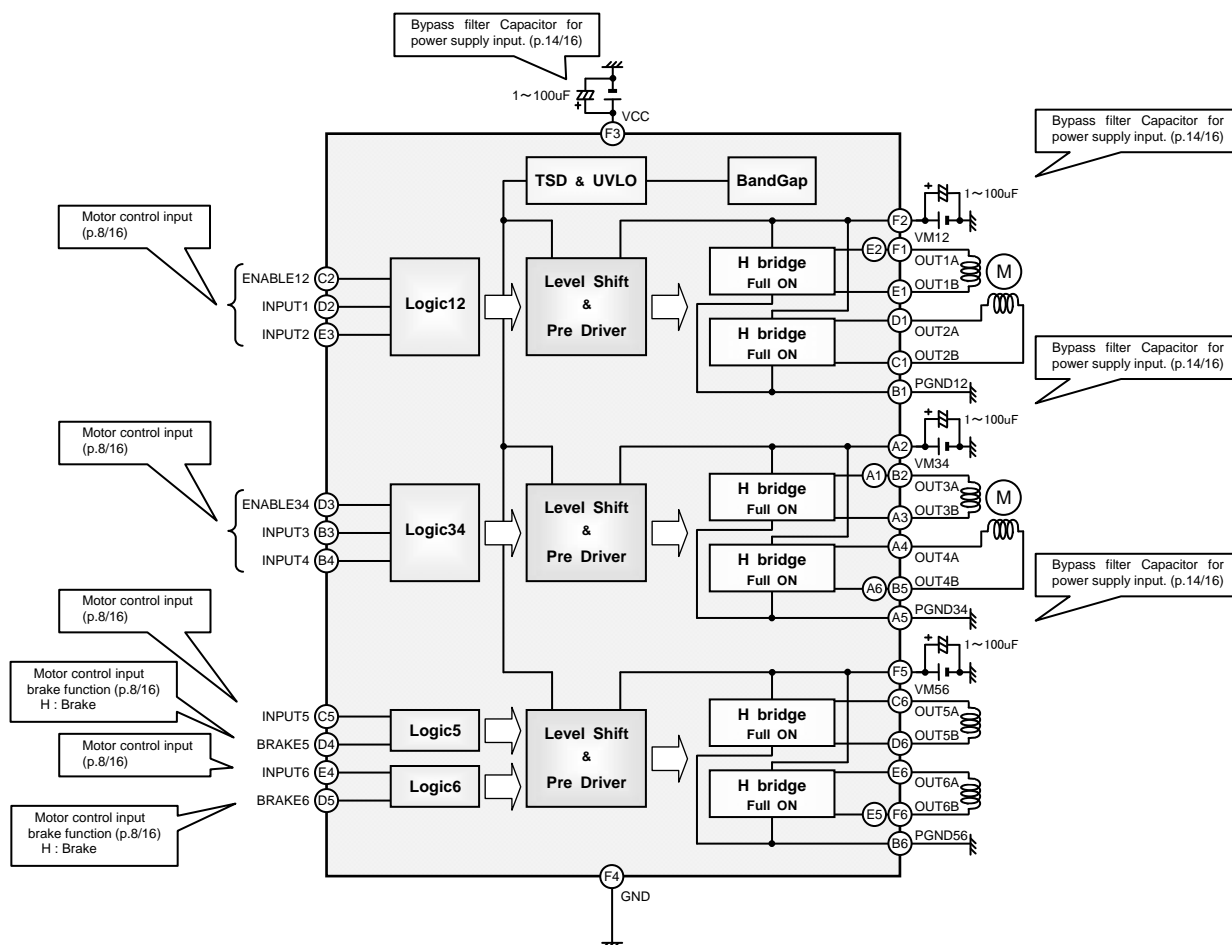


Fig.18 BD6373GW Application Circuit Diagram

1) Power-saving function

When Low-level voltage is applied to PS pin, the IC will be turned off internally and the circuit current will be 0μA (Typ.). During operating mode, PS pin should be High-level. (See the Electrical Characteristics; p.2/16)

2) Motor Control input

(1) ENABLExx and INPUTx pins (BD6373GW), INxA, INxB, EN1 and IN6 pins (BD6873KN), and PWMx pins (BD6753KV)

These pins are used to program and control the motor drive modes. (See the Electrical Characteristics; p.2/16 and p.3/16 and I/O Truth Table; p.12/16 and p.13/16)

(2) SELx pins (BD6873KN)

When the Low-level voltage is applied to the SELx pins, the I/O logic can be set to EN/IN mode. However, when the High-level voltage is applied, the I/O logic can be set to IN/IN mode. The same selection made with the BD6873KN's SELx pin can be made for the BD6753KV, using serial control. (See the Electrical Characteristics; p.2/16 and p.3/16 and I/O Truth Table)

(3) BRAKExx pins (BD6373GW) and BRK1 pin (BD6873KN)

Applying the High-level voltage pin will set the brake mode. The same selection made with the brake mode can be made for the BD6753KV, using serial control. (See the Electrical Characteristics; p.2/16 and p.3/16 and I/O Truth Table; p.12/16 and p.13/16)

