STRUCTURE Silicon Monolithic Integrated Circuit

PRODUCT SERIES 1ch Piezo Driver built-in 10MHz Oscillator

TYPE **BH6452GUL**

FEATURES
- Built-in 10MHz Oscillator
- Built in 1ch H Bridge Driver
- 2-wire serial interface (I2C-compatible)

●Absolute maximum ratings (Ta=+25°C)

Parameter	Symbol	Limit	Unit
Power supply voltage	VCC	-0.3 to +4.5	V
Motor power supply voltage	VM	-0.3 to +5.5	V
Power save input voltage	VPS	-0.3 to VCC+0.3	V
Control input voltage	VIN	-0.3 to VCC+0.3	V
Power dissipation	Pd	530※1	mW
Operating temperature range	Topr	-25 to +85	°C
Junction temperature	Tjmax	+125	°C
Storage temperature range	Tstg	-55 to +125	°C
H-bridge output current	Iout	-500 to +500※2	mA

※1Conditions: mounted on a glass epoxy board (50mm × 58mm × 1.75mm; 8 layers). In case of Ta>25°C, reduced by 5.3 mW/°C

※2Must not exceed Pd, ASO, or Tjmax of 125°C.

●Operating Conditions (Ta= -25°C to +85°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	VCC	2.3	3.0	3.6	V
Motor power supply voltage	VM	2.3	3.0	4.8	V
Power save input voltage	VPS	0	-	VCC	V
Control input voltage	VIN	0	-	VCC	V
I^2C bus transmission rate	SCL	-	-	400	kHz
H-bridge output current	Iout	-	-	±400※3	mA

※3Must not exceed Pd, ASO.

This product is not designed for protection against radioactive rays.

Status of this document

The Japanese version of this document is the formal specification. A customer may use this translation version only for a reference to help reading the formal version. If there are any differences in translation version of this document, formal version takes priority.

○ Package Outline

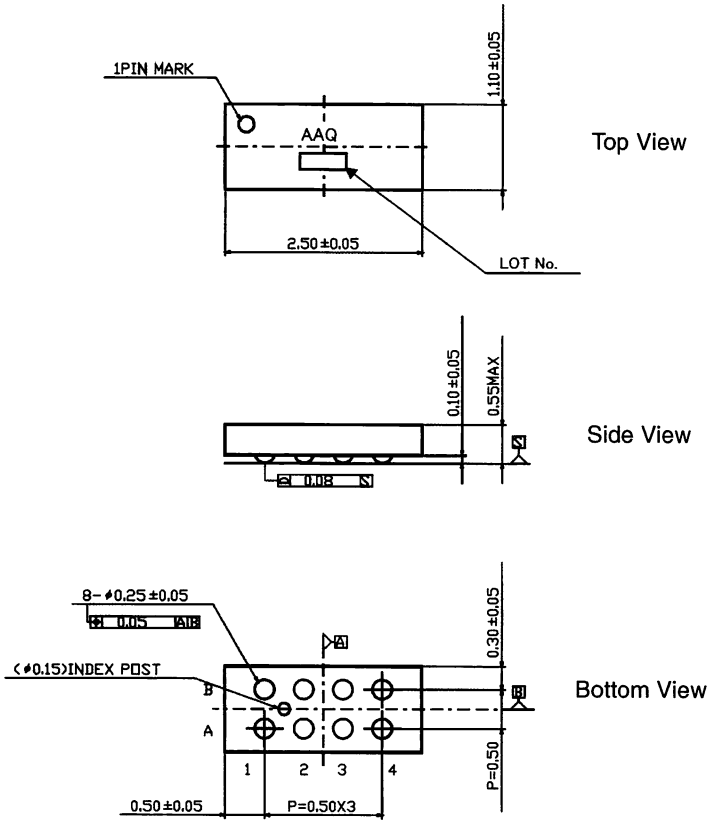


Fig1. VCSP50L2 Package (Unit;mm)

○Pin Arrangement (Top View)

	1	2	3	4
A	VM	OUTB	SCL	SDA
B	OUTA	GND	VCC	PS

Fig2. BH6452GUL Pin Arrangement (Top View)

