Chipsmall

Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

System Lens Driver Series for Mobile Phone Cameras

Parallel Interface Type
Lens Drivers for Voice Coil Motor

BD6883GUL,BH6453GUL,BD6886GUL,BD6369GUL

No.12015EAT02

●Description

The BD6883GUL, and the BH6453GUL motor driver provide 1 Constant-Current Driver Half-bridge, and 1 Constant-Voltage Driver Half-bridge channel. The BD6886GUL, and the BD6369GUL motor driver provide 1 Constant-Voltage Driver H-bridge channel. These lens drivers are offered in an ultra-small functional lens system for use in an auto focus system using a Voice Coil motor.

●Features

1) BD6883GUL Characteristics
1) Ultra-small chip size package; 1.1mm × 1.6mm × 0.55mm
2) Low ON-Resistance Power CMOS output; on high side PMOS typ.0.65Ω, on low side NMOS typ.0.40Ω
3) ESD resistance (Human Body Model); 8kV
4) Built-in ±5% high-precision Constant-Voltage Driver (phase compensation capacitor-free design)
5) Built-in UVLO (Under Voltage Locked Out: UVLO)
6) Built-in TSD (Thermal Shut Down) circuit
7) Standby current consumption: 0μA Typ.

2) BH6453GUL Characteristics
1) Ultra-small chip size package; 1.5mm × 0.9mm × 0.55mm
2) Low ON-Resistance Power CMOS output; on high side PMOS typ.1.2Ω, on low side NMOS typ.0.4Ω
3) ESD resistance (Human Body Model); 8kV
4) Built in resistor for output current detect (phase compensation capacitor-free design)
5) 1.8V can be put into each control input terminal
6) Built-in UVLO (Under Voltage Locked Out: UVLO)
7) Built-in TSD (Thermal Shut Down) circuit
8) Standby current consumption: 0μA Typ.

3) BD6886GUL, BD6369GUL Characteristics
1) Ultra-small chip size package; 2.1mm × 2.1mm × 0.55mm
2) Low ON-Resistance Power CMOS output; on high and low sides in total typ.0.80Ω
3) ESD resistance (Human Body Model); 8kV
4) Built-in ±5% high-precision Constant-Voltage Driver (phase compensation capacitor-free design)
5) Control Input mode selection function
6) Built-in UVLO (Under Voltage Locked Out: UVLO)
7) Built-in TSD (Thermal Shut Down) circuit
8) Standby current consumption: 0μA Typ.

●Absolute Maximum Ratings (Ta=+25°C)

Parameter	Symbol	Limit				Unit
		BD6883GUL	BH6453GUL	BD6886GUL	BD6369GUL	
Power supply voltage	VCC	-0.5 to +6.5	-0.5 to +4.5	-0.5 to +6.5	-0.5 to +6.5	V
Motor power supply voltage	VM	-	-	-0.5 to +6.5	-0.5 to +6.5	V
Control input voltage	VIN	-0.5 to VCC+0.5	-0.5 to VCC+0.5	-0.5 to VCC+0.5	-0.5 to VCC+0.5	V
Input voltage for Constant-Voltage setting	VLIM	-0.5 to VCC+0.5	-	-0.5 to VM+0.5	-0.5 to VM+0.5	V
Input voltage for Constant-Current setting	CLIM	-	-0.5 to VCC+0.5	-	-	V
Power dissipation	Pd	510[※1]	430[※2]	730[※3]	730[※3]	mW
Operating temperature range	Topr	-25 to +85	-25 to +85	-25 to +85	-25 to +85	°C
Junction temperature	Tjmax	+150	+125	+150	+150	°C
Storage temperature range	Tstg	-55 to +150	-55 to +125	-55 to +150	-55 to +150	°C
H-bridge output current	Iout	-200 to +200[※4]	-300 to +300[※5]	-200 to +200[※4]	-500 to +500[※4]	mA

[※1] Reduced by 4.08mW/°C over 25°C, when mounted on a glass epoxy board (50mm × 58mm × 1.75mm; 8 layers).
[※2] Reduced by 4.30mW/°C over 25°C, when mounted on a glass epoxy board (50mm × 58mm × 1.75mm; 8 layers).
[※3] Reduced by 5.84mW/°C over 25°C, when mounted on a glass epoxy board (50mm × 58mm × 1.75mm; 8 layers).
[※4] Must not exceed Pd, ASO, or Tjmax of 150°C.
[※5] Must not exceed Pd, ASO, or Tjmax of 125°C.

●Operating Conditions

Parameter	Symbol	Limit				Unit
		BD6883GUL	BH6453GUL	BD6886GUL	BD6369GUL	
Power supply voltage	VCC	+2.5 to +5.5	+2.3 to +3.6	+2.5 to +5.5	+2.5 to +5.5	V
Motor power supply voltage	VM	-	-	+2.5 to +5.5	+2.5 to +5.5	V
Control input voltage	VIN	0 to VCC	0 to VCC	0 to VCC	0 to VCC	V
Input voltage for Constant-Voltage setting	VLIM	0 to VCC	-	0 to VM	0 to VM	V
Input voltage for Constant-Current setting	CLIM	-	0 to VCC	-	-	V
H-bridge output current	Iout	-150 to +150[※6]	-200 to +200[※6]	-150 to +150[※6]	-400 +400[※6]	mA

[※6] Must not exceed Pd or ASO.
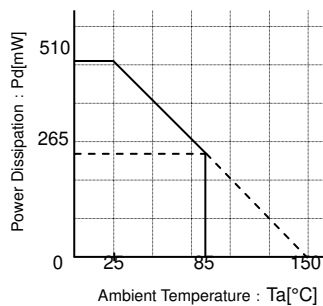
●Power Dissipation Reduction
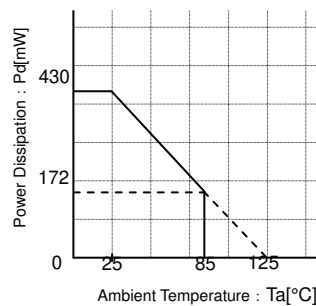

Fig.1 BD6883GUL Power Dissipation Reduction

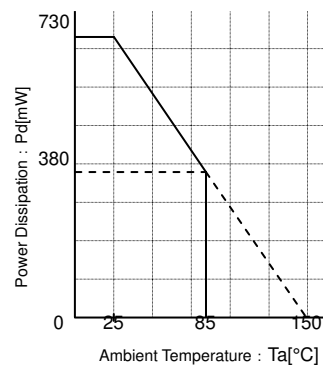Fig.2 BH6453GUL Power Dissipation Reduction
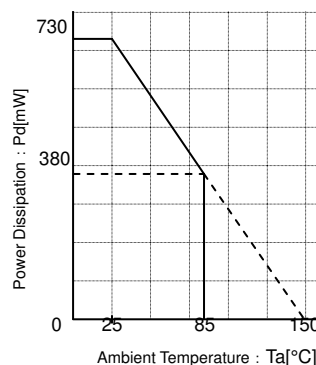

