STRUCTURE Silicon Monolithic Integrated Circuit

PRODUCT SERIES 2ch Stepping Motor Driver for Digital Still Camera

TYPE **BD6360GUL**

FEATURES
- Built in 2 Full-ON H BridgeDrivers
- Built in 1 comparator with hysteresis for photo-interrupter output waveform shaping
- Built in 1 voltage-regulator for photo-interrupter

●Absolute maximum ratings (Ta=+25°C)

Parameter	Symbol	Limit	Unit
Power supply voltage	VCC	-0.3 to +6.5	V
Control input voltage	VIN	-0.3 to VCC+0.3	V
Power dissipation	Pd	730※1	mW
Operating temperature range	Topr	-25 to +85	°C
Junction temperature	Tjmax	+150	°C
Storage temperature range	Tstg	-55 to +150	°C
H-bridge output current	Iout	-500 to +500※2	mA/ch

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

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

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	VCC	2.3	3.0	5.5	V
Control input voltage	VIN	0	-	VCC	V
H-bridge output current	Iout	-	-	±400※3	mA/ch

※3 Must not exceed Pd or ASO.

This product isn't 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.

●BD6360GUL 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	-	1.1	1.8	mA	PS=3V with no signal, and no load
Control input (VIN= IN1A, IN1B, IN2A, IN2B, SEL, and 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	
Photo-interrupter (PI) comparator						
Input bias current	IBIPI	-3	0	3	μA	
Output low level voltage	VLOPI	0	-	0.5	V	Io=+1mA
Output high level voltage	VHIPI	VCC-0.5	-	VCC	V	Io=-1mA
Threshold voltage	VTHPI	1.2	1.3	1.4	V	Lo→Hi threshold voltage
Hysteresis voltage	VHYSPI	200	300	400	mV	Hi→Lo threshold voltage VTHPI-VHYSPI
Photo-interrupter (PI) regulator						
ON-Resistance	RONSW	-	-	10	Ω	Io=-30mA
OFF current	ILSW	-1.0	0	-	μA	BIAS=0V
Full-ON Drive block (ch1 and ch2)						
Output ON-Resistance	RON	-	1.00	1.25	Ω	Io=+400mA on high and low sides in total
Output AC characteristic						
Turn-on time	ton	-	0.6	2.0	μs	Io=±400mA
Turn-off time	toff	-	0.08	0.5	μs	Io=±400mA
Rise time	tr	0.1	0.15	1.0	μs	Io=±400mA
Fall time	tf	-	0.03	0.2	μs	Io=±400mA

