

Motor Drivers for Digital Still Cameras

# 6-Channel System Lens Driver for Digital Still Cameras

BD6373GW

**General Description**

The BD6373GW is a motor driver that integrates 6 Full-ON type H-Bridges. The device is intended to drive a stepping motor for auto focus system, and another stepping motor for either zoom or iris. It can also be used to drive an actuator of the new system like a lens barrier.

**Features**

- Low ON-Resistance Power CMOS Output
- Drive Mode Switch Function
- Under Voltage Locked Out Protection & Thermal Shut Down Circuit

**Applications**

- Mobile system
- Home appliance
- Amusement system, etc

**Key Specifications**

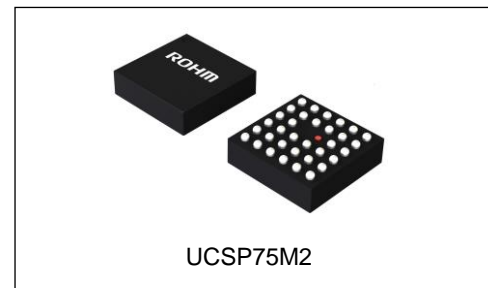
- Power Supply Voltage Range: 2.5V to 5.5V
- Motor Power Supply Voltage Range: 2.5V to 5.5V
- Circuit Current(No Signal & No Load): 1.0mA(Typ)
- Control Input Voltage: 0V to V<sub>CC</sub>V
- H-Bridge Output Current: -0.5A/ch to +0.5A/ch
- Output ON-Resistance(Each Channel): 1.2Ω(Typ)
- Operating Temperature Range: -25°C to +85°C

**Package**

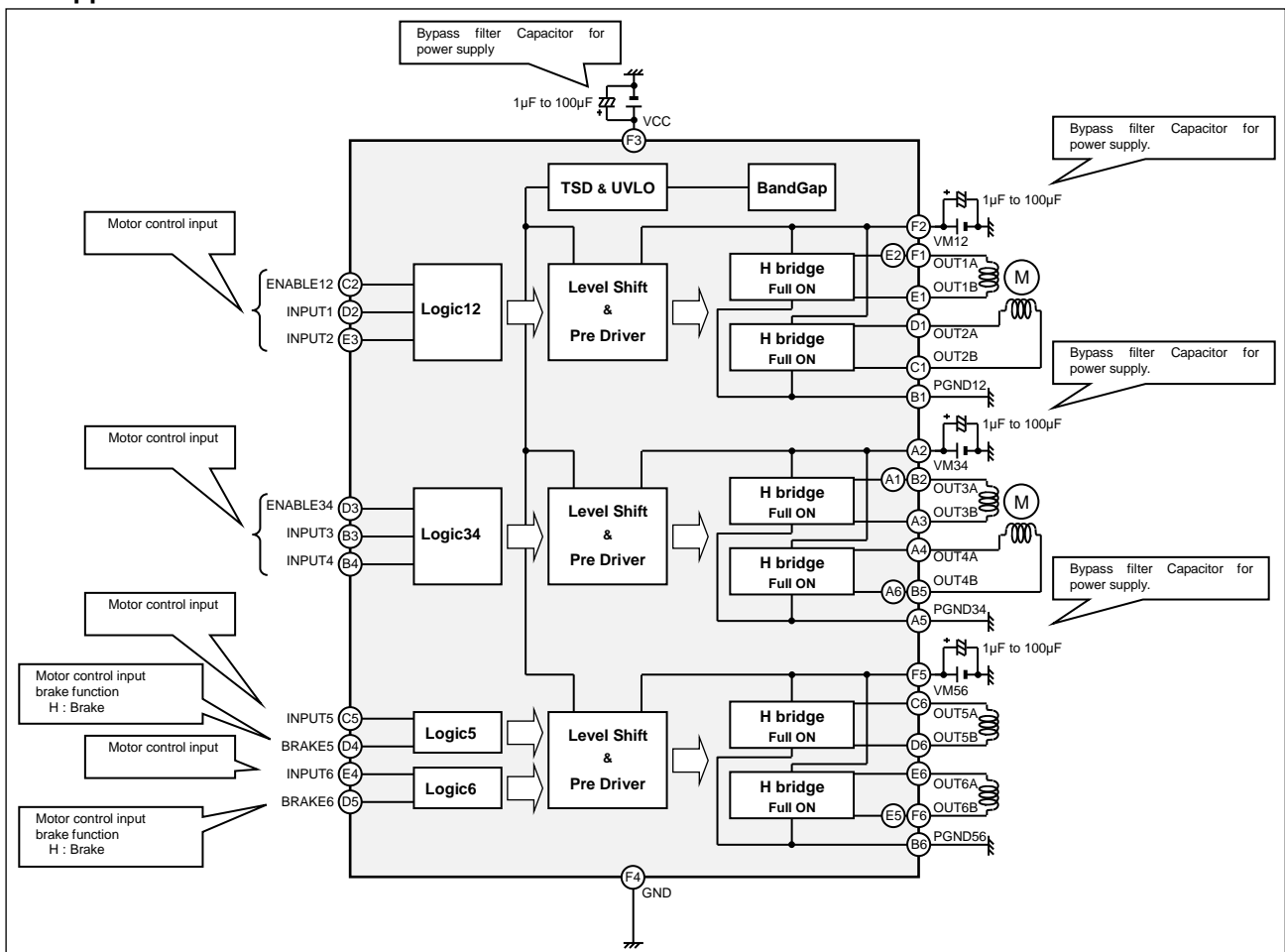
UCSP75M2

**W(Typ) x D(Typ) x H(Max)**

2.60mm x 2.60mm x 0.85mm



**Typical Application Circuit**



○Product structure : Silicon monolithic integrated circuit ○This product has no designed protection against radioactive rays

