STRUCTURE Silicon Monolithic Integrated Circuit

PRODUCT SERIES Digital ambient light sensor and proximity sensor IC.

TYPE **BH1772GLC**

FUNCTION
1. Correspond to I^2C bus interface (f/s mode & Hs mode support)
2. ALS spectral responsibility is approximately human eye response (Peak wavelength : typ. 550nm)
3. Correspond to wide range of light intensity (1-65535 lx range)
4. Low Current by power down function
5. Rejecting 50Hz/60Hz light noise
6. Correspond to 1.8V logic interface
7. ALS Low measurement dispersion (+/- 15%)
8. Proximity sensor detection range is very wide (1uW/cm^2 – 100mW/cm^2)
9. Built in configurable LED current driver.

● Absolute maximum ratings (Ta = 25℃)

Parameter	Symbol	Limits	Units
VCC Supply Voltage	Vccmax	4.5	V
SDA, SCL, GNDNC Terminal Voltage	VSDAmax,VSCLmax, VGNDNCmax	4.5	V
LEDC, INT Terminal Voltage	VLEDCmax, VINTmax	7	V
Operating Temperature	Topr	-40～85	℃
Storage Temperature	Tstg	-40～100	℃
SDA, INT Sink Current	Imax	7	mA
Power Dissipation	Pd	250※	mW

※ 70mm × 70mm × 1.6mm glass epoxy board. Decreasing rate is 3.33mW/℃ for operating above Ta=25℃

● Operating conditions

Parameter	Symbol	Min.	Typ.	Max.	Units
VCC Voltage	Vcc	2.3	2.5	3.6	V
LEDC Terminal Voltage	Vledc	0.7	2.5	5.5	V

NOTE: This product is not designed for protection against radioactive rays.
This product does not include laser transmitter. This product does not include optical load.
This product includes Photo detector, (Photo Diode) inside of it.

● Electrical characteristics (VCC = 2.5V, Ta = 25℃, unless otherwise noted.)

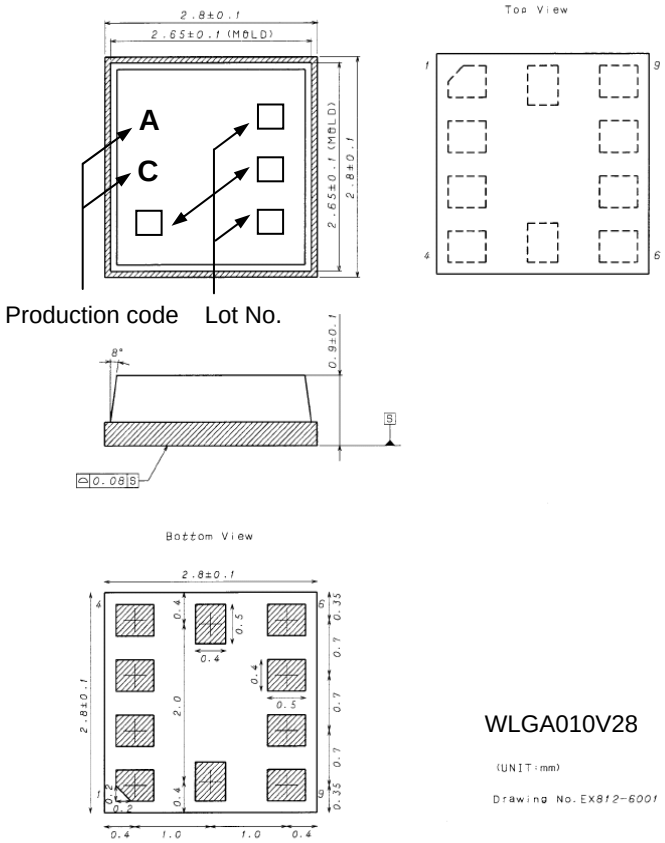
Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Supply current for ALS	Icc1	—	90	180	uA	Ev = 100 lx ※1 Average current when ALS_CONTROL register(40h) = ” 03h ” and the other registers are default.
Supply current for PS	Icc2	—	90	180	uA	Average current when PS_CONTROL register(41h) = ” 03h ” and the other registers are default.
Supply current for PS during LED current drive	Icc3	—	6.5	8.5	mA	
Standby mode current	Icc4	—	0.8	1.5	uA	ALS & PS standby No Input Light f/s mode
ALS measurement time	tMALS	—	100	125	ms	
ALS measurement accuracy	S/A	0.85	1.0	1.15	Times	Sensor out / Actual lx, Ev = 1000 lx ※1
ALS dark (0 lx) sensor out	ALS0	0	0	2	count	
PS sensor out (No proximity object)	PS0	0	0	30	count	Ambient irradiance = 0uW/cm^2
PS sensor out (Irradiance by proximity object = 324uW/cm^2)	PS324u	120	128	136	count	Ambient irradiance = 0uW/cm^2
ILED pulse duration	twILED	—	200	250	us	
PS measurement time	tMPS	—	10	12.5	ms	
LEDC terminal sink current at LEDC terminal voltage = 1.3V	ILEDC	18	20	22	mA	ILED register(42h) [2:0] = “010”
INT output ‘L’ Voltage	VINT	0	—	0.4	V	IINT = 3mA
SCL SDA input 'H' Voltage	VIH	1.26	—	—	V	
SCL SDA input 'L' Voltage	VIL	—	—	0.54	V	
SCL SDA input 'H'/'L' Current	IIHL	-10	—	10	uA	
I^{2}C SDA Output 'L' Voltage	VOL	0	—	0.4	V	IOL = 3mA