●Photo-interrupter I/O Timing Chart

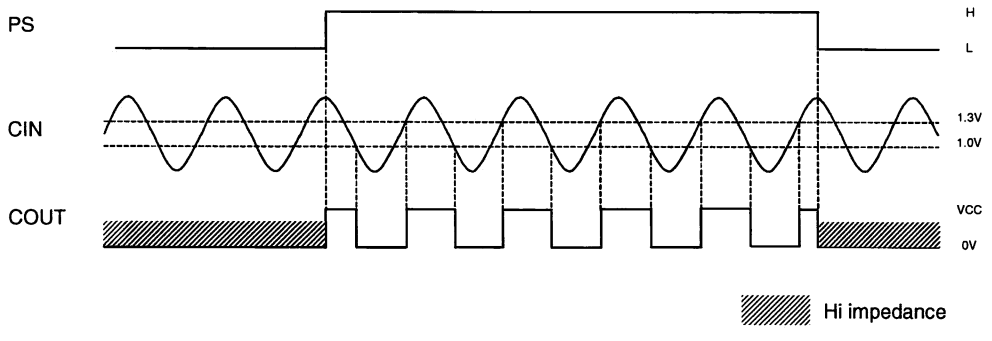

Fig.1 Photo-interrupter I/O Timing Chart

●Package Outline

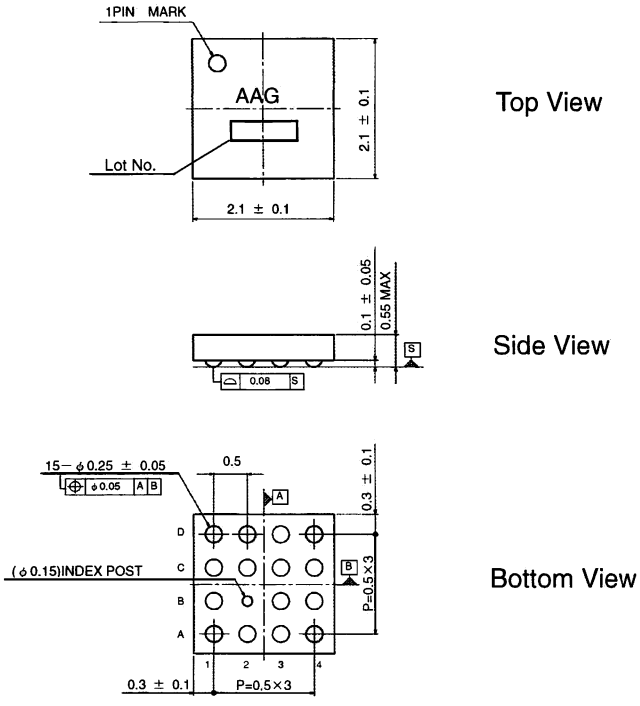

Fig.2 VCSP50L2 Package (Unit; mm)

●Pin Arrangement (Top View)

	1	2	3	4
A	OUT2B	CIN	COUT	BIAS
B	OUT2A	INDEX POST	IN2A	VCC
C	OUT1B	IN1B	IN2B	SEL
D	OUT1A	GND	IN1A	PS

Fig.3 BD6360GUL Pin Arrangement (Top View)

●Block Diagram

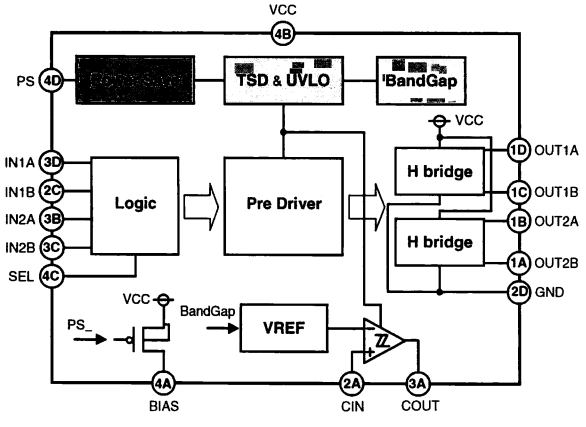

Fig.4 BD6360GUL Block Diagram

●I/O Truth Table

Tab. 1 BD6360GUL I/O Truth Table

MODE	INPUT				OUTPUT	
	PS	SEL	INxA	INxB	OUTxA	OUTxB
EN/IN	H	L	L	X	Z	Z
			H	L	H	L
			H	H	L	H
IN/IN		H	L	L	Z	Z
			L	H	L	H
			H	L	H	L
			H	H	L	L
-	L	X	X	X	Z	Z

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

●I/O Switching Waveform

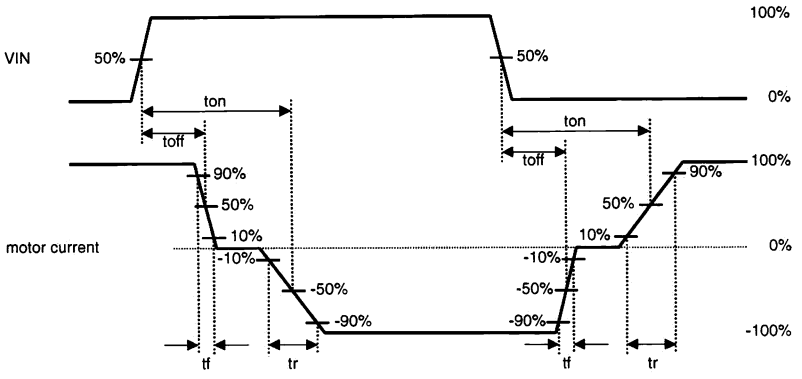

Fig.5 BD6360GUL I/O Switching Waveform

●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 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 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 the output transistor for the motor so that it does not exceed absolute maximum ratings or ASO.

(7) Thermal shutdown circuit

This IC incorporates a TSD (thermal shutdown) circuit (TSD circuit). If the temperature of the chip reaches the following temperature, the motor coil output will be opened. The thermal shutdown circuit (TSD circuit) 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.)
175	25

(8) Ground Wiring Pattern

When using both small signal GND and large current GND 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.

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