## Pin Configurations

(TOP VIEW)

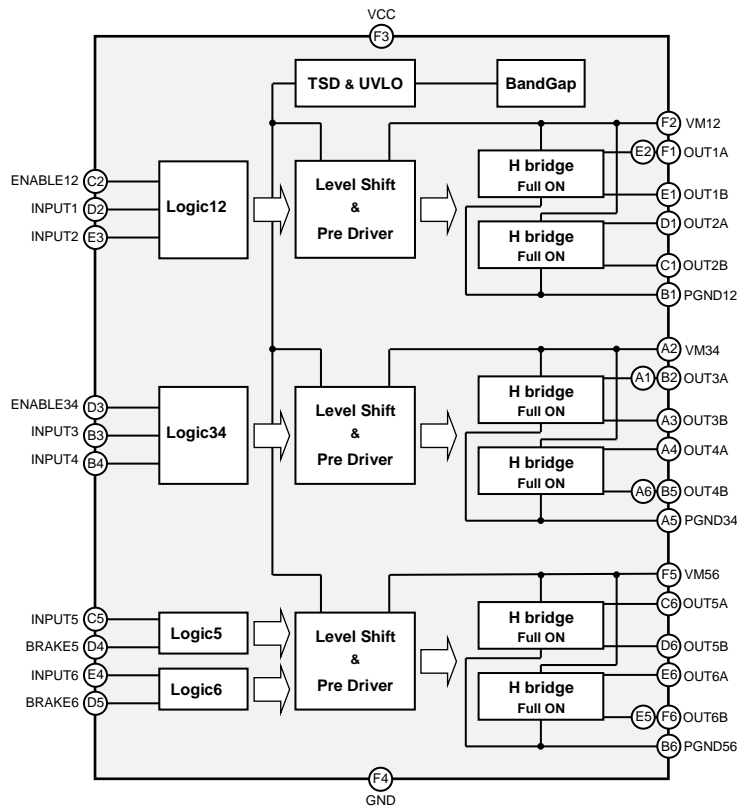
|   | 1      | 2        | 3          | 4      | 5      | 6      |
|---|--------|----------|------------|--------|--------|--------|
| A | OUT3A  | VM34     | OUT3B      | OUT4A  | PGND34 | OUT4B  |
| B | PGND12 | OUT3A    | INPUT3     | INPUT4 | OUT4B  | PGND56 |
| C | OUT2B  | ENABLE12 | INDEX POST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

The pins of the same name, such as OUT3A, OUT4B, OUT1A, and OUT6B, must be shorted on printed circuit boards.

## Pin Descriptions

| Pin No. | Pin Name   | Function                        | Pin No. | Pin Name | Function                        |
|---------|------------|---------------------------------|---------|----------|---------------------------------|
| A1      | OUT3A      | H-bridge output 3A              | D1      | OUT2A    | H-bridge output 2A              |
| A2      | VM34       | Motor power supply ch.3 & ch.4  | D2      | INPUT1   | Control logic input 1           |
| A3      | OUT3B      | H-bridge output 3B              | D3      | ENABLE34 | Control logic input ch.3 & ch.4 |
| A4      | OUT4A      | H-bridge output 4A              | D4      | BRAKE5   | Control logic input ch.5        |
| A5      | PGND34     | Motor ground ch.3 & ch.4        | D5      | BRAKE6   | Control logic input ch.6        |
| A6      | OUT4B      | H-bridge output 4B              | D6      | OUT5B    | H-bridge output 5B              |
| B1      | PGND12     | Motor ground ch.1 & ch.2        | E1      | OUT1B    | H-bridge output 1B              |
| B2      | OUT3A      | H-bridge output 3A              | E2      | OUT1A    | H-bridge output 1A              |
| B3      | INPUT3     | Control logic input 3           | E3      | INPUT2   | Control logic input 2           |
| B4      | INPUT4     | Control logic input 4           | E4      | INPUT6   | Control logic input 6           |
| B5      | OUT4B      | H-bridge output 4B              | E5      | OUT6B    | H-bridge output 6B              |
| B6      | PGND56     | Motor ground ch.5 & ch.6        | E6      | OUT6A    | H-bridge output 6A              |
| C1      | OUT2B      | H-bridge output 2B              | F1      | OUT1A    | H-bridge output 1A              |
| C2      | ENABLE12   | Control logic input ch.1 & ch.2 | F2      | VM12     | Motor power supply ch.1 & ch.2  |
| C3      | INDEX POST |                                 | F3      | VCC      | Power supply                    |
| C4      | -          |                                 | F4      | GND      | Ground                          |
| C5      | INPUT5     | Control logic input 5           | F5      | VM56     | Motor power supply ch.5 & ch.6  |
| C6      | OUT5A      | H-bridge output 5A              | F6      | OUT6B    | H-bridge output 6B              |

## Block Diagram



## Description of Blocks

## 1. Motor Control Input

## (a) ENABLE12, ENABLE34, INPUT1 to INPUT6 Pins

Logic level controls the output logic of H-Bridge.