Fig.3 BD6886GUL Power Dissipation Reduction

Fig.4 BD6369GUL Power Dissipation Reduction

●Electrical Characteristics

1) BD6883GUL Electrical Characteristics (Unless otherwise specified, Ta=25°C, VCC=3.0V)

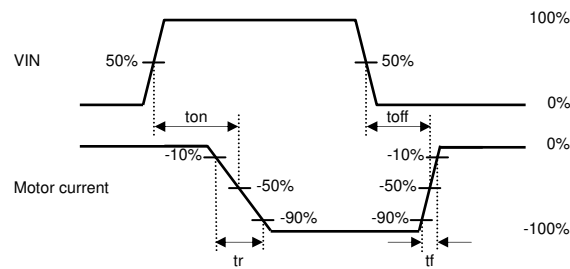| Parameter	Symbol	Limit			Unit	Conditions
		Min	Typ	Max		
Overall						
Circuit current during standby operation	ICCST	-	0	10	µA	PS=0V
Circuit current	ICC	-	0.9	1.4	mA	PS=3V, VLIM=3V with no signal and load
Control input (VIN=IN, PS)						
High level input voltage	VINH	2.0	-	VCC	V	
Low level input voltage	VINL	0	-	0.7	V	
High level input current	IINH	15	30	60	µA	VINH=3V, pull-down resistor typ.100kΩ
Low level input current	IINL	-1	0	-	µA	VINL=0V
Input for Constant-Voltage setting						
Input current	IVLIM	-1.5	-0.5	-	µA	VLIM=0V
UVLO						
UVLO voltage	VUVLO	1.6	-	2.4	V	
Constant-Voltage Drive block						
PMOS Output ON-Resistance	RONP	-	0.65	0.80	Ω	Io=-150mA
NMOS Output ON-Resistance	RONN	-	0.40	0.60	Ω	Io=+150mA
Output high-level voltage	VOH	1.9 × VLIM	2.0 × VLIM	2.1 × VLIM	V	VLIM=1V with 10Ω load
Output AC characteristic						
Turn-on time	ton	-	1.5	5	µs	Io=-150mA, 10Ω load
Turn-off time	toff	-	0.1	2	µs	Io=-150mA, 10Ω load
Rise time	tr	-	1.5	8	µs	Io=-150mA, 10Ω load
Fall time	tf	-	0.05	1	µs	Io=-150mA, 10Ω load

Fig.5 BD6883GUL I/O Switching Waveform
(The direction flowing into IC is plus)

2) BH6453GUL Electrical Characteristics (Unless otherwise specified, Ta=25°C, VCC=3.0V)

Parameter	Symbol	Limit			Unit	Conditions
		Min	Typ	Max		
Overall						
Circuit current during standby operation	ICCST	-	0	5	μA	PS=0V
Circuit current	ICC	-	0.9	1.3	mA	PS=3V, IN=3V, no load
Control input (VIN=IN, PS)						
High-level input voltage	VINH	1.5	-	VCC	V	
Low-level input voltage	VINL	0	-	0.5	V	
High-level input current	IINH	15	30	60	μA	VINH=3V, pull down resistance typ.100kΩ
Low-level input current	IINL	-1	0	-	μA	VINL=0V
UVLO						
UVLO voltage	VUVLO	1.6	-	2.2	V	
Constant-Current Drive block						
PMOS Output ON-Resistance	RONP	-	1.2	1.5	Ω	Io=-200mA
NMOS Output ON-Resistance	RONN	-	0.35	0.50	Ω	Io=+200mA
Offset current	Iofs	0	1	5	mA	CLIM=0V
Output current	Iout	180	200	220	mA	CLIM=0.8V, RL=10Ω

Drive system of Constant-Current

$$I_{SINK}[A] = \frac{CLIM[V]}{2 \times 2.0(Typ.)[\Omega]}$$

I_{SINK}: VCC-OUT current
CLIM: VCC-OUT current setting voltage
R_{RNF}: VCC-OUT current detection resistance

3) BD6886GUL, BD6369GUL 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 1	ICC	-	0.9	1.4	mA	PS=3V, with no signal
Circuit current 2	IM	-	0.4	0.65	mA	PS=3V, VLIM=5V, no load
Control input (VIN=INA, INB, SEL, PS)						
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
Pull-down resistor	RIN	50	100	200	kΩ	
Input for Constant-Voltage setting						
Input current	IVLIM	-1.5	-0.5	-	µA	VLIM=0V
UVLO						
UVLO voltage	VUVLO	1.6	-	2.4	V	
Constant-Voltage Drive block						
Output ON-Resistance	RON	-	0.80	1.20	Ω	Io=±150mA on high and low sides in total
Output high-level voltage	VOH	1.9×VLIM	2.0×VLIM	2.1×VLIM	V	VLIM=1V with 10Ω load
Output AC characteristic						
Turn-on time	ton	-	1.5	5	µs	Io=±150mA with 10Ω load
Turn-off time	toff	-	0.1	2	µs	Io=±150mA with 10Ω load
Rise time	tr	-	2	8	µs	Io=±150mA with 10Ω load
Fall time	tf	-	0.05	1	µs	Io=±150mA with 10Ω load
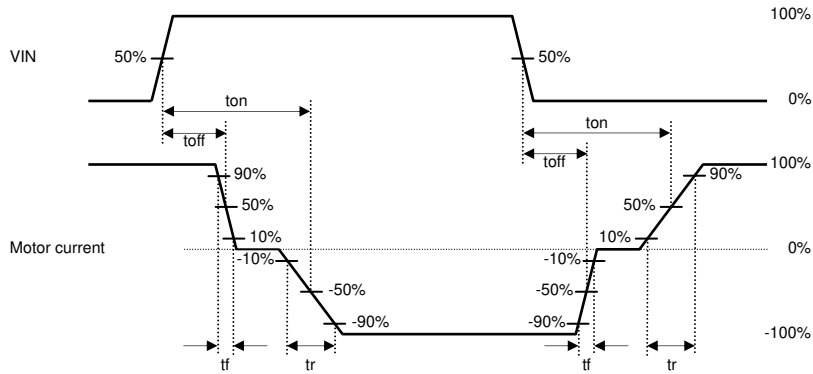
Fig.6 BD6886GUL, BD6369GUL I/O Switching Waveform
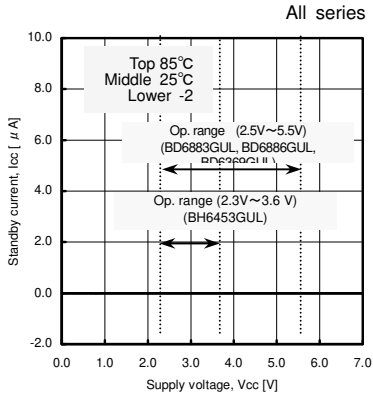
●Electrical Characteristic Diagrams
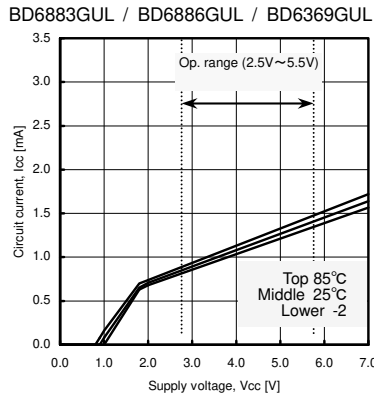
Fig.7 Standby Current
（All series）