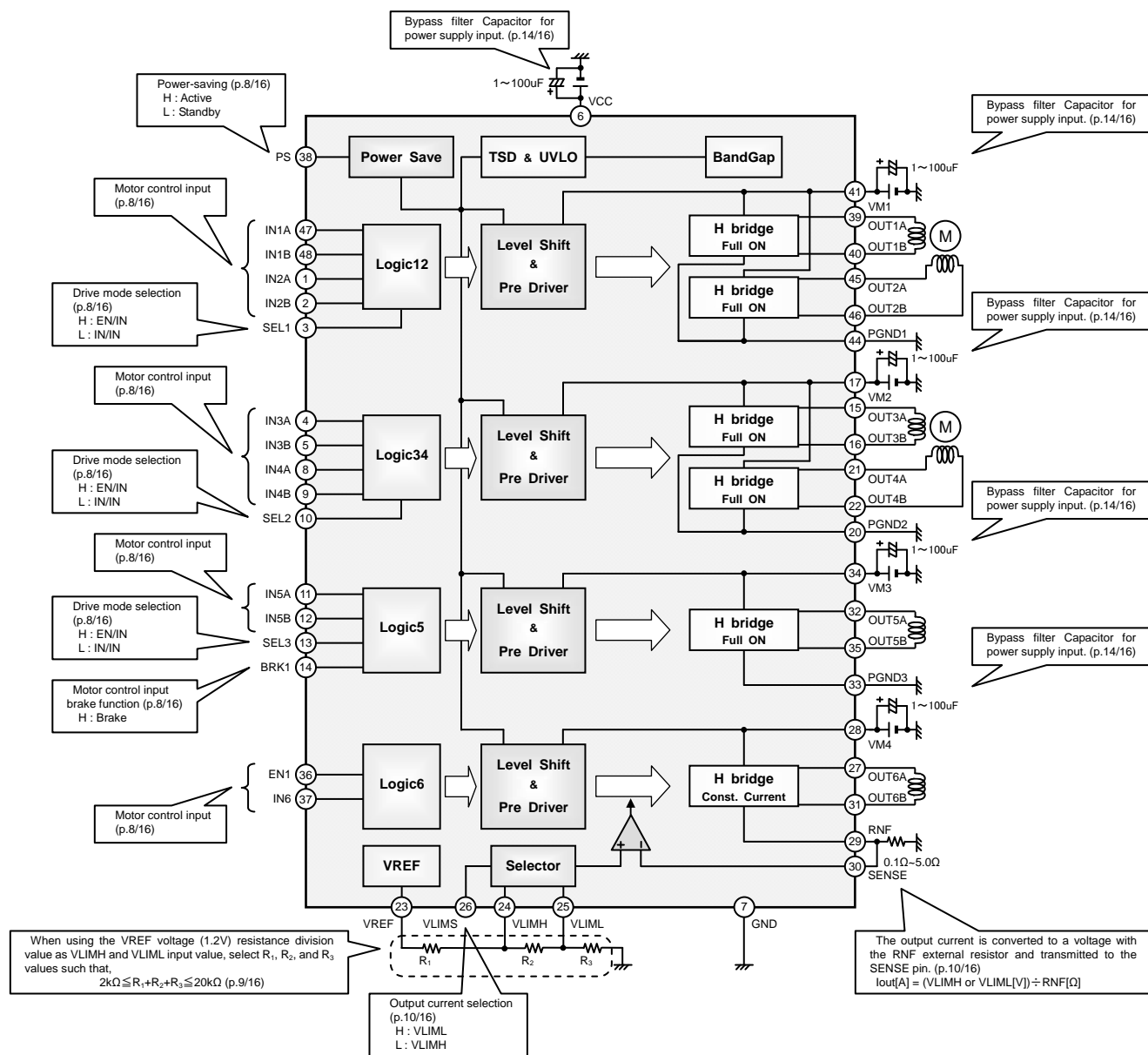


Fig.19 BD6873KN Application Circuit Diagram

3) H-bridge

The 6-channel H-bridges of can be controlled independently. For this reason, it is possible to drive the H-bridges simultaneously, as long as the package thermal tolerances are not exceeded.

The H-bridge output transistors of the BD6373GW, BD6873KN and BD6753KV consist of Power CMOS, with the motor power supply VM, and Power DMOS, with the voltage pump step-up power supply VG, respectively. The total H-bridge ON-Resistance on the high and low sides varies with the VM and VG voltages, respectively. The system must be designed so that the maximum H-bridge current for each channel is 800mA or below.

4) Drive system of Linear Constant-Current H-bridge (BD6873KN: ch6)

BD6873KN (ch6) enables Linear Constant-Current Driving.

(1) Reference voltage output (with a tolerance of $\pm 3\%$)

The VREF pin outputs 1.2V, based on the internal reference voltage. The output current of the Constant-Current Drive block is controllable by connecting external resistance to the VREF pin of the IC and applying a voltage divided by the resistor to the output current setting pins (VLIMH and VLIML pins). It is recommended to set the external resistance to 2k Ω or above in consideration of the current capacity of the VREF pin, and 20k Ω or below in order to minimize the fluctuation of the set value caused by the base current of the internal transistor of the IC.