※1 White LED is used as optical source.

● I^2C bus timing characteristics (VCC = 2.5V, Ta = 25℃, unless otherwise noted.)

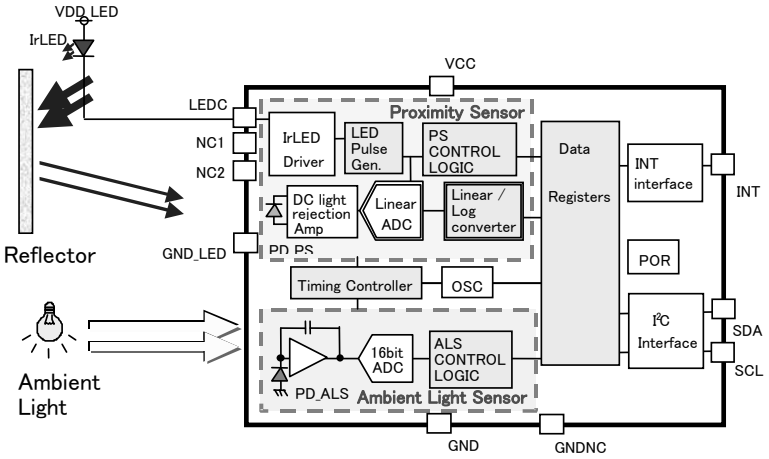
Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
I^2C SCL Clock Frequency	f_{SCL}	0	—	400	kHz	f/s mode
I^2C SCL Clock Frequency2	f_{SCLH}	0	—	3.4	MHz	Hs mode Cb=100pF
I^2C Hold Time (Repeated) START Condition	$t_{HD;STA}$	0.6	—	—	us	f/s mode
I^2C Hold Time (Repeated) START Condition2	$t_{HD;STA}$	160	—	—	ns	Hs mode
I^2C 'L' Period of the SCL Clock	t_{LOW}	1.3	—	—	us	f/s mode
I^2C 'L' Period of the SCL Clock2	t_{LOW}	160	—	—	ns	Hs mode
I^2C 'H' Period of the SCL Clock	t_{HIGH}	0.6	—	—	us	f/s mode
I^2C 'H' Period of the SCL Clock2	t_{HIGH}	60	—	—	ns	Hs mode
I^2C Set up time for a Repeated START Condition	$t_{SU;STA}$	0.6	—	—	us	f/s mode
I^2C Set up time for a Repeated START Condition2	$t_{SU;STA}$	160	—	—	ns	Hs mode
I^2C Data Hold Time	$t_{HD;DAT}$	0	—	—	us	f/s mode
I^2C Data Hold Time2	$t_{HD;DAT}$	0	—	70	ns	Hs mode Cb=100pF
I^2C Data Setup Time	$t_{SU;DAT}$	100	—	—	ns	f/s mode
I^2C Data Setup Time2	$t_{SU;DAT}$	10	—	—	ns	Hs mode
I^2C Set up Time for STOP Condition	$t_{SU;STO}$	0.6	—	—	us	f/s mode
I^2C Set up Time for STOP Condition2	$t_{SU;STO}$	160	—	—	ns	Hs mode
I^2C Bus Free Time between a STOP and START Condition	t_{BUF}	1.3	—	—	us	
I^2C Data Valid Time	$t_{VD;DAT}$	—	—	0.9	us	f/s mode
I^2C Data Valid Acknowledge Time	$t_{VD;ACK}$	—	—	0.9	us	f/s mode