Fig.8 Circuit Current
(BD6883GUL/BD6886GUL/BD6369GUL)

Fig.9 Circuit Current
(BH6453GUL)

Fig.10 NMOS Output Voltage
(BD6883GUL)

Fig.11 NMOS Output Voltage
(BD6886GUL / BD6369GUL)

Fig.12 NMOS Output Voltage
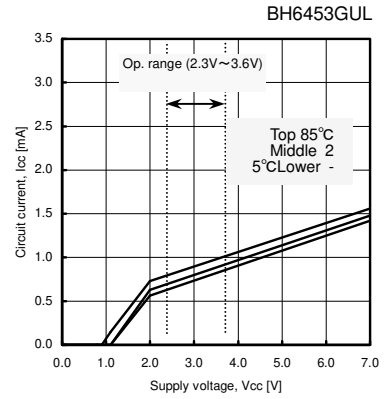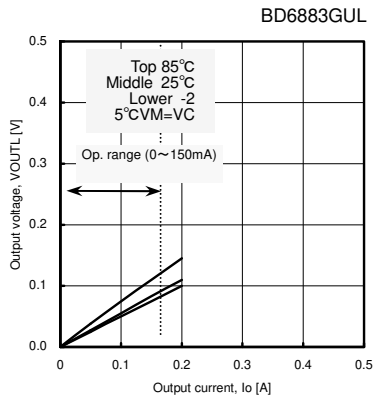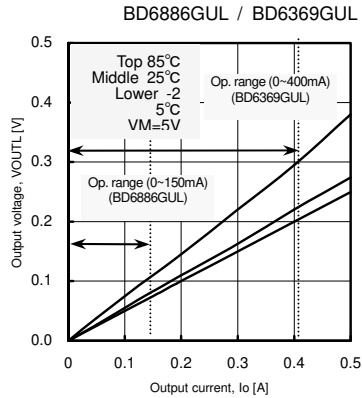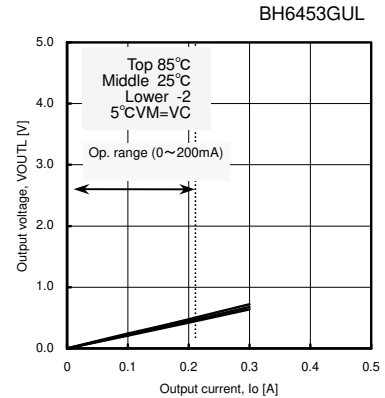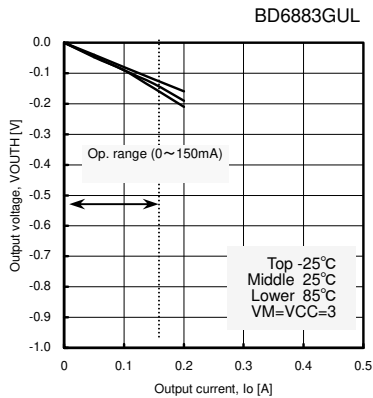(BH6453GUL)

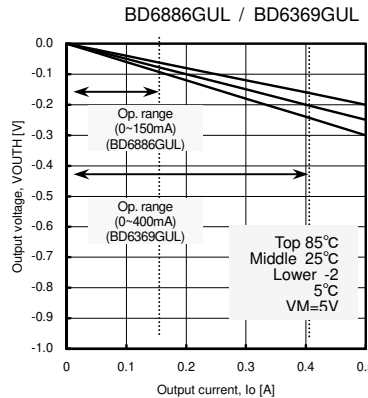Fig.13 PMOS Output Voltage
(BD6883GUL)

Fig.14 PMOS Output Voltage
(BD6886GUL / BD6369GUL)
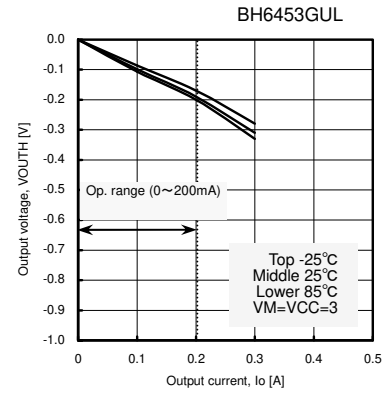
Fig.15 PMOS Output Voltage
(BH6453GUL)
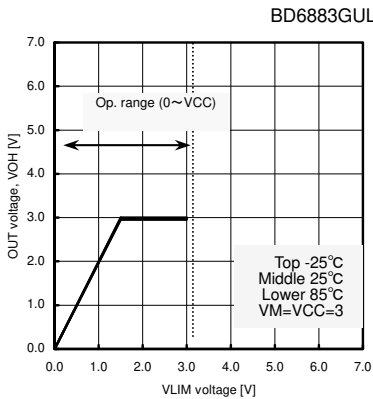
Fig.16 Output High-Level Voltage
(BD6883GUL)
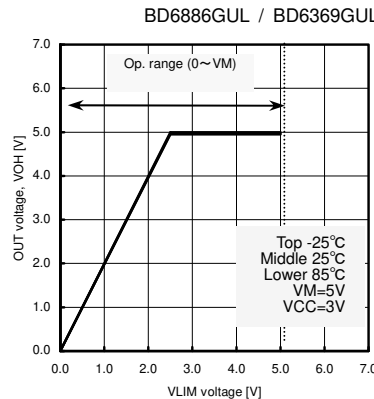
Fig.17 Output High-Level Voltage
(BD6886GUL / BD6369GUL)
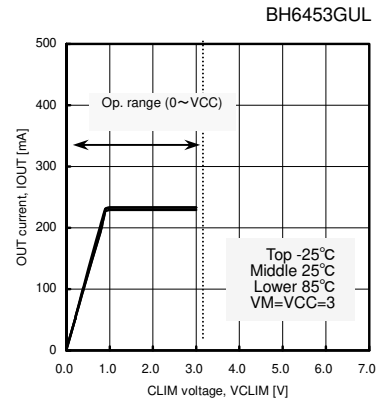
Fig.18 Current Limit Output Voltage
(BH6453GUL)

● Block Diagram, Application Circuit Diagram, Pin Arrangement, Pin Function Table

    1) BD6883GUL Block Diagram, Application Circuit Diagram, Pin Arrangement, Pin Function Table

Bypass filter Capacitor for power supply input. See. P.14/16.