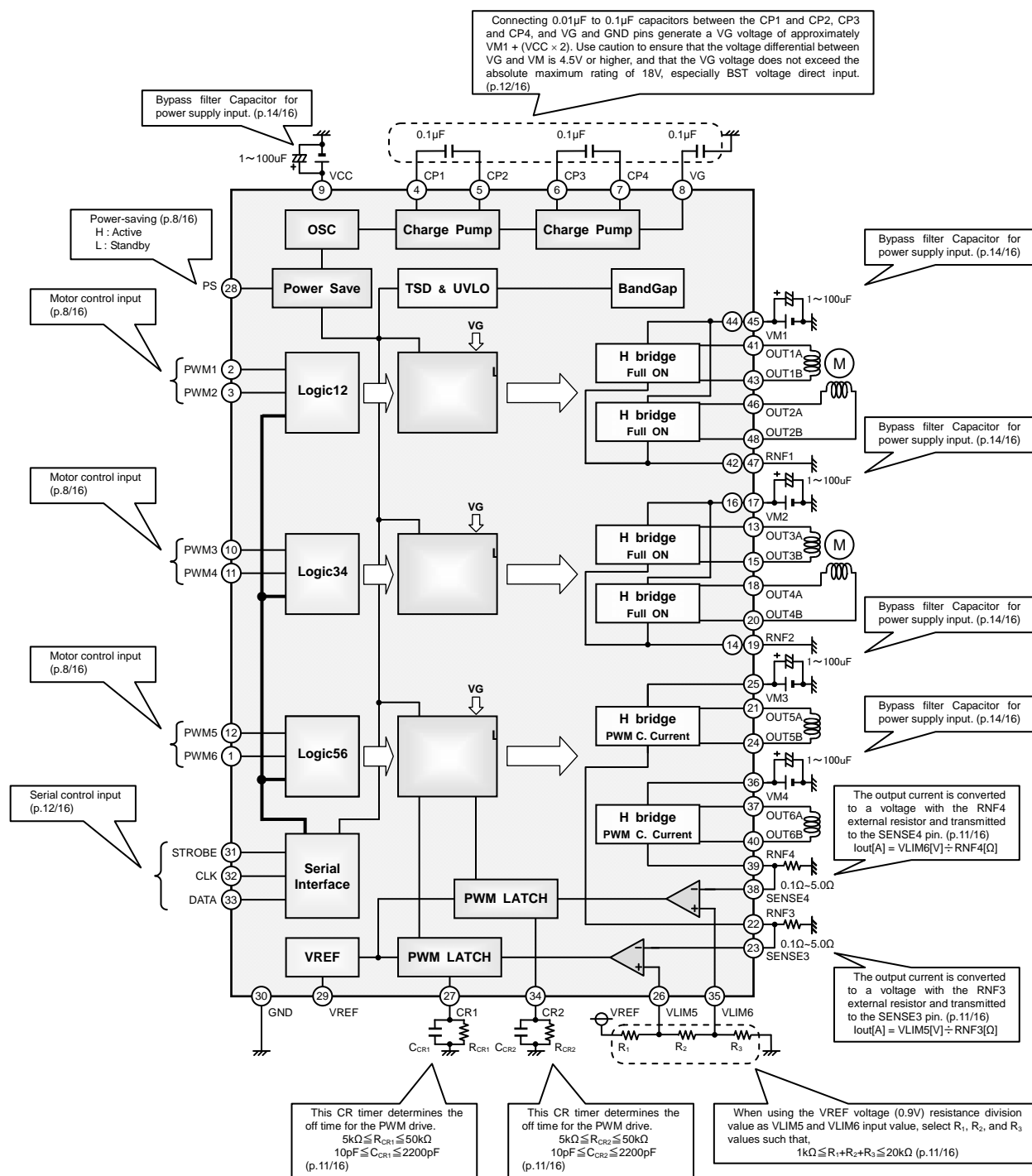


Fig.20 BD6753KV Application Circuit Diagram

(2) Output current settings and setting changes

When the Low-level control voltage is applied to the VLIMS pin, the value on the VLIMH pin will be used as an output current set value to control the output current. When the High-level control voltage is applied to the VLIMS pin, the value on the VLIML pin will be used as an output current set value to control the output current. (See the Electrical Characteristics; P.2/16)

(3) Output current detection and current settings

By connecting external resistor (0.1Ω to 5.0Ω) to the RNF pin of the IC, the motor drive current will be converted into voltage in order to be detected. The output current is kept constant by shorting the RNF and SENSE pins and comparing the voltage with the VLIMH or VLIML voltage. To perform output current settings more precisely, trim the external RNF resistance if needed, and supply a precise voltage externally to the VLIMH or VLIML pin of the IC. In that case, open the VREF pin.

$$\text{Output current value } I_{out}[A] = \frac{V_{LIMH}[V] \text{ or } V_{LIML}[V]}{R_{NF}[\Omega]} \quad \left(\begin{array}{l} \text{Select VLIMH when VLIMS is Low-level} \\ \text{Select VLIML when VLIMS is High-level} \end{array} \right) \dots\dots(1)$$

The output current is 400mA±3% if 0.2V is applied to the VLIMH or VLIML pin and a 0.5Ω resistor is connected externally to the RNF pin.

If the VLIMH and VLIML pins are shorted to the VCC pin (or the same voltage level as the VCC is applied) and the SENSE and RNF pins are shorted to the ground, this channel can be used as a Full-ON Drive H-bridge like the other five channels.

5) Drive system of PWM Constant-Current H-bridge (BD6753KV: ch5 and ch6)

BD6753KV (ch5 and ch6) enable peak current control PWM Constant-Current Driving.

(1) Output current detection and current settings

By connecting external resistance (0.1Ω to 5.0Ω) to the RNF3 and RNF4 pins of the IC, the motor drive current will be converted into voltage in order to be detected. The output current is kept constant by shorting the RNF3 and RNF4 pins with the SENSE3 and SENSE4 pins, respectively, and comparing the voltage to the set voltage input from outside the IC to the VLIM5 and VLIM6 pins. As with the BD6873KN, the reference voltage generated inside the IC (VREF pin: 0.9V±10%) can be divided using external resistors (from 1kΩ to 20kΩ). The resulting value can be input as the set voltage.

It is also necessary to connect a resistor and capacitor to the CR1 and CR2 pins, to determine the PWM drive off time.

(2) PWM Constant-Current control operation

When the output current in output ON mode increases, and the RNF3 or RNF4 voltage reaches the value set with the VLIM5 or VLIM6 voltage, the internal current limiting comparator operates to set the IC to short mode. This caused the current to be attenuated so that the H-bridge's low-side DMOS is ON. Once the off time (Toff) ends, as measured by the CR timer, the IC returns to output ON mode. By repeating this cycle, the IC maintains a fixed current due to the motor's inductance characteristics.

(3) Noise cancellation function

In order to avoid false detections by the current limiting comparator (caused by spike noise generated when output is turned on), the IC uses the noise cancellation time (Tn) to disable current detection. This begins from the time output turns on, until the noise cancellation time elapses. The noise cancellation time represents the minimum on time, and is determined by the CR pin's internal resistor, external resistor, and capacitor.

(4) CR timer

When output turns on, the CR pin is clamped at approximately 0.9V. When the mode changes to short mode, it discharges to approximately 0.4V. The interval over which this 0.5V voltage differential is discharged, is determined by the off time (Toff). Once the CR pin voltage reaches 0.4V, the pin begins to charge as the output turns on, until it reaches 0.9V. The interval over which the pin charges from 0.4V to approximately 0.8V is given by the noise cancellation time (Tn). Toff and Tn are determined by the external resistor and capacitor connected to the CR pin.

A low resistance value to the CR pin will prevent it from reaching the clamp voltage. Therefore a resistor from 5 kΩ to 50kΩ should be used. Capacitors should be from 10pF to 2200pF. The use of a capacitance in excess of 2200pF will lengthen the noise cancellation time and may cause the output current to exceed the set current. Setting a longer off time may increase the output current ripple, reducing both the average current and the motor's rotational efficiency.

$$\text{Output current value } I_{out}[A] = \frac{VLIM5[V]}{RNF3[\Omega]} \quad \text{or} \quad \frac{VLIM6[V]}{RNF4[\Omega]} \quad \dots\dots(2)$$