(See the Electrical Characteristics; p.4/12, and I/O Truth Table; p.5/12)

## (b) BRAKE5 &amp; BRAKE6 Pins

Logic high puts the device in short brake mode.

(See the Electrical Characteristics; p.4/12 and I/O Truth Table; p.5/12)

## 2. H-Bridge

Each H-bridge can be controlled independently. It is therefore possible to drive the H-bridges simultaneously, as long as the package thermal tolerances are not exceeded. Because the respective output transistors consist of power CMOS which consumes a motor power supply  $V_M$ , the ON-Resistance value of high and low-side total is dependent on  $V_M$  voltage. Further, the whole application must be designed so that the maximum current of each channel may be 500mA or below. (See the Recommended Operating Conditions; p.4/12)

## Absolute Maximum Ratings (Ta=25°C)

| Parameter                  | Symbol            | Limit                         | Unit |
|----------------------------|-------------------|-------------------------------|------|
| Power Supply Voltage       | V <sub>CC</sub>   | -0.5 to +6.5                  | V    |
| Motor Power Supply Voltage | V <sub>M</sub>    | -0.5 to +6.5                  | V    |
| Control Input Voltage      | V <sub>IN</sub>   | -0.5 to +V <sub>CC</sub> +0.5 | V    |
| Power Dissipation          | P <sub>d</sub>    | 0.94 (Note 1)                 | W    |
| H-bridge Output Current    | I <sub>OUT</sub>  | -0.8 to +0.8 (Note 2)         | A/ch |
| Storage Temperature Range  | T <sub>stg</sub>  | -55 to +150                   | °C   |
| Junction Temperature       | T <sub>jmax</sub> | 150                           | °C   |

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

(Note 2) Must not exceed P<sub>d</sub>, A<sub>SO</sub>, or T<sub>jmax</sub> of 150°C

**Caution:** Operating the IC over the absolute maximum ratings may damage the IC. The damage can either be a short circuit between pins or an open circuit between pins and the internal circuitry. Therefore, it is important to consider circuit protection measures, such as adding a fuse, in case the IC is operated over the absolute maximum ratings.

## Recommended Operating Conditions

| Parameter                                   | Symbol           | Min  | Typ | Max             | Unit |
|---------------------------------------------|------------------|------|-----|-----------------|------|
| Power Supply Voltage                        | V <sub>CC</sub>  | 2.5  | -   | 5.5             | V    |
| Motor Power Supply Voltage                  | V <sub>M</sub>   | 2.5  | -   | 5.5             | V    |
| Control Input Voltage                       | V <sub>IN</sub>  | 0    | -   | V <sub>CC</sub> | V    |
| H-bridge Output Current <sup>(Note 3)</sup> | I <sub>OUT</sub> | -0.5 | -   | +0.5            | A/ch |
| Operating Temperature Range                 | T <sub>opr</sub> | -25  | -   | +85             | °C   |

(Note 3) Must not exceed P<sub>d</sub>, A<sub>SO</sub>, or T<sub>jmax</sub> of 150°C

Electrical Characteristics (Unless otherwise specified V<sub>CC</sub>=3.0V, V<sub>M</sub>=5.0V, Ta=25°C)