Power-Saving
H: Active
L: Standby

Motor control input

0.5ch Constant-Voltage output pins.
Output H voltage.
OUT[V]=2 × VLIM[V]

Setting for Constant-Voltage input terminal
In addition to the DC input, PWM signal drive is also possible using filter components.
See. P.11/16
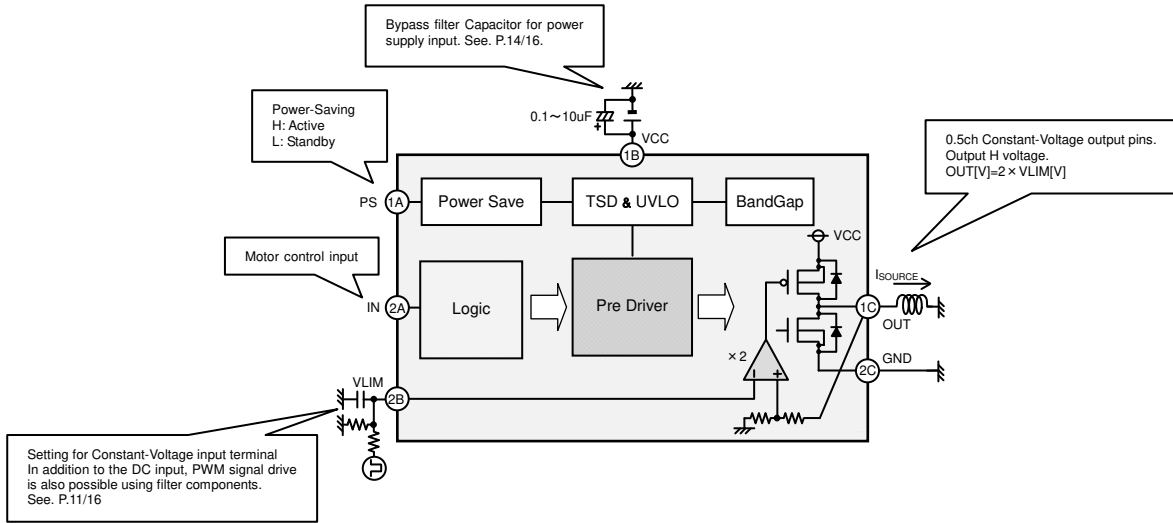
Fig.19 BD6883GUL Block Diagram, Application Circuit Diagram

Fig.20 BD6883GUL Pin Arrangement (Top View)

BD6883GUL Pin Function Table

No.	Pin Name	Function	No.	Pin Name	Function
1A	PS	Power-saving pin	2B	VLIM	Output high-level voltage setting pin
2A	IN	Control input pin	1C	OUT	Half-bridge output pin
1B	VCC	Power supply pin	2C	GND	Ground pin

2) BH6453GUL Block Diagram, Application Circuit Diagram, Pin Arrangement, Pin Function Table
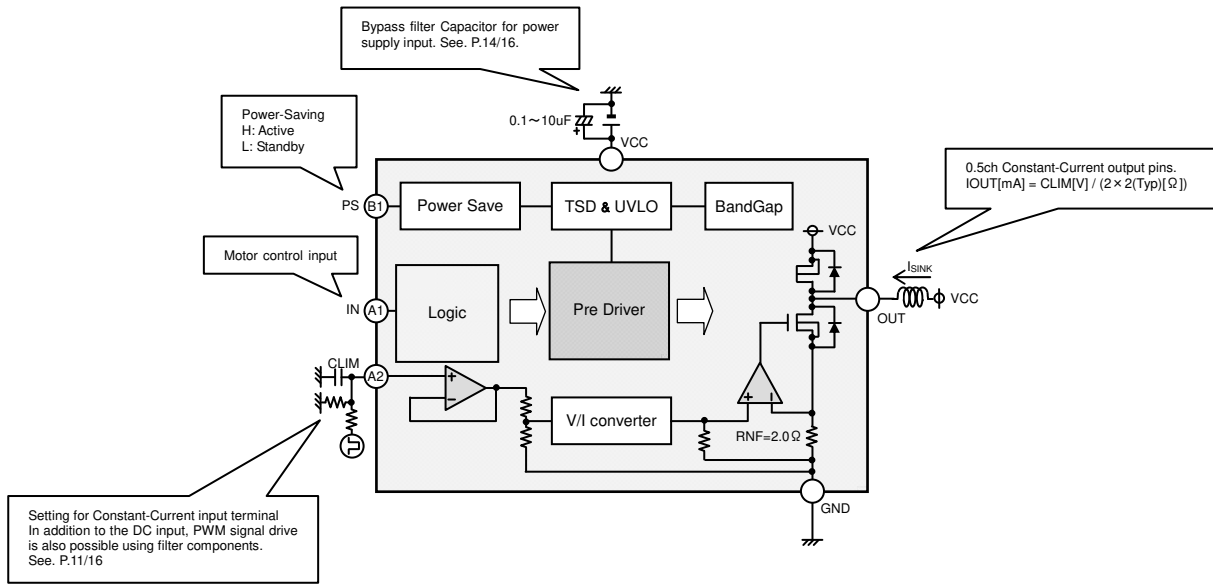
Fig.21 BH6453GUL Block Diagram, Application Circuit Diagram

Fig.22 BH6453GUL Pin Arrangement (Top View)

BH6453GUL Pin Function Table

No.	Pin Name	Function	No.	Pin Name	Function
1A	IN	Control input pin	1B	PS	Power-saving pin
2A	CLIM	Output current setting pin	2B	VCC	Power supply pin
3A	GND	Ground pin	3B	OUT	Half-bridge output pin

3) BD6886GUL, BD6369GUL Block Diagram, Application Circuit Diagram, Pin Arrangement, Pin Function Table
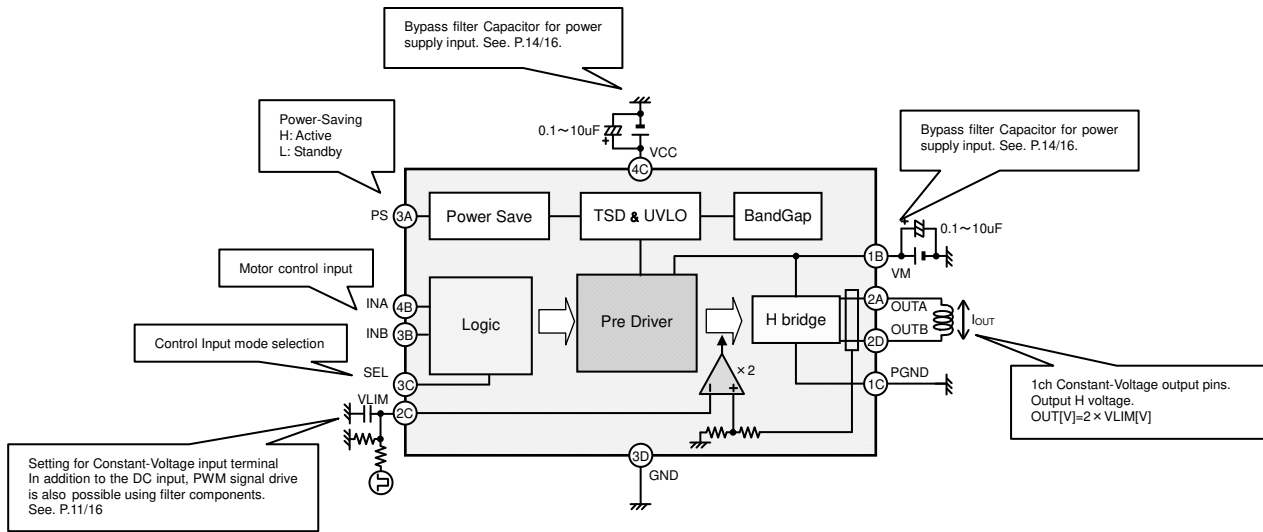
Fig.23 BD6886GUL, BD6369GUL Block Diagram, Application Circuit Diagram