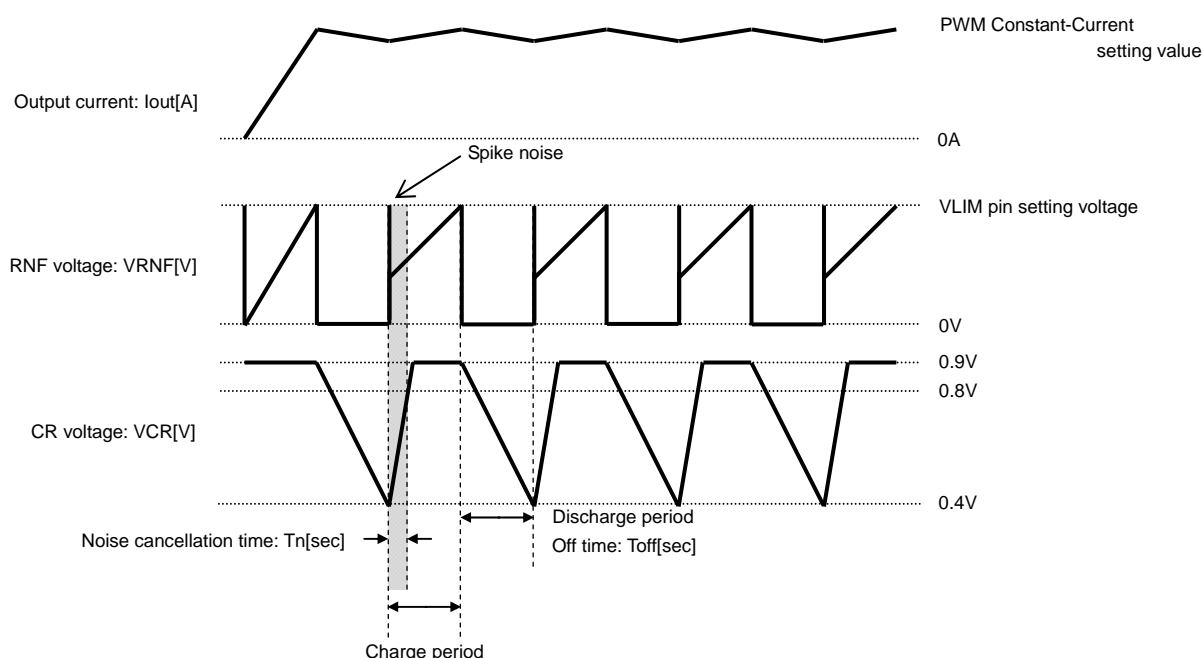


Fig.21 BD6753KV Peak Current Control PWM Constant-Current Drive Using the CR Timer

If the VLIM5 or VLIM6 is shorted to the VCC pin (or the same voltage level as the VCC is applied) and the SENSE3 or SENSE4 and RNF3 or RNF4 pins are shorted to the ground, this channel can be used as a Full-ON Drive H-bridge like the other four channels.

6) Charge pump (BD6753KV)

Each output H-bridge of the BD6753KV on the high and low sides consists of Nch DMOS. Therefore, the gate voltage V_G should be higher than the VM voltage to drive the Nch DMOS on the high side. The BD6753KV has a built-in charge pump circuit that generates V_G voltage by connecting an external capacitor (0.01 μ F to 0.1 μ F).

If a 0.1 μ F capacitor is connected between: CP1 and CP2, CP3 and CP4, V_G and GND

Then, V_G pin output voltage will be: $VM1 + (V_{CC} \times 2)$

If a 0.1 μ F capacitor is connected between: CP1 and CP2, V_G and GND
CP4 and V_G pins are shorted, and CP3 pin is open

Then, V_G pin output voltage will be: $VM1 + V_{CC}$

The VM1 to VM4 respectively can be set to voltages different to one another. In order to ensure better performance, the voltage differential between V_G and VM must be 4.5V or higher, and the V_G voltage must not exceed the absolute maximum rating of 18V.

7) Serial interface (BD6753KV)

The BD6753KV provides an 8-bit, 3-line serial interface for setting output modes. DATA is sent to the internal shift register during the STROBE low interval at the CLK rising edge. Shift register data is written to the IC's internal 6-bit memory at the STROBE rising edge, according to the addresses stored in Bit[7] and Bit[6]. The serial data input order is Bit[0] to Bit[7]. Serial settings are reset when the PS pin changes to Low-level control voltage, triggering standby mode. Serial settings are also reset when the UVLO circuit operates.

BD6753KV Serial Resistor Bit Map

| No. | ADDRESS BIT | | DATA BIT | | | | | |
|-----|-------------|--------|----------|--------|--------|--------|--------|--------|
| | Bit[7] | Bit[6] | Bit[5] | Bit[4] | Bit[3] | Bit[2] | Bit[1] | Bit[0] |
| 00H | 0 | 0 | mod2 | mod1 | p2a | p2b | p1a | p1b |
| 01H | 0 | 1 | mod4 | mod3 | p4a | p4b | p3a | p3b |
| 02H | 1 | 0 | mod6 | mod5 | p6a | p6b | p5a | p5b |

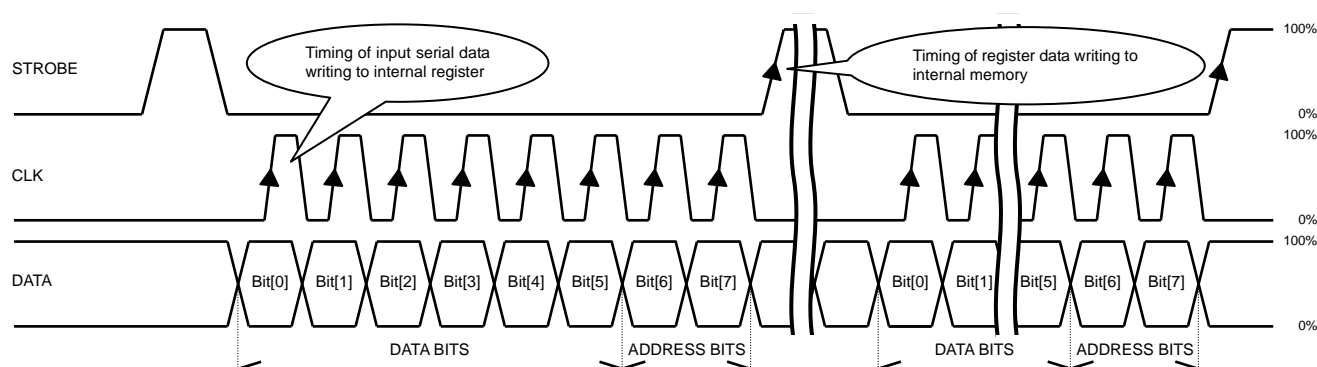


Fig.22 BD6753KV Sequence of Serial Control Input

● I/O Truth Table

BD6373GW Full-ON Driver ch1 to ch2 I/O Truth Table

| Drive mode | INPUT | | OUTPUT | | Output mode |
|------------|----------|--------|--------|-------|-------------|
| | ENABLE12 | INPUTx | OUTxA | OUTxB | |
| EN/IN | H | X | Z | Z | Standby |
| | L | L | H | L | CW |
| | L | H | L | H | CCW |