| Parameter                                                               | Symbol            | Min | Typ  | Max             | Unit | Conditions                                            |
|-------------------------------------------------------------------------|-------------------|-----|------|-----------------|------|-------------------------------------------------------|
| All Circuits                                                            |                   |     |      |                 |      |                                                       |
| Circuit Current                                                         | I <sub>CC</sub>   | -   | 1.0  | 1.9             | mA   | No signal and no load                                 |
| Control Input (IN=ENABLE12, ENABLE34, INPUT1 to INPUT6, BRAKE5, BRAKE6) |                   |     |      |                 |      |                                                       |
| High-Level Input Voltage                                                | V <sub>INH</sub>  | 2.0 | -    | V <sub>CC</sub> | V    |                                                       |
| Low-Level Input Voltage                                                 | V <sub>INL</sub>  | 0   | -    | 0.7             | V    |                                                       |
| High-Level Input Current                                                | I <sub>INH</sub>  | 15  | 30   | 60              | μA   | V <sub>IN</sub> =3V                                   |
| Low-Level Input Current                                                 | I <sub>INL</sub>  | -1  | 0    | -               | μA   | V <sub>IN</sub> =0V                                   |
| Under Voltage Locked Out (UVLO)                                         |                   |     |      |                 |      |                                                       |
| UVLO Voltage                                                            | V <sub>UVLO</sub> | 1.6 | -    | 2.4             | V    |                                                       |
| Full ON Type H-Bridge Driver (Each Channel)                             |                   |     |      |                 |      |                                                       |
| Output ON-Resistance 1                                                  | R <sub>ON1</sub>  | -   | 1.2  | 1.5             | Ω    | I <sub>OUT</sub> =±400mA, V <sub>M</sub> =5.0V, total |
| Output ON-Resistance 2                                                  | R <sub>ON2</sub>  | -   | 1.5  | 2.0             | Ω    | I <sub>OUT</sub> =±400mA, V <sub>M</sub> =3.0V, total |
| Turn ON Time                                                            | t <sub>ON</sub>   | -   | 0.55 | 1.95            | μs   | R <sub>L</sub> =20Ω                                   |
| Turn OFF Time                                                           | t <sub>OFF</sub>  | -   | 0.08 | 0.5             | μs   | R <sub>L</sub> =20Ω                                   |
| Rise Time                                                               | t <sub>R</sub>    | 0.1 | 0.15 | 1.0             | μs   | R <sub>L</sub> =20Ω                                   |
| Fall Time                                                               | t <sub>F</sub>    | -   | 0.03 | 0.2             | μs   | R <sub>L</sub> =20Ω                                   |

Typical Performance Curves (Reference Data)

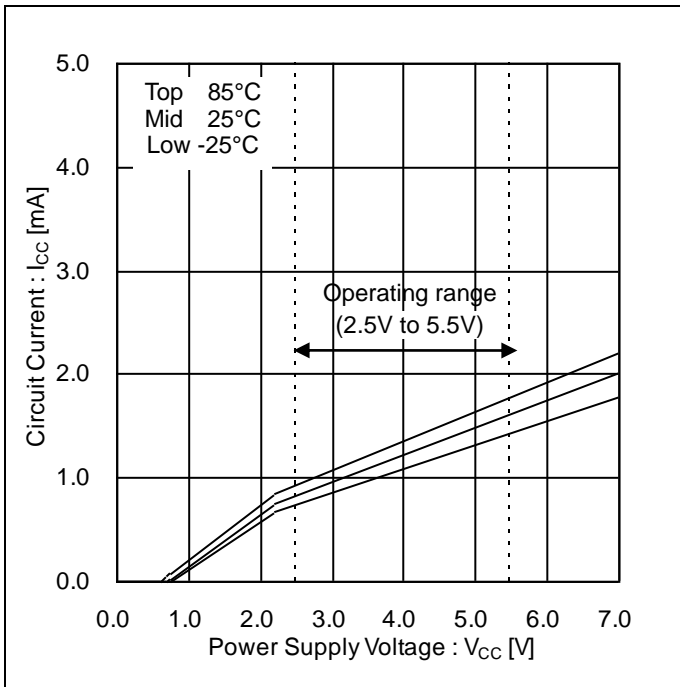


Figure 1.  
Circuit Current vs Supply Voltage

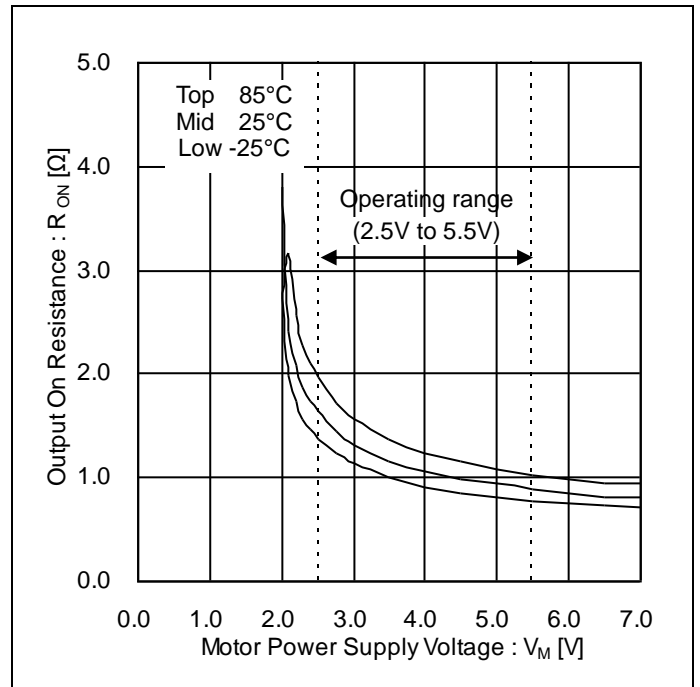


Figure 2.  
Output ON-Resistance vs Motor Power Supply Voltage

Timing Chart

Table 1. I/O Truth Table (Channel 1 & Channel 2)

| Input Mode | INPUT    |        | OUTPUT |       |                                 |
|------------|----------|--------|--------|-------|---------------------------------|
|            | ENABLE12 | INPUTx | OUTxA  | OUTxB | Output Mode <sup>(Note 4)</sup> |
| EN/IN      | L        | X      | Z      | Z     | Open                            |
|            | H        | L      | H      | L     | CW                              |
|            | H        | H      | L      | H     | CCW                             |