Fig.24 BD6886GUL, BD6369GUL Pin Arrangement (Top View)

BD6886GUL, BD6369GUL Pin Function Table

No.	Pin Name	Function	No.	Pin Name	Function
1A	N.C.	N.C.	1C	PGND	Motor ground pin
2A	OUTA	H-bridge output pin A	2C	VLIM	Output high-level voltage setting pin
3A	PS	Power-saving pin	3C	SEL	Control input mode selection pin
4A	N.C.	N.C.	4C	VCC	Power supply pin
1B	VM	Motor power supply pin	1D	N.C.	N.C.
2B			2D	OUTB	H-bridge output pin B
3B	INB	Control input pin B	3D	GND	Ground pin
4B	INA	Control input pin A	4D	N.C.	N.C.

●Function Explanation

1) Power-saving function (all series)

When the L voltage is applied the PS pin, the IC's inside circuit stop, and when 0V applied, the circuit current became 0μA(Typ.), especially.

When the IC drive, serial input while the PS pin applied H voltage. (See the electrical characteristics; P.3, 4, 5/16)

2) Control Input Pin

（Ⅰ） IN pin (BD6883GUL, BH6453GUL)

The IN pin is used to program and control the motor drive modes.

(See the electrical characteristics; P3, 4/16, and the I/O Truth Table; P12/16)

（Ⅱ） INA, INB, SEL pins (BD6886GUL, BD6369GUL)

The INA and INB are used to program and control the motor drive modes.

When the L voltage is applied to the SEL pin, the I/O logic can be set to EN (Enable)/IN mode, and when the H voltage is applied to the one, the I/O logic can be set to IN/IN mode. (See the electrical characteristics; P5/16, and the I/O Truth Table; P12/16)

3) H-bridge and Half-bridge on the output stage (ALL series)

Specify maximum current applied to the H-bridge and Half-bridge within the operating range, in consideration of power dissipation. (See the Operating Conditions; P.2/16)

4) Drive system of Linear Constant-Voltage H-bridge (BD6883GUL, BD6886GUL, and BD6369GUL)

To set up the output H voltage, when the voltage input to the VLIM pin, the output H voltage is two times as high as the voltage.

（Ⅰ） BD6883GUL

The output H voltage VOH [V] = 2.0 × VLIM [V]   (When VLIM [V] $> \dfrac{VCC\ [V]}{2}$, Output H voltage is about VCC voltage) $\cdots\cdots$①

（Ⅱ） BD6886GUL, BD6369GUL

The output H voltage VOH [V] = 2.0 × VLIM [V]   (When VLIM [V] $> \dfrac{VM\ [V]}{2}$, Output H voltage is about VM voltage) $\cdots\cdots$②

For example, the output voltage is 2.0V±5%, if 1.0V is applied to the VLIM pin.

If the VLIM pin is shorted to the VM pin (or the same voltage level as the VM is applied), you can be used as a Full-ON Drive H-bridge.

5) Drive system of Linear Constant-Current H-bridge (BH6453GUL)

To detect the output current and the output current settings

The BH6453GUL built in resistor for output current detect. The output current is kept constant by comparing it with the CLIM voltage. In addition, impress a highly accurate voltage form the outside of IC to the CLIM terminal, when you do the output current setting accuracy or more good.

Output current I_{SINK} [A] = $\dfrac{CLIM\ [V]}{2 \times 2(Typ)\ [\Omega]}$ $\cdots\cdots$③

If the CLIM pin applied 0.8V, Output current is 200mA±10%.

7) Setting of PWM signal input VLIM and CLIM terminals (all series)

It is also possible to compose filters outside the IC, change an input voltage for output voltage and output current setting terminals such as VLIM and CLIM terminals by the DUTY control using an PWM signal, etc., and use them as set values for control.

In this case, however, ensure the smoothing of the signals, heeding the constant number of the low-pass filter as stated below.

A cutoff frequency F_C (-3dB attenuation frequency) of the low-pass filter in Fig25 is calculated by the formula mentioned below.

$$\text{Cutoff frequency } F_C \text{ [Hz]} = \frac{1}{2\pi C_{IN}(R_{INA}//R_{INB})} \text{ [Hz]} \qquad \cdots\cdots④$$

Set the cutoff frequency F_C at 1/100 or below of the PWM frequency F_{PWM}.

For example, if the cutoff frequency F_C is set at 1/100 of F_{PWM} when the PWM frequency F_{PWM}=50[kHz], according to the formula above:

$$\text{Cutoff frequency } F_C \text{ [Hz]} = \frac{1}{2\pi C_{IN}(R_{INA}//R_{INB})} = \frac{1}{100} \times F_{PWM} = \frac{50\times10^3}{100} \text{ [Hz]} \qquad \cdots\cdots⑤$$

When C_{IN}=0.1[μF], according to the formula above:

$$R_{INA}//R_{INB}=3.2\text{[k}\Omega\text{]} \qquad \cdots\cdots⑥$$

Where, an effective value of PWM signal as a DC current, according to crest values V_{MAX} and ON DUTY [%]=$\frac{\text{ON time}}{\text{ON time+ OFF time}}$ is as follows:

$$V_{PWM}\text{[V]}= V_{MAX}\text{[V]} \times \text{ ON DUTY[\%]} \qquad \cdots\cdots⑦$$

An actual voltage V_{LIM} input to terminals that specify output current and voltages, such as VLIM and CLIM terminals is as follows according to resistance potential division of R_{INA} and R_{INB}:

$$V_{LIM}\text{[V]}= \frac{R_{INB}}{R_{INA}+R_{INB}} \times V_{PWM}\text{[V]} \qquad \cdots\cdots⑧$$

For example, when an PWM signal with crest values V_{MAX}=3[V] and DUTY [%]=5[%] is input, a V_{LIM} value according to the formula above is:

$$V_{LIM}\text{[V]}= \frac{R_{INB}}{R_{INA}+R_{INB}} \times 3\text{[V]} \times 50\text{[\%]} \qquad \cdots\cdots⑨$$

（Ⅰ） BD6883GUL, BD6886GUL, and BD6369GUL

Where, to specify an output voltage VOH=2[V], a value VLIM=1.0[V] according to the formula in the previous page. And then, according to the formula above, VLIM=1.0[V].

$$\text{VLIM=1.0[V]}=V_{LIM}= \frac{R_{INB}}{R_{INA}+R_{INB}} \times 3\text{[V]} \times 50\text{[\%]}$$

Therefore, R_{INA}=0.5R_{INB} $\cdots\cdots$⑩

According to ⑥ and ⑩, R_{INA}=4.8kΩ, R_{INB}=9.6kΩ.