BD6373GW Full-ON Driver ch3 to ch4 I/O Truth Table

| Drive mode | INPUT | | OUTPUT | | Output mode |
|------------|----------|--------|--------|-------|-------------|
| | ENABLE34 | INPUTx | OUTxA | OUTxB | |
| EN/IN | H | X | Z | Z | Standby |
| | L | L | H | L | CW |
| | L | H | L | H | CCW |

BD6373GW Full-ON Driver ch5 to ch6 I/O Truth Table

| Drive mode | INPUT | | OUTPUT | | Output mode |
|------------|--------|--------|--------|-------|-------------|
| | INPUTx | BRAKEx | OUTxA | OUTxB | |
| IN/IN | L | L | H | L | CW |
| | H | L | L | H | CCW |
| | X | H | L | L | Brake |

L: Low, H: High, X: Don't care, Z: High impedance

At CW, current flows from OUTA to OUTB. At CCW, current flows from OUTB to OUTA.

BD6873KN Full-ON Driver ch1 to ch4 I/O Truth Table

| Drive mode | INPUT | | | OUTPUT | | Output mode |
|------------|-------|------|------|--------|-------|-------------|
| | SELx | INxA | INxB | OUTxA | OUTxB | |
| EN/IN | L | H | X | Z | Z | Standby |
| | | L | L | H | L | CW |
| | | L | H | L | H | CCW |
| IN/IN | H | L | L | Z | Z | Standby |
| | | H | L | H | L | CW |
| | | L | H | L | H | CCW |
| | | H | H | L | L | Brake |

L: Low, H: High, X: Don't care, Z: High impedance

At CW, current flows from OUTA to OUTB. At CCW, current flows from OUTB to OUTA.

BD6873KN Full-ON Driver ch5 I/O Truth Table

| Drive mode | INPUT | | | | OUTPUT | | Output mode |
|------------|-------|------|------|------|--------|-------|-------------|
| | SEL3 | IN5A | IN5B | BRK1 | OUT5A | OUT5B | |
| EN/IN | L | H | X | X | Z | Z | Standby |
| | | L | L | L | H | L | CW |
| | | L | H | L | L | H | CCW |
| | | L | X | H | L | L | Brake |
| IN/IN | H | L | L | X | Z | Z | Standby |
| | | H | L | X | H | L | CW |
| | | L | H | X | L | H | CCW |
| | | H | H | X | L | L | Brake |

L: Low, H: High, X: Don't care, Z: High impedance

At CW, current flows from OUTA to OUTB. At CCW, current flows from OUTB to OUTA.

BD6873KN Linear Constant-Current Driver ch6 I/O Truth Table

| Drive mode | INPUT | | OUTPUT | | Output mode |
|------------|-------|-----|--------|-------|-------------|
| | EN1 | IN6 | OUT6A | OUT6B | |
| EN/IN | H | X | Z | Z | Standby |
| | L | L | H | L | CW |
| | L | H | L | H | CCW |

L: Low, H: High, X: Don't care, Z: High impedance

At CW, current flows from OUTA to OUTB. At CCW, current flows from OUTB to OUTA.

BD6753KV ch1 to ch6 I/O Truth Table

| ED0600RV-01 to 060100 Main table | | | | | | | |
|----------------------------------|-------------|-----|-----|----------|--------|-------|-------------|
| Drive mode | INPUT | | | | OUTPUT | | Output mode |
| | Serial data | | | Terminal | | | |
| | modx | pxa | pxa | PWMx | OUTxA | OUTxB | |
| IN/IN | L | L | L | X | Z | Z | Standby |
| | | L | H | L | L | H | CCW |
| | | L | H | H | L | L | Brake |
| | | H | L | L | H | L | CW |
| | | H | L | H | L | L | Brake |
| | | H | H | X | L | L | Brake |
| EN/IN | H | L | X | X | Z | Z | Standby |
| | | H | L | L | H | L | CW |
| | | H | L | H | L | H | CCW |
| | | H | H | X | L | L | Brake |

L: Low, H: High, X: Don't care, Z: High impedance

At CW, current flows from OUTA to OUTB. At CCW, current flows from OUTB to OUTA.

● I/O Circuit Diagram

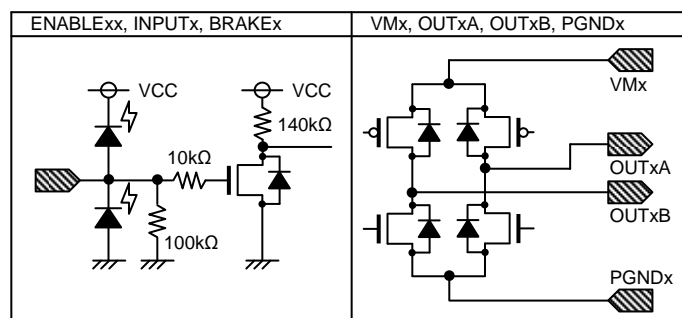


Fig.23 BD6373GW I/O Circuit Diagram (Resistance values are typical ones)

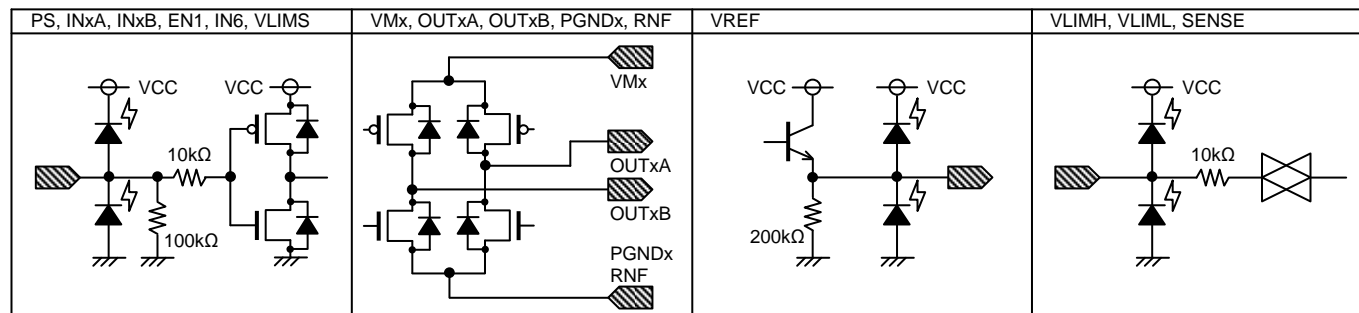


Fig.24 BD6873KN I/O Circuit Diagram (Resistance values are typical ones)