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

(Note 4) CW: Current flows from OUTxA to OUTxB, CCW: Current flows from OUTxB to OUTxA (x=1, 2)

Table 2. I/O Truth Table (Channel 3 & Channel 4)

| Input Mode | INPUT    |        | OUTPUT |       |                                 |
|------------|----------|--------|--------|-------|---------------------------------|
|            | ENABLE34 | INPUTx | OUTxA  | OUTxB | Output Mode <sup>(Note 5)</sup> |
| EN/IN      | L        | X      | Z      | Z     | Open                            |
|            | H        | L      | H      | L     | CW                              |
|            | H        | H      | L      | H     | CCW                             |

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

(Note 5) CW: Current flows from OUTxA to OUTxB, CCW: Current flows from OUTxB to OUTxA (x=3, 4)

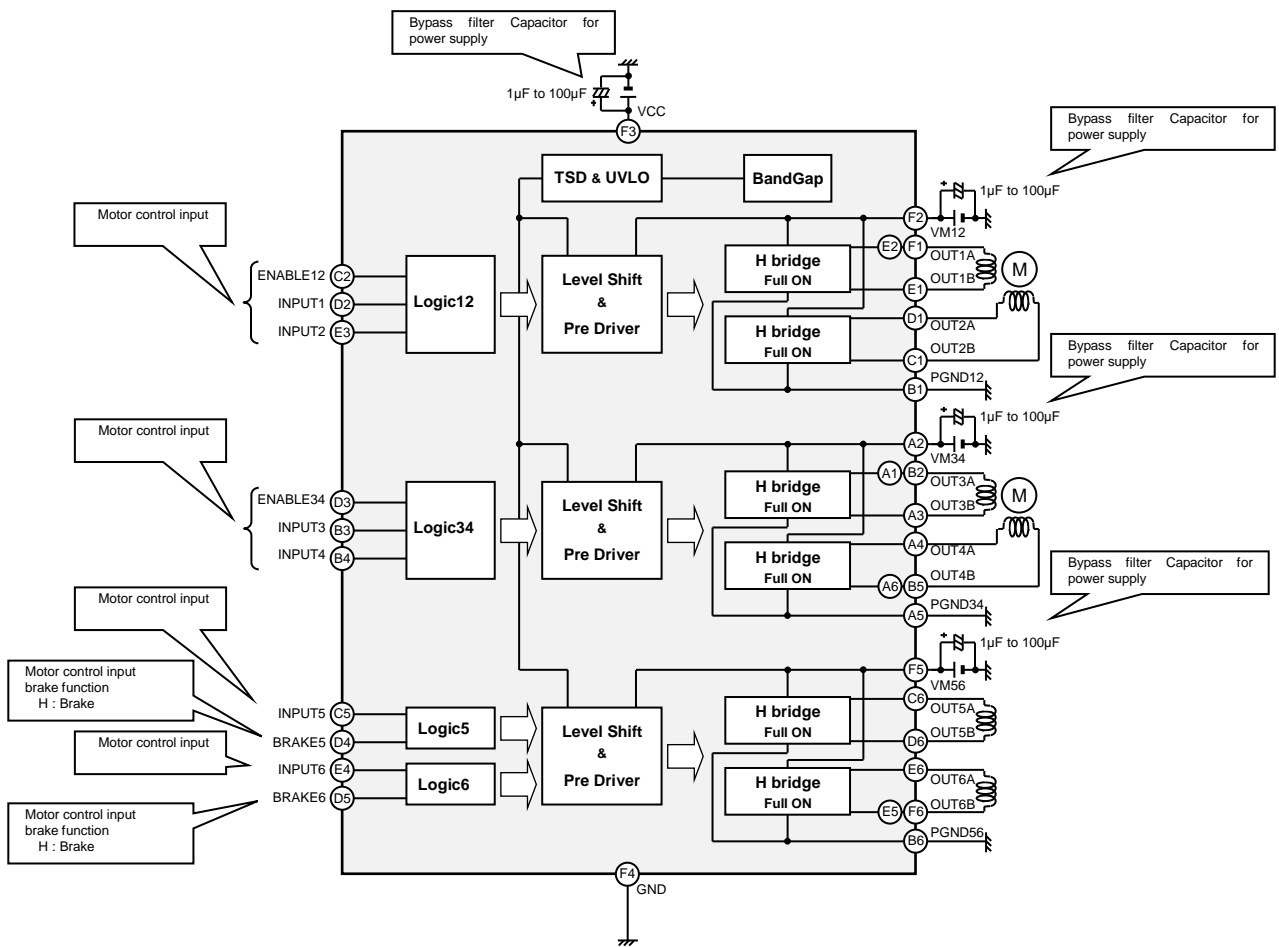
Table 3. I/O Truth Table (Channel 5 & Channel 6)

| Input Mode | INPUT  |        | OUTPUT |       |                                 |
|------------|--------|--------|--------|-------|---------------------------------|
|            | INPUTx | BRAKEx | OUTxA  | OUTxB | Output Mode <sup>(Note 6)</sup> |
| IN/IN      | L      | L      | H      | L     | CW                              |
|            | H      | L      | L      | H     | CCW                             |
|            | X      | H      | L      | L     | Short Brake                     |

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

(Note 6) CW: Current flows from OUTxA to OUTxB, CCW: Current flows from OUTxB to OUTxA (x=5, 6)

Application Example



Selection of Components Externally Connected

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.