（Ⅱ） BH6453GUL

Where, to specify an output current I_{SINK}=100[mA], the following formula is derived according to the formula in the previous page ③, CLIM=0.4[V], and according to the formula above ⑨:

$$\text{CLIM=0.4[V]}=V_{LIM}= \frac{R_{INB}}{R_{INA}+R_{INB}} \times 3\text{[V]} \times 50\text{[\%]}$$

$$R_{INA}=2.75R_{INB} \qquad \cdots\cdots⑪$$

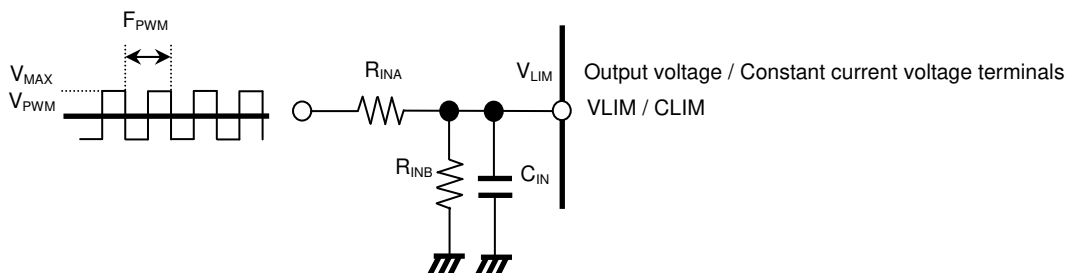According to ⑥ and ⑪: R_{INA}=11.9kΩ, R_{INB}=4.3kΩ

Fig.25 Example PWM signal input

● I/O Truth Table

BD6883GUL I/O Truth Table

MODE	INPUT		OUTPUT	OUTPUT MODE
	PS	IN	OUT	
-	H	L	L	Sink
		H	H	Source
-	L	X	Z※7	Standby

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

Sink is a direction of current flowing into the driver, and Source is a direction of current flowing out the driver.

When it is sink, which drive FULL ON.

※7Z at the Constant-Voltage driver output L voltage for connect feedback resistance (20kΩ Typ.) for output H voltage setting between OUT pin and GND. But output Power MOS is OFF condition.

BH6453GUL I/O Truth Table

MODE	INPUT		OUTPUT	OUTPUT MODE
	PS	IN	OUT	
-	H	H	L	Sink
		L	H	Source
-	L	X	Z	Standby

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

Sink is a direction of current flowing into the driver, and Source is a direction of current flowing out the driver.

When it is source, which drive FULL ON.

BD6886GUL, BD6369GUL I/O Truth Table

MODE	INPUT				OUTPUT		OUTPUT MODE
	PS	SEL	INA	INB	OUTA	OUTB	
EN/IN	H	L	L	X	Z※7	Z※7	Standby
			H	L	H	L	Forward rotation
			H	H	L	H	Reverse rotation
IN/IN		H	L	L	L	L	Brake
			L	H	L	H	Reverse rotation
			H	L	H	L	Forward rotation
			H	H	Z※8	Z※8	Standby
-	L	X	X	X	Z※8	Z※8	Standby

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

At forward rotation, current flows from OUTA to OUTB. At reverse rotation, current flows from OUTB to OUTA.

※8Z at the Constant-Voltage driver output L voltage for connect feedback resistance (20kΩ Typ.) for output H voltage setting between OUT pin and GND. But output Power MOS is OFF condition.

●I/O Circuit Diagram
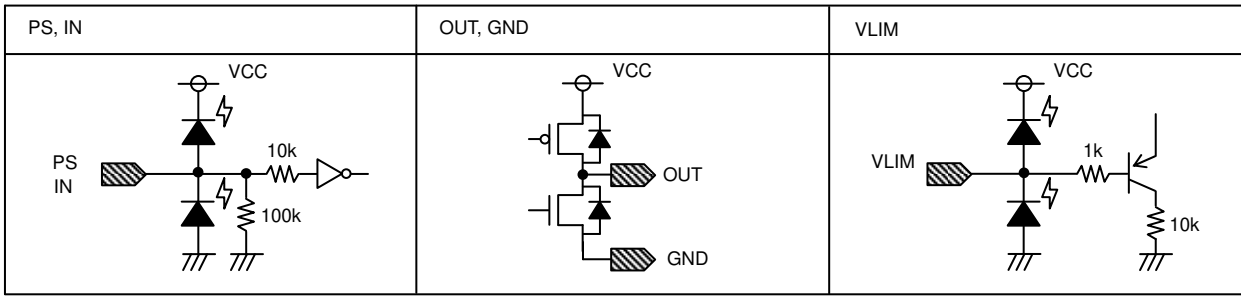

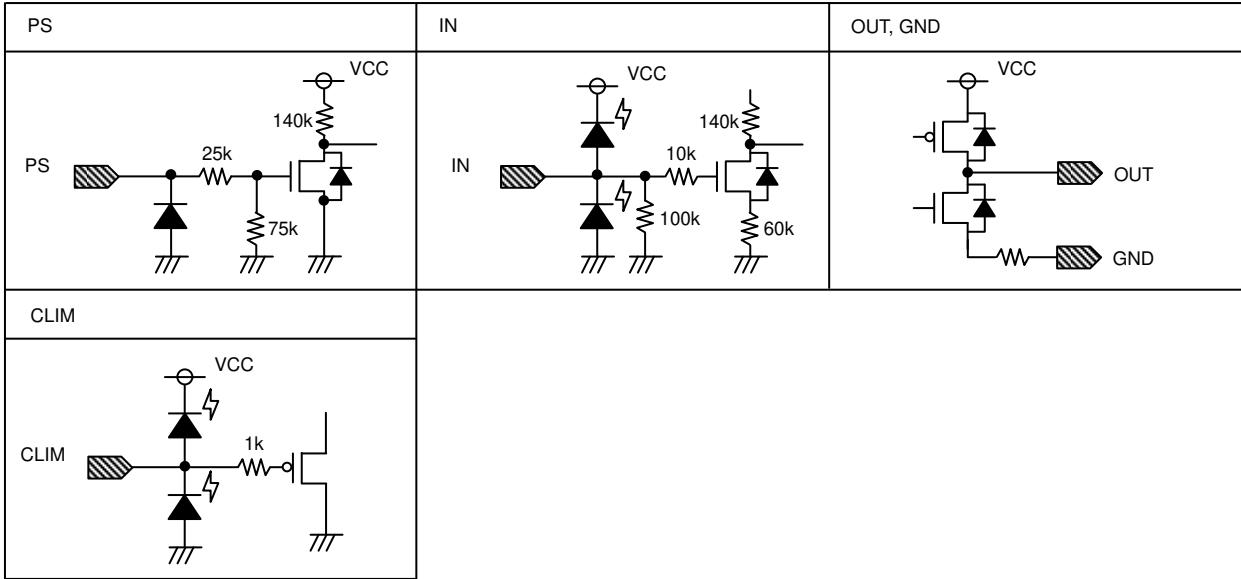Fig.26 BD6883GUL I/O Circuit Diagram (Resistance values are typical ones.）