● Package outlines



● Terminal description and Block diagram

Pin No.	Pin Name	Function
1	NC1	Connect to VDD_LED or NC
2	NC2	
3	LEDC	LED current drive
4	GND_LED	GND for LED terminal
5	INT	Interrupt terminal
6	VCC	VCC terminal
7	GND	GND terminal
8	SCL	I^2C bus SCL Pin
9	SDA	I^2C bus SDA Pin
10	GNDNC	Connect to GND or NC



● Cautions on use

1) Absolute Maximum Ratings

An excess in the absolute maximum ratings, such as supply voltage (Vccmax, VSDAmax, VSCLmax, VINTmax, VGNDNCmax, VLEDCmax), temperature range of operating conditions (Topr), etc., can break down devices, thus making impossible to identify breaking mode such as a short circuit or an open circuit. If any special mode exceeding the absolute maximum ratings is assumed, consideration should be given to take physical safety measures including the use of fuses, etc.

2) GND voltage

Make setting of the potential of the GND, GND_LED terminal so that these will be maintained at the minimum in any operating state. Furthermore, check to be sure no terminals are at a potential lower than the GND voltage including an actual electric transient.

3) Short circuit between terminals and erroneous mounting

In order to mount ICs on a set PCB, pay thorough attention to the direction and offset of the ICs. Erroneous mounting can break down the ICs. Furthermore, if a short circuit occurs due to foreign matters entering between terminals or between the terminal and the power supply or the GND terminal, the ICs can break down.

4) Operation in strong electromagnetic field

Be noted that using ICs in the strong electromagnetic field can malfunction them.

5) Inspection with set PCB

On the inspection with the set PCB, if a capacitor is connected to a low-impedance IC terminal, the IC can suffer stress. Therefore, be sure to discharge from the set PCB by each process. Furthermore, in order to mount or dismount the set PCB to/from the jig for the inspection process, be sure to turn OFF the power supply and then mount the set PCB to the jig. After the completion of the inspection, be sure to turn OFF the power supply and then dismount it from the jig. In addition, for protection against static electricity, establish a ground for the assembly process and pay thorough attention to the transportation and the storage of the set PCB.

6) Input terminals

In terms of the construction of IC, parasitic elements are inevitably formed in relation to potential. The operation of the parasitic element can cause interference with circuit operation, thus resulting in a malfunction and then breakdown of the input terminal. Therefore, pay through attention not to handle the input terminals; such as to apply to the input terminals a voltage lower than the GND respectively, so that any parasitic element will operate. In addition, apply to the input terminals a voltage within the guaranteed value of electrical characteristics.

7) Thermal design

Perform thermal design in which there are adequate margins by taking into account the power dissipation (Pd) in actual states of use.

8) Treatment of package

Dusts or scratch on the photo detector may affect the optical characteristics. Please handle it with care.

9) Rush current

When power is first supplied to the CMOS IC, it is possible that the internal logic may be unstable and rush current may flow instantaneously. Therefore, give special consideration to power coupling capacitance, power wiring, width of GND wiring, and routing of connections.

Notes

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