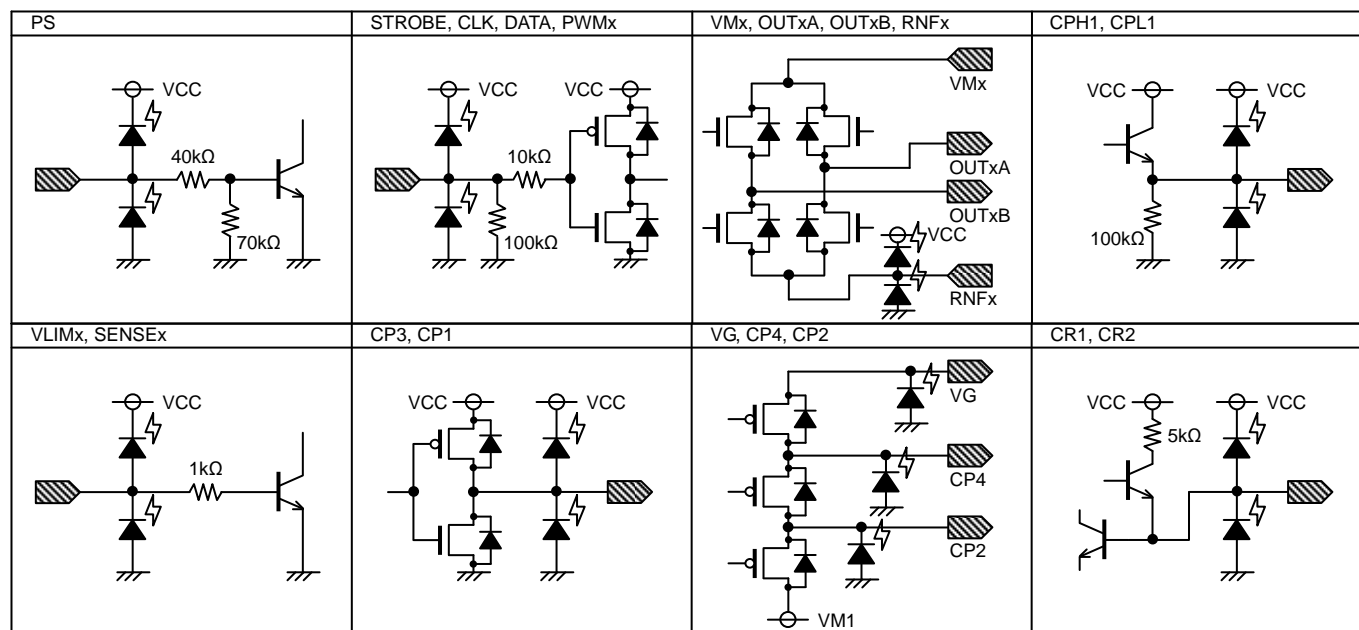


Fig.25 BD6753KV I/O Circuit Diagram (Resistance values are typical ones)

● Operation Notes

1) Absolute maximum ratings

Use of the IC in excess of absolute maximum ratings such as the applied voltage or operating temperature range may result in IC damage. Assumptions should not be made regarding the state of the IC (short mode or open mode) when such damage is suffered. The implementation of a physical safety measure such as a fuse should be considered when use of the IC in a special mode where the absolute maximum ratings may be exceeded is anticipated.

2) Storage temperature range

As long as the IC is kept within this range, there should be no problems in the IC's performance. Conversely, extreme temperature changes may result in poor IC performance, even if the changes are within the above range.

- 3) Power supply pins and lines
None of the VM line for the H-bridges is internally connected to the VCC power supply line, which is only for the control logic or analog circuit. Therefore, the VM and VCC lines can be driven at different voltages. Although these lines can be connected to a common power supply, do not open the power supply pin but connect it to the power supply externally. Regenerated current may flow as a result of the motor's back electromotive force. Insert capacitors between the power supply and ground pins to serve as a route for regenerated current. Determine the capacitance in full consideration of all the characteristics of the electrolytic capacitor, because the electrolytic capacitor may lose some capacitance at low temperatures. If the connected power supply does not have sufficient current absorption capacity, regenerative current will cause the voltage on the power supply line to rise, which combined with the product and its peripheral circuitry may exceed the absolute maximum ratings. It is recommended to implement a physical safety measure such as the insertion of a voltage clamp diode between the power supply and ground pins.
For this IC with several power supplies and a part consists of the CMOS block, it is possible that rush current may flow instantaneously due to the internal powering sequence and delays, and to the unstable internal logic, respectively. Therefore, give special consideration to power coupling capacitance, width of power and ground wirings, and routing of wiring.
- 4) Ground pins and lines
Ensure a minimum GND pin potential in all operating conditions. Make sure that no pins are at a voltage below the GND at any time, regardless of whether it is a transient signal or not.
When using both small signal GND and large current MGND patterns, it is recommended to isolate the two ground patterns, placing a single ground point at the application's reference point so that the pattern wiring resistance and voltage variations caused by large currents do not cause variations in the small signal ground voltage. Be careful not to change the GND wiring pattern of any external components, either.
The power supply and ground lines must be as short and thick as possible to reduce line impedance.
- 5) Thermal design
Use a thermal design that allows for a sufficient margin in light of the power dissipation (Pd) in actual operating conditions.
- 6) Pin short and wrong direction assembly of the device
Use caution when positioning the IC for mounting on printed circuit boards. The IC may be damaged if there is any connection error or if positive and ground power supply terminals are reversed. The IC may also be damaged if pins are shorted together or are shorted to other circuit's power lines.
- 7) Actions in strong magnetic field
Use caution when using the IC in the presence of a strong magnetic field as doing so may cause the IC to malfunction.
- 8) ASO
When using the IC, set the output transistor for the motor so that it does not exceed absolute maximum ratings or ASO.
- 9) Thermal shutdown circuit
If the junction temperature (Tjmax) reaches 175°C, the TSD circuit will operate, and the coil output circuit of the motor will open. There is a temperature hysteresis of approximately 25°C (BD6373GW and BD6873KN Typ.) and 25°C (BD6753KV Typ.). The TSD circuit is designed only to shut off the IC in order to prevent runaway thermal operation. It is not designed to protect the IC or guarantee its operation. The performance of the IC's characteristics is not guaranteed and it is recommended that the device is replaced after the TSD is activated.
- 10) Serial data input
In the BD6753KV, DATA input string start with LSB first.
The serial settings are reset during standby mode operation and whenever the UVLO or TSD circuits are operating.
- 11) Power saving terminal
Be cancelled power saving mode after turned on power supply VCC and VM, because of PS terminal combines power saving with serial reset function. If the case of power saving terminal always shorted power supply terminal, reset function may not be well, and it may cause the IC to malfunction.
- 12) Testing on application board
When testing the IC on an application board, connecting a capacitor to a pin with low impedance subjects the IC to stress. Always discharge capacitors after each process or step. Always turn the IC's power supply off before connecting it to, or removing it from a jig or fixture, during the inspection process. Ground the IC during assembly steps as an antistatic measure. Use similar precaution when transporting and storing the IC.
- 13) Application example
The application circuit is recommended for use. Make sure to confirm the adequacy of the characteristics. When using the circuit with changes to the external circuit constants, make sure to leave an adequate margin for external components including static and transitional characteristics as well as dispersion of the IC.
- 14) Regarding input pin of the IC
This monolithic IC contains P+ isolation and P substrate layers between adjacent elements to keep them isolated. P-N junctions are formed at the intersection of these P layers with the N layers of other elements, creating a parasitic diode or transistor. For example, the relation between each potential is as follows:
When GND > Pin A, the P-N junction operates as a parasitic diode.
When GND > Pin B, the P-N junction operates as a parasitic diode and transistor.
Parasitic elements can occur inevitably in the structure of the IC. The operation of parasitic elements can result in mutual interference among circuits, operational faults, or physical damage. Accordingly, methods by which parasitic elements operate, such as applying a voltage that is lower than the GND (P substrate) voltage to an input pin, should not be used.