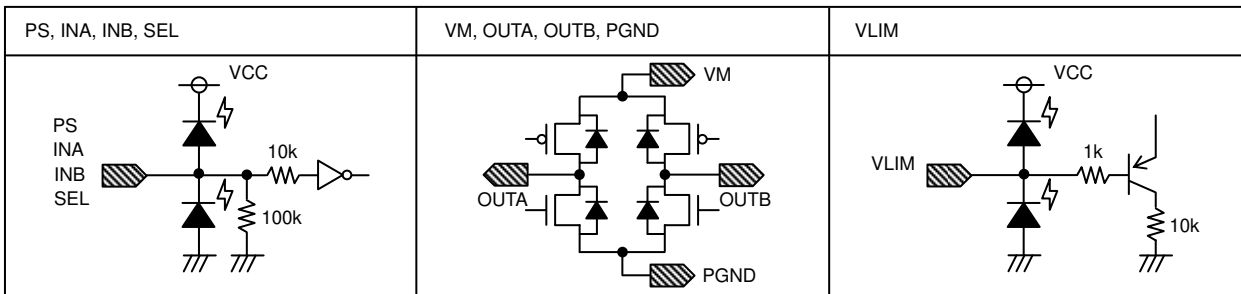Fig.27 BH6453GUL I/O Circuit Diagram (Resistance values are typical ones.）

Fig.28 BD6886GUL, BD6369GUL 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 (VCC, VM) or operating temperature range (Topr), 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. A physical safety measure, such as a fuse, should be implemented when using the IC at times where the absolute maximum ratings may be exceeded.

2)   Storage temperature range (Tstg)
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 and wiring
Be sure to connect the power terminals outside the IC. Do not leave them open. Because a return current is generated by a counter electromotive force of the motor, take necessary measures such as putting a Capacitor between the power source and the ground as a passageway for the regenerative current. Be sure to connect a Capacitor of proper capacitance (0.1μF to 10μF) between the power source and the ground at the foot of the IC, and ensure that there is no problem in properties of electrolytic Capacitors such as decrease in capacitance at low temperatures. When the connected power source does not have enough current absorbing capability, there is a possibility that the voltage of the power source line increases by the regenerative current an exceeds the absolute maximum rating of this product and the peripheral circuits.
Therefore, be sure to take physical safety measures such as putting a zener diode for a voltage clamp between the power source an the ground.

4)   Ground terminal and wiring
The potential at GND terminals should be made the lowest under any operating conditions. Ensure that there are no terminals where the potentials are below the potential at GND terminals, including the transient phenomena. The motor ground terminals PGND, and the small signal ground terminal GND are not interconnected with one another inside the IC. It is recommended that you should isolate the large-current RNF pattern and PGND pattern from the small-signal GND pattern, and should establish a one-point grounding at a reference point of the set, to avoid fluctuation of small-signal GND voltages caused by voltage changes due to pattern wire resistances and large currents. Also prevent the voltage variation of the ground wiring patterns of external components. Use short and thick power source and ground wirings to ensure low impedance.

5)   Thermal design
Use a proper thermal design that allows for a sufficient margin of the power dissipation (Pd) at 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)   Avoiding strong magnetic field
Malfunction may occur if the IC is used around a strong magnetic field.

8)   ASO
Ensure that the output transistors of the motor driver are not driven under excess conditions of the absolute maximum ratings and ASO.

9)   TSD (Thermal Shut Down) circuit
If the junction temperature (Tjmax) reaches 175°C (but the BH6453GUL is 150°C), the TSD circuit will operate, and the coil output circuit of the motor will open. There is a temperature hysterics of approximately 25°C (but the BH6453GUL is 20°C). 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)   Testing an 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.

11)   Regarding the 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.
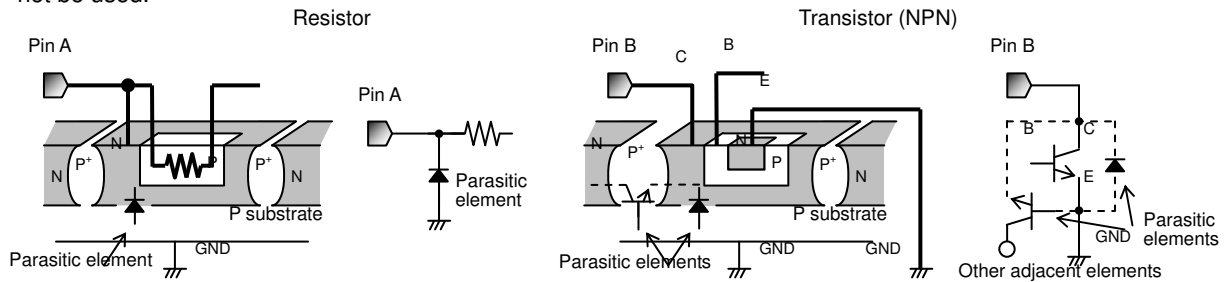