Power Dissipation

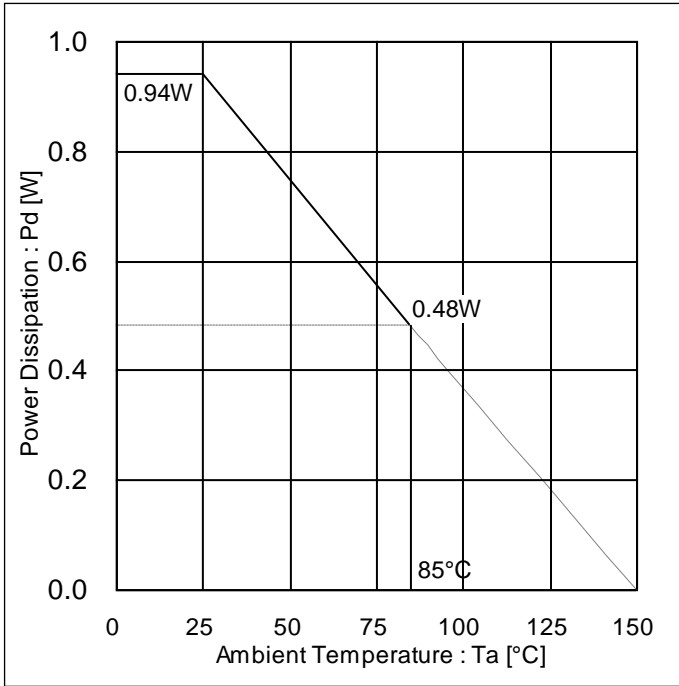
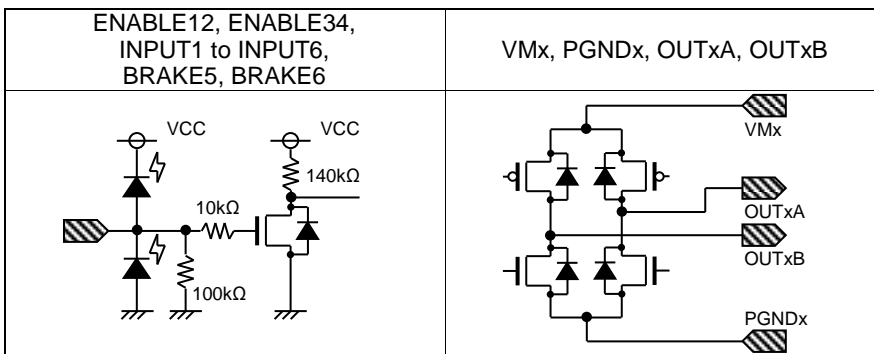


Figure 3.  
Power Dissipation vs Ambient Temperature

I/O Equivalent Circuits



## Operational Notes

### 1. Reverse Connection of Power Supply

Connecting the power supply in reverse polarity can damage the IC. Take precautions against reverse polarity when connecting the power supply, such as mounting an external diode between the power supply and the IC's power supply pins.

### 2. Power Supply Lines

Design the PCB layout pattern to provide low impedance supply lines. Separate the ground and supply lines of the digital and analog blocks to prevent noise in the ground and supply lines of the digital block from affecting the analog block. Furthermore, connect a capacitor to ground at all power supply pins. Consider the effect of temperature and aging on the capacitance value when using electrolytic capacitors.

### 3. Ground Voltage

Ensure that no pins are at a voltage below that of the ground pin at any time, even during transient condition.

### 4. Ground Wiring Pattern

When using both small-signal(GND) and large-current ground(PGND) traces, the two ground traces should be routed separately but connected to a single ground at the reference point of the application board to avoid fluctuations in the small-signal ground caused by large currents. Also ensure that the ground traces of external components do not cause variations on the ground voltage. The ground lines must be as short and thick as possible to reduce line impedance.

### 5. Thermal Consideration

Should by any chance the power dissipation rating be exceeded the rise in temperature of the chip may result in deterioration of the properties of the chip. In case of exceeding this absolute maximum rating, increase the board size and copper area to prevent exceeding the Pd rating.

### 6. Recommended Operating Conditions

These conditions represent a range within which the expected characteristics of the IC can be approximately obtained. The electrical characteristics are guaranteed under the conditions of each parameter.

### 7. Inrush Current

When power is first supplied to the IC, it is possible that the internal logic may be unstable and inrush current may flow instantaneously due to the internal powering sequence and delays, especially if the IC has more than one power supply. Therefore, give special consideration to power coupling capacitance, power wiring, width of ground wiring, and routing of connections.

### 8. Operation Under Strong Electromagnetic Field

Operating the IC in the presence of a strong electromagnetic field may cause the IC to malfunction.