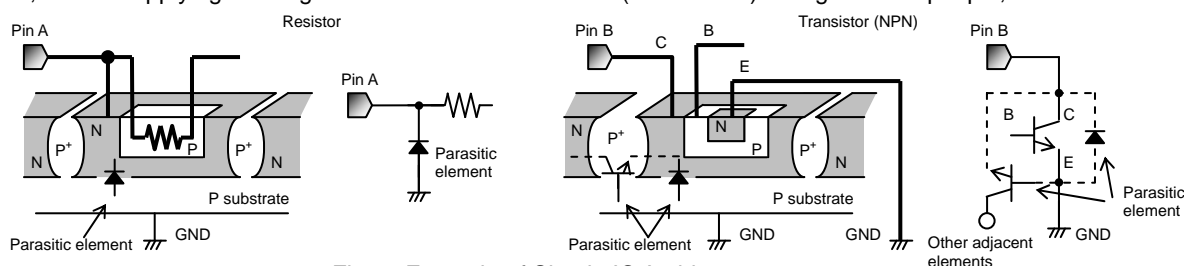


Fig.26 Example of Simple IC Architecture

●Ordering part number

| | |
|---|---|
| B | D |
|---|---|

Part No.

| | | | |
|---|---|---|---|
| 6 | 3 | 7 | 3 |
|---|---|---|---|

Part No.

6373 : F.ON 6ch
 6873 : F.ON 5ch+C.C. 1ch
 6753 : F.ON 4ch+PWM 2ch

| | |
|---|---|
| G | W |
|---|---|

Package

GW : UCSP75M2
 KN : UQFN48
 KV : VQFP48C

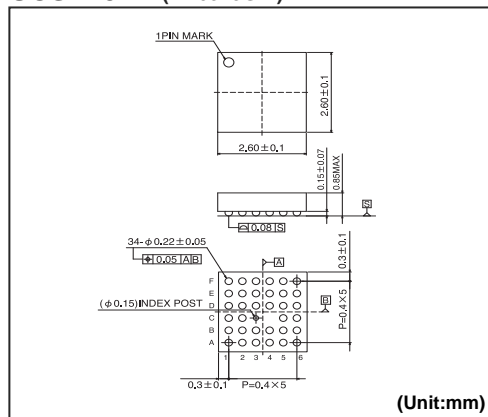
| | |
|---|---|
| E | 2 |
|---|---|

Packaging and forming specification

E2: Embossed tape and reel
 (UCSP75M2/ UQFN48))

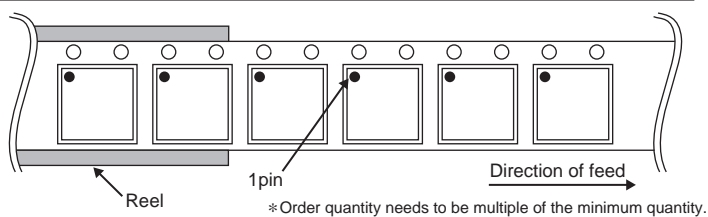
None: Tray
 (VQFP48C)

UCSP75M2 (BD6373GW)

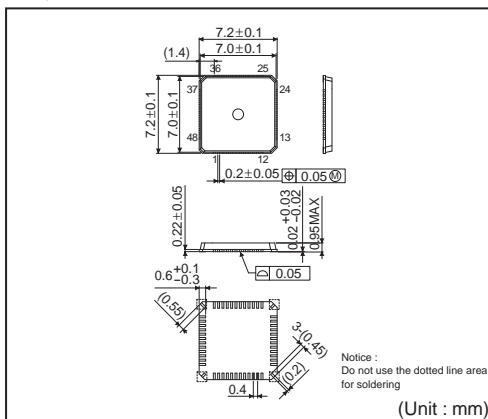


<Tape and Reel information>

| | |
|-------------------|---|
| Tape | Embossed carrier tape |
| Quantity | 3000pcs |
| Direction of feed | E2 (The direction is the 1pin of product is at the upper left when you hold reel on the left hand and you pull out the tape on the right hand) |