○ Block Diagram

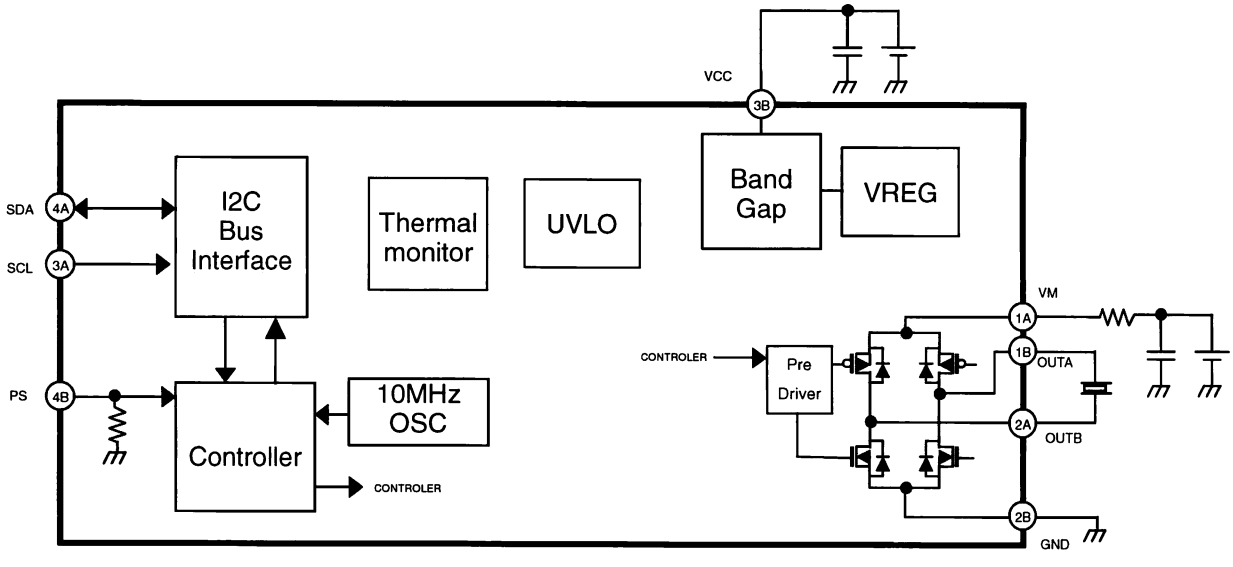


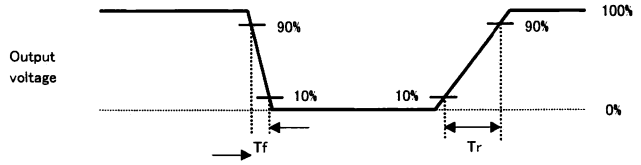
Fig3. BH6452GUL Block Diagram

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

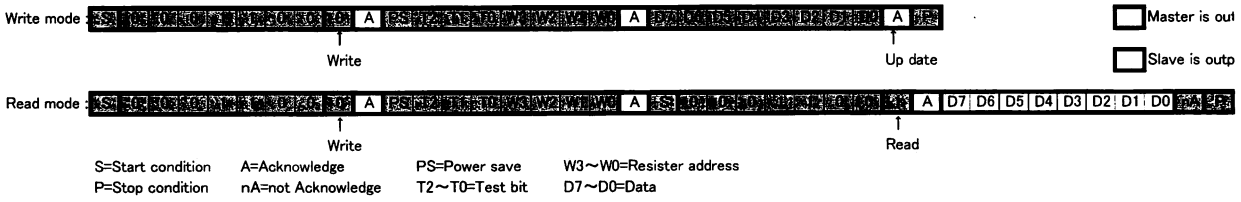
Parameter	Symbol	Limit			Unit	Conditions
		Min.	Typ.	Max.		
Overall						
Circuit current during standby operation	ICCST	-	0	1	μA	PS=L
Circuit current	ICC	-	3.2	6.4	mA	PS=H, SCL=400kHz, OSC active
UVLO						
UVLO voltage	VUVLO	1.8	-	2.2	V	
Power save input						
High level input voltage	V_{PSH}	1.5	-	VCC	V	
Low level input voltage	V_{PSL}	0	-	0.5	V	
High level input current	I_{PSH}	15	30	60	μA	VINH=3.0V
Low level input current	I_{PSL}	-3	0	-	μA	VINL=0V
Control input (SDA,SCL)						
High level input voltage	V_{INH}	1.5	-	VCC	V	
Low level input voltage	V_{INL}	0	-	0.5	V	
Low level output voltage	V_{OL}	-	-	0.4	V	I_{IN}=3.0mA (SDA)
High level input current	I_{INH}	-10	-	10	μA	Input voltage=VCC
Low level input voltage	I_{INL}	-10	-	10	μA	Input voltage=GND
H Bridge Drive						
Output ON-Resistance	RONP	-	0.7	1.0	Ω	
	RONN	-	0.7	1.0	Ω	
Cycle length of sequence drive	TMIN	15.5	16.0	16.5	uS	※4 Built-in CLK 160 count
Output rise time	Tr	-	0.1	0.8	uS	※5 7.5Ω load condition
Output fall time	Tf	-	0.02	0.4	uS	※5 7.5Ω load condition