### 9. Testing on Application Boards

When testing the IC on an application board, connecting a capacitor directly to a low-impedance output pin may subject the IC to stress. Always discharge capacitors completely after each process or step. The IC's power supply should always be turned off completely before connecting or removing it from the test setup during the inspection process. To prevent damage from static discharge, ground the IC during assembly and use similar precautions during transport and storage.

### 10. Inter-pin Short and Mounting Errors

Ensure that the direction and position are correct when mounting the IC on the PCB. Incorrect mounting may result in damaging the IC. Avoid nearby pins being shorted to each other especially to ground, power supply and output pin. Inter-pin shorts could be due to many reasons such as metal particles, water droplets (in very humid environment) and unintentional solder bridge deposited in between pins during assembly to name a few.

### 11. Unused Input Pins

Input pins of an IC are often connected to the gate of a MOS transistor. The gate has extremely high impedance and extremely low capacitance. If left unconnected, the electric field from the outside can easily charge it. The small charge acquired in this way is enough to produce a significant effect on the conduction through the transistor and cause unexpected operation of the IC. So unless otherwise specified, unused input pins should be connected to the power supply or ground line.



## Operational Notes – continued

**12. Regarding the Input Pin of the IC**

This monolithic IC contains P+ isolation and P substrate layers between adjacent elements in order to keep them isolated. P-N junctions are formed at the intersection of the P layers with the N layers of other elements, creating a parasitic diode or transistor. For example (refer to figure below):

When  $GND > Pin A$  and  $GND > Pin B$ , the P-N junction operates as a parasitic diode.

When  $GND > Pin B$ , the P-N junction operates as a parasitic transistor.

Parasitic diodes inevitably occur in the structure of the IC. The operation of parasitic diodes can result in mutual interference among circuits, operational faults, or physical damage. Therefore, conditions that cause these diodes to operate, such as applying a voltage lower than the GND voltage to an input pin (and thus to the P substrate) should be avoided.

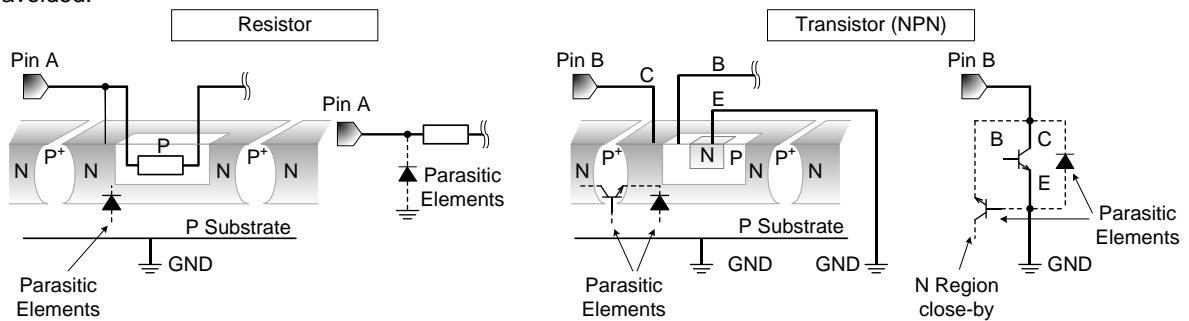


Figure 4.

Example of monolithic IC structure

**13. Ceramic Capacitor**

When using a ceramic capacitor, determine the dielectric constant considering the change of capacitance with temperature and the decrease in nominal capacitance due to DC bias and others.

**14. Area of Safe Operation (ASO)**

Operate the IC such that the output voltage, output current, and power dissipation are all within the Area of Safe Operation (ASO).

**15. Thermal Shutdown Circuit(TSD)**

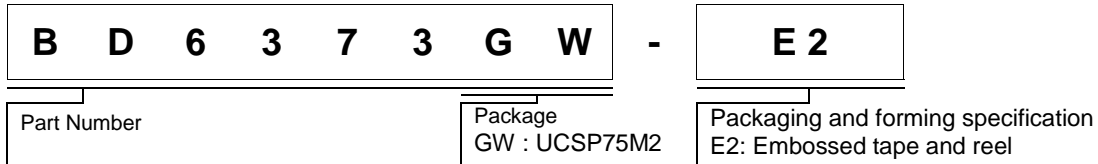
This IC has a built-in thermal shutdown circuit that prevents heat damage to the IC. Normal operation should always be within the IC's power dissipation rating. If however the rating is exceeded for a continued period, the junction temperature ( $T_j$ ) will rise which will activate the TSD circuit that will turn OFF all output pins. When the  $T_j$  falls below the TSD threshold, the circuits are automatically restored to normal operation.

Note that the TSD circuit operates in a situation that exceeds the absolute maximum ratings and therefore, under no circumstances, should the TSD circuit be used in a set design or for any purpose other than protecting the IC from heat damage.