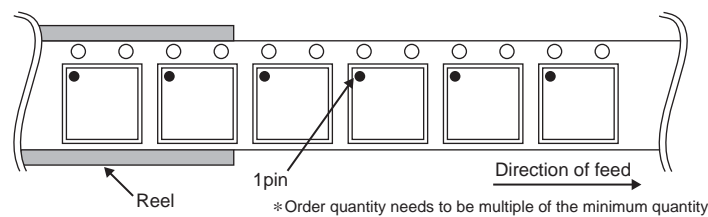


UQFN48

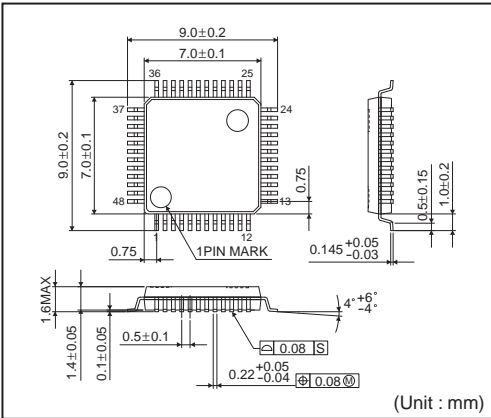


<Tape and Reel information>

| | |
|-------------------|---|
| Tape | Embossed carrier tape (with dry pack) |
| Quantity | 2500pcs |
| Direction of feed | E2 (The direction is the 1pin of product is at the upper left when you hold reel on the left hand and you pull out the tape on the right hand) |

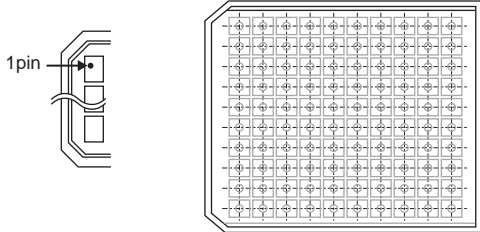


VQFP48C



<Tape and Reel information>

| | |
|-------------------|---|
| Container | Tray |
| Quantity | 1000pcs |
| Direction of feed | Direction of product is fixed in a tray |



* Order quantity needs to be multiple of the minimum quantity.

Notice

Precaution on using ROHM Products

- Our Products are designed and manufactured for application in ordinary electronic equipments (such as AV equipment, OA equipment, telecommunication equipment, home electronic appliances, amusement equipment, etc.). If you intend to use our Products in devices requiring extremely high reliability (such as medical equipment ^(Note 1), transport equipment, traffic equipment, aircraft/spacecraft, nuclear power controllers, fuel controllers, car equipment including car accessories, safety devices, etc.) and whose malfunction or failure may cause loss of human life, bodily injury or serious damage to property ("Specific Applications"), please consult with the ROHM sales representative in advance. Unless otherwise agreed in writing by ROHM in advance, ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of any ROHM's Products for Specific Applications.

(Note1) Medical Equipment Classification of the Specific Applications

| JAPAN | USA | EU | CHINA |
|-----------|-----------|------------|-----------|
| CLASS III | CLASS III | CLASS II b | CLASS III |
| CLASS IV | | CLASS III | |

- ROHM designs and manufactures its Products subject to strict quality control system. However, semiconductor products can fail or malfunction at a certain rate. Please be sure to implement, at your own responsibilities, adequate safety measures including but not limited to fail-safe design against the physical injury, damage to any property, which a failure or malfunction of our Products may cause. The following are examples of safety measures:
 - Installation of protection circuits or other protective devices to improve system safety
 - Installation of redundant circuits to reduce the impact of single or multiple circuit failure
- Our Products are designed and manufactured for use under standard conditions and not under any special or extraordinary environments or conditions, as exemplified below. Accordingly, ROHM shall not be in any way responsible or liable for any damages, expenses or losses arising from the use of any ROHM's Products under any special or extraordinary environments or conditions. If you intend to use our Products under any special or extraordinary environments or conditions (as exemplified below), your independent verification and confirmation of product performance, reliability, etc. prior to use, must be necessary:
 - Use of our Products in any types of liquid, including water, oils, chemicals, and organic solvents
 - Use of our Products outdoors or in places where the Products are exposed to direct sunlight or dust
 - Use of our Products in places where the Products are exposed to sea wind or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves
 - Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
 - Sealing or coating our Products with resin or other coating materials
 - Use of our Products without cleaning residue of flux (even if you use no-clean type fluxes, cleaning residue of flux is recommended); or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering
 - Use of the Products in places subject to dew condensation
- The Products are not subject to radiation-proof design.
- Please verify and confirm characteristics of the final or mounted products in using the Products.
- In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse. is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.
- De-rate Power Dissipation (Pd) depending on Ambient temperature (Ta). When used in sealed area, confirm the actual ambient temperature.
- Confirm that operation temperature is within the specified range described in the product specification.
- ROHM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.

Precaution for Mounting / Circuit board design

- When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.
- In principle, the reflow soldering method must be used; if flow soldering method is preferred, please consult with the ROHM representative in advance.

For details, please refer to ROHM Mounting specification

Precautions Regarding Application Examples and External Circuits

1. If change is made to the constant of an external circuit, please allow a sufficient margin considering variations of the characteristics of the Products and external components, including transient characteristics, as well as static characteristics.
2. You agree that application notes, reference designs, and associated data and information contained in this document are presented only as guidance for Products use. Therefore, in case you use such information, you are solely responsible for it and you must exercise your own independent verification and judgment in the use of such information contained in this document. ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of such information.

Precaution for Electrostatic

This Product is electrostatic sensitive product, which may be damaged due to electrostatic discharge. Please take proper caution in your manufacturing process and storage so that voltage exceeding the Products maximum rating will not be applied to Products. Please take special care under dry condition (e.g. Grounding of human body / equipment / solder iron, isolation from charged objects, setting of ionizer, friction prevention and temperature / humidity control).

Precaution for Storage / Transportation

1. Product performance and soldered connections may deteriorate if the Products are stored in the places where:
 - [a] the Products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - [b] the temperature or humidity exceeds those recommended by ROHM
 - [c] the Products are exposed to direct sunshine or condensation
 - [d] the Products are exposed to high Electrostatic
2. Even under ROHM recommended storage condition, solderability of products out of recommended storage time period may be degraded. It is strongly recommended to confirm solderability before using Products of which storage time is exceeding the recommended storage time period.
3. Store / transport cartons in the correct direction, which is indicated on a carton with a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.
4. Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.

Precaution for Product Label

QR code printed on ROHM Products label is for ROHM's internal use only.

Precaution for Disposition

When disposing Products please dispose them properly using an authorized industry waste company.

Precaution for Foreign Exchange and Foreign Trade act

Since our Products might fall under controlled goods prescribed by the applicable foreign exchange and foreign trade act, please consult with ROHM representative in case of export.

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Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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