Fig.29 Example of Simple IC Architecture

●Selecting a Model Name when Ordering
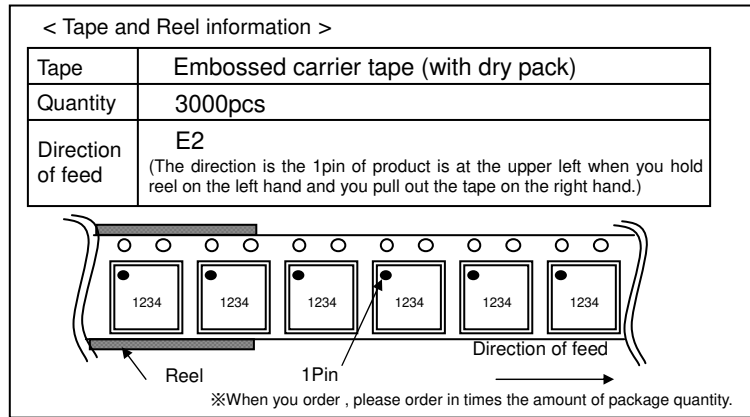
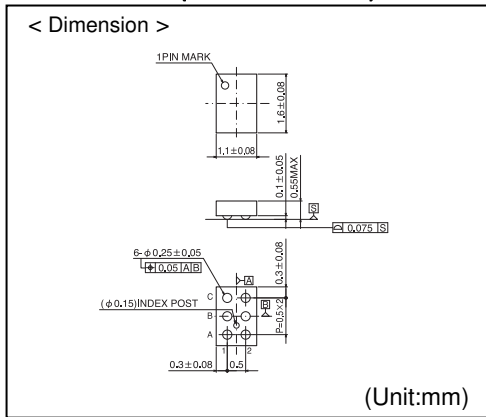| B | X | 6 | X | X | X | G | U | L |

| E 2 |

Rohm model name

Package

Packaging and forming specification
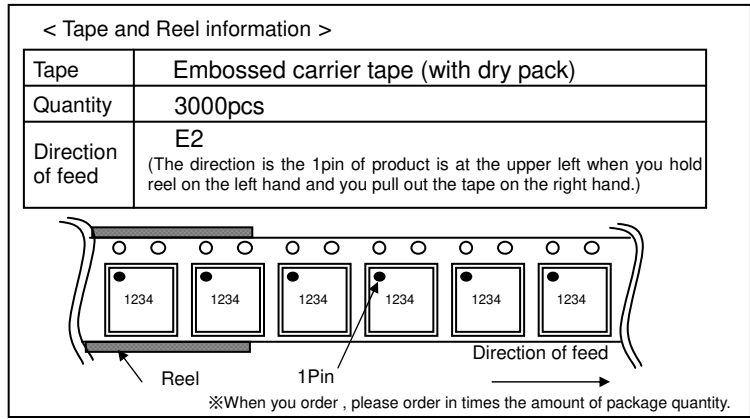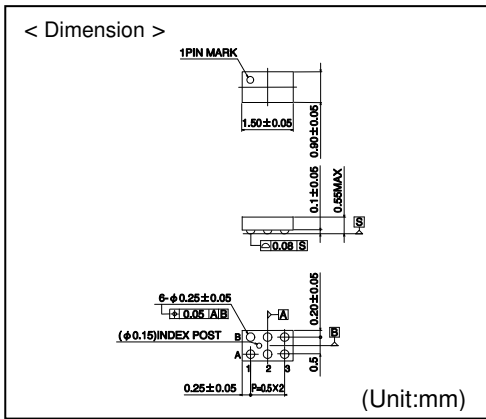E2: Embossed tape and reel

6883 : Constant voltage 0.5ch
6453 : Constant current 0.5ch
6886 : Constant voltage 1ch
6369 : Constant voltage 1ch

GUL : VCSP50L1 (BD6883)
GUL : VCSP50L1 (BH6453)
GUL : VCSP50L2 (BD6886)
GUL : VCSP50L2 (BD6369)

VCSP50L1 (BD6883GUL)

< Dimension >

1PIN MARK
1.6±0.08
1.1±0.08
0.1±0.05
0.55MAX
0.075 S
6-φ0.25±0.05
0.05 A B
0.3±0.08
(φ0.15)INDEX POST
P=0.5×2
0.3±0.08   0.5

(Unit:mm)

< Tape and Reel information >

Tape	Embossed carrier tape (with dry pack)
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.)

1234 1234 1234 1234 1234 1234

Reel   1Pin   Direction of feed

※When you order , please order in times the amount of package quantity.

VCSP50L1 (BH6453GUL)

< Dimension >

1PIN MARK
1.50±0.05
0.90±0.05
0.1±0.05
0.55MAX
0.08 S
6-φ0.25±0.05
0.05 A B
0.20±0.05
(φ0.15)INDEX POST
0.5
0.25±0.05   P=0.5×2

(Unit:mm)

< Tape and Reel information >

Tape	Embossed carrier tape (with dry pack)
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.)

1234 1234 1234 1234 1234 1234

Reel   1Pin   Direction of feed

※When you order , please order in times the amount of package quantity.

VCSP50L2 (BD6886GUL, BD6369GUL)

< Dimension >

1PIN MARK
2.1±0.1
2.1±0.1
0.1±0.05
0.55MAX
0.075 S
15-φ0.25±0.05   0.5
0.05 A B
0.3±0.1
(φ0.15)INDEX POST
P=0.5×3
0.3±0.1   P=0.5×3

(Unit:mm)

< Tape and Reel information >

Tape	Embossed carrier tape (with dry pack)
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.)

1234 1234 1234 1234 1234 1234

Reel   1Pin   Direction of feed

※When you order , please order in times the amount of package quantity.

N o t e s

No copying or reproduction of this document, in part or in whole, is permitted without the consent of ROHM Co.,Ltd.

The content specified herein is subject to change for improvement without notice.

The content specified herein is for the purpose of introducing ROHM's products (hereinafter "Products"). If you wish to use any such Product, please be sure to refer to the specifications, which can be obtained from ROHM upon request.

Examples of application circuits, circuit constants and any other information contained herein illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

Great care was taken in ensuring the accuracy of the information specified in this document. However, should you incur any damage arising from any inaccuracy or misprint of such information, ROHM shall bear no responsibility for such damage.

The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM and other parties. ROHM shall bear no responsibility whatsoever for any dispute arising from the use of such technical information.

The Products specified in this document are intended to be used with general-use electronic equipment or devices (such as audio visual equipment, office-automation equipment, communication devices, electronic appliances and amusement devices).

The Products specified in this document are not designed to be radiation tolerant.

While ROHM always makes efforts to enhance the quality and reliability of its Products, a Product may fail or malfunction for a variety of reasons.

Please be sure to implement in your equipment using the Products safety measures to guard against the possibility of physical injury, fire or any other damage caused in the event of the failure of any Product, such as derating, redundancy, fire control and fail-safe designs. ROHM shall bear no responsibility whatsoever for your use of any Product outside of the prescribed scope or not in accordance with the instruction manual.

The Products are not designed or manufactured to be used with any equipment, device or system which requires an extremely high level of reliability the failure or malfunction of which may result in a direct threat to human life or create a risk of human injury (such as a medical instrument, transportation equipment, aerospace machinery, nuclear-reactor controller, fuel-controller or other safety device). ROHM shall bear no responsibility in any way for use of any of the Products for the above special purposes. If a Product is intended to be used for any such special purpose, please contact a ROHM sales representative before purchasing.

If you intend to export or ship overseas any Product or technology specified herein that may be controlled under the Foreign Exchange and the Foreign Trade Law, you will be required to obtain a license or permit under the Law.

Thank you for your accessing to ROHM product informations.
More detail product informations and catalogs are available, please contact us.

ROHM Customer Support System

http://www.rohm.com/contact/