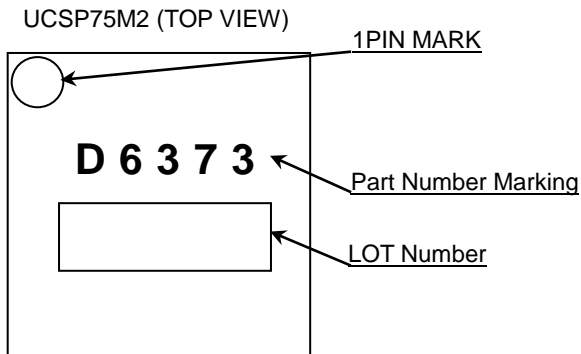
**16. Disturbance light**

In a device where a portion of silicon is exposed to light such as in a WL-CSP, IC characteristics may be affected due to photoelectric effect. For this reason, it is recommended to come up with countermeasures that will prevent the chip from being exposed to light.

Ordering Information



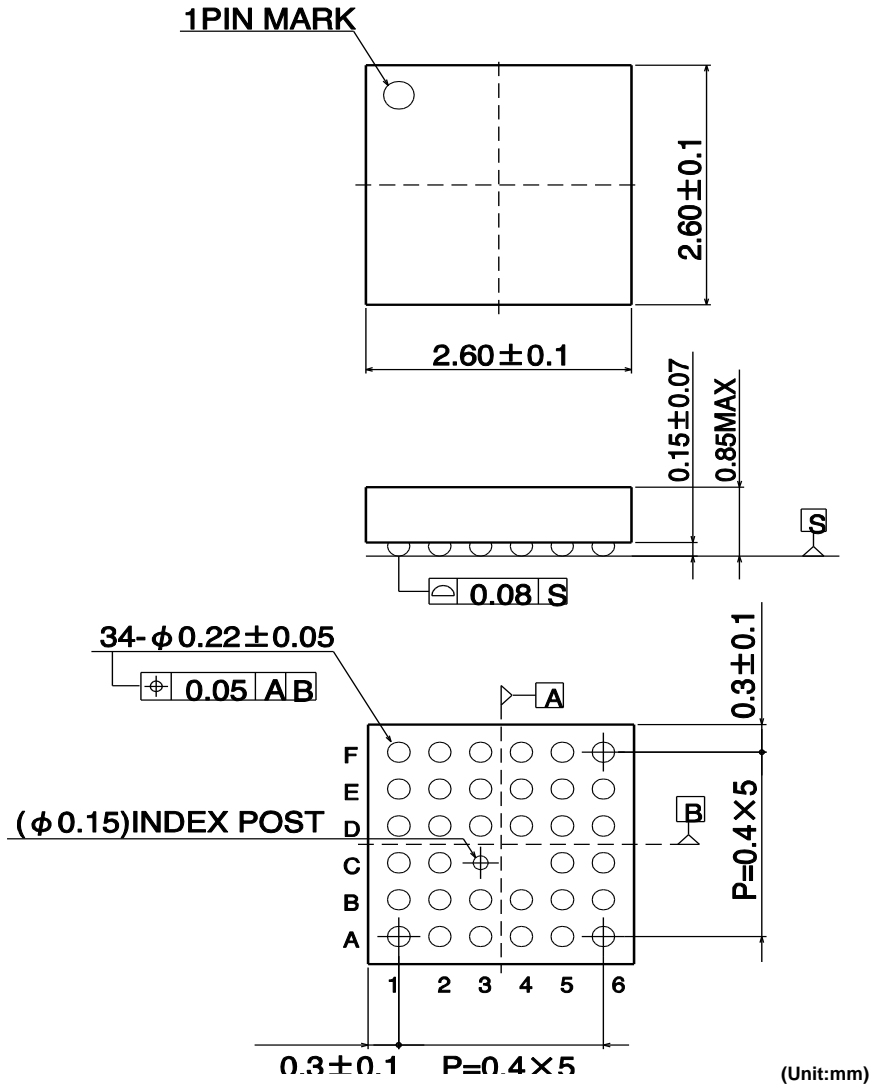
Marking Diagram



| Part Number Marking | Package  | Orderable Part Number |
|---------------------|----------|-----------------------|
| D6373               | UCSP75M2 | BD6373GW-E2           |

Physical Dimension, Tape and Reel Information

|              |          |
|--------------|----------|
| Package Name | UCSP75M2 |
|--------------|----------|



<Tape and Reel information>

|                   |                                                                                                                                                   |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Tape              | Embossed carrier tape                                                                                                                             |
| Quantity          | 3000pcs                                                                                                                                           |
| Direction of feed | E2<br>(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) |

Reel

1pin

Direction of feed

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

**Revision History**

| Date        | Revision | Changes     |
|-------------|----------|-------------|
| 09.Dec.2015 | 001      | New Release |

# 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 <sup>(Note 1)</sup>, 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 Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, and NO<sub>2</sub>
  - 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 depending on ambient temperature. When used in sealed area, confirm that it is the use in the range that does not exceed the maximum junction 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 on a surface-mount products, the flow soldering method must be used on a through hole mount products. If the flow soldering method is preferred on a surface-mount products, 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 Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, and NO<sub>2</sub>
  - [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 concerned goods might be fallen under listed items of export control prescribed by Foreign exchange and Foreign trade act, please consult with ROHM in case of export.

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