※4 The time that 1 cycle of sequence drive at the below setting of I2C data
ta[7:0]=8'h13, brake1[7:0]=8'h03, tb[7:0]=8'h1e, brake2[7:0]=8'h6b, osc[2:0]=3'h0

※5 Output switching wave



○I2C BUS SPEC (Fast mode : SCL=400kHz)



○Resister map

Address	W3	W2	W1	W0	D7	D6	D5	D4	D3	D2	D1	D 0
0H	0	0	0	0	HiZE	initB[2]	initB[1]	initB[0]	init	START	MODE	dir
1H	0	0	0	1	ta[7]	ta[6]	ta[5]	ta[4]	ta[3]	ta[2]	ta[1]	ta[0]
2H	0	0	1	0	brake1[7]	brake1 [6]	brake1 [5]	brake1[4]	brake1[3]	brake1[2]	brake1[1]	brake1[0]
3H	0	0	1	1	tb[7]	tb[6]	tb[5]	tb[4]	tb[3]	tb[2]	tb[1]	tb[0]
4H	0	1	0	0	brake2[7]	brake2[6]	brake2[5]	brake2[4]	brake2[3]	brake2[2]	brake2[1]	brake2[0]
5H	0	1	0	1	cnt[7]	cnt[6]	cnt[5]	cnt[4]	cnt[3]	cnt[2]	cnt[1]	cnt[0]
6H	0	1	1	0	cnt[15]	cnt[14]	cnt[13]	cnt[12]	cnt[11]	cnt[10]	cnt[9]	cnt[8]
7H	0	1	1	1	pa	pb	osc[2]	osc[1]	osc[0]	cntck[2]	cntck[1]	cntck[0]
8H	1	0	0	0	cntout[7]	cntout[6]	cntout[5]	cntout[4]	cntout[3]	cntout[2]	cntout[1]	cntout[0]
9H	1	0	0	1	cntout[15]	cntout[14]	cntout[13]	cntout[12]	cntout[11]	cntout[10]	cntout[9]	cntout[8]
AH	1	0	1	0	TEST	TEST	TEST	TEST	TEST	TEST	EXT	initEXT
BH	1	0	1	1	TEST	TEST	TEST	TEST	TEST	TEST	TEST	TEST
CH	1	1	0	0	TEST	TEST	TEST	TEST	TEST	TEST	TEST	TEST

* A low signal should be input to the TEST bit at all times

○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 (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. 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) Power supply lines

Regenerated current may flow as a result of the inductance of printed circuit board. 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 loose 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.

(3) Ground potential

Ensure a minimum GND pin potential in all operating conditions.

(4) Setting of heat

Use a thermal design that allows for a sufficient margin in light of the power dissipation (Pd) in actual operating conditions.

(5) 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.

(6) ASO

When using the IC, set that it does not exceed absolute maximum ratings or ASO.

(7) Thermal shutdown circuit

This IC incorporates a thermal shutdown circuit (TSD). If the temperature of the chip reaches the following temperature, the motor output will be opened. TSD is designed only to shut the IC off to prevent runaway thermal operation. It is not designed to protect the IC or guarantee its operation. Do not continue to use the IC after operating this circuit or use the IC in an environment where the operation of this circuit is assumed.

TSD ON temperature [°C] (Typ.)	Hysteresis temperature [°C] (Typ.)
150	20

(8) PS terminal

Release PS after rising VCC. PS works resetting logic as well. If keep connecting PS with VCC, resetting cannot be done cause misoperating or destroy.

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