AF Control LSI

LC898249AXH

Overview

This LSI is Closed−Auto Focus control LSI equipped with hall sensor. It consists of 1 system of feedback circuit and constant current driver. It has also a built−in EEPROM and temperature sensor.

Features

- Built−in Equalizer Circuit Using Digital Operation
  - ♦ AF Control Equalizer Circuit
  - ♦ Any Coefficient can be Specified by 2−wire Serial I/F (TWIF)
- 2−wire Serial Interface
  (The Communication Protocol is Compatible with I^2C)
  - ♦ 4 Selectable Slave Addresses
    - − 50h(W)/51h(R), 53h(R)
    - − 74h(W)/75h(R), 77h(R)
    - − E8h(W)/E9h(R), EBh(R)
    - − E4h(W)/E5h(R), E7h(R) factory−configured

    Right Side Addresses are Used at the Access of Built−in EEPROM
- Built−in A/D Converter
- Built−in D/A Converter
  - ♦ Hall Offset
  - ♦ Constant Current Bias
- Built−in Hall Sensor
  - ♦ Si Hall Sensor
- Built−in EEPROM
  - ♦ 64 Byte (16 Byte / Page)
- Built−in OSC
- Built−in Constant Current Driver
  - ♦ 150 mA
- Package
  - ♦ WLCSP 6−pin (2 x 3 Pin), Thickness Max 0.29 mm, with Backside Coat
- Supply Voltage
  - ♦ VDD (2.6 V to 3.3 V)
- This Device is Pb−Free, Halogen Free/BFR Free and is RoHS Compliant

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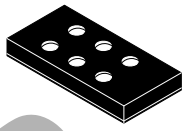
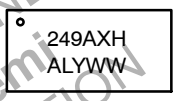


WLCSP6, 0.86x1.75x0.265
CASE 567XD

MARKING DIAGRAM



249AXH = Specific Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
WW = Work Week

ORDERING INFORMATION

Device	Package	Shipping†
LC898249AXHTBG	WLCSP6	4,000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

PIN DESCRIPTION

Table 1. PIN DESCRIPTION

Pin Name	Description
I	Input
P	Power Supply, GND
NC	Not Connect
O	Output
B	Bidirection

- 2−wire serial interface
  SCL I 2−wire serial interface clock pin
  SDA B 2−wire serial interface data pin
- Driver interface
  OUT1 O Driver output (to Actuator)
  OUT2 O Driver output (to Actuator)
- Power supply pin
  VDD P Power Supply
  VSS P GND

**Process when pins are not used*
PIN TYPE “O” – Ensure that it is set to OPEN.
PIN TYPE “I” – OPEN is inhibited. Ensure that it is connected to the VDD or VSS even when it is unused. (Please contact ON Semiconductor for more information about selection of VDD or VSS.)
PIN TYPE “B” – If you are unsure about processing method on the pin description of pin layout table, please contact us.
Note that incorrect processing of unused pins may result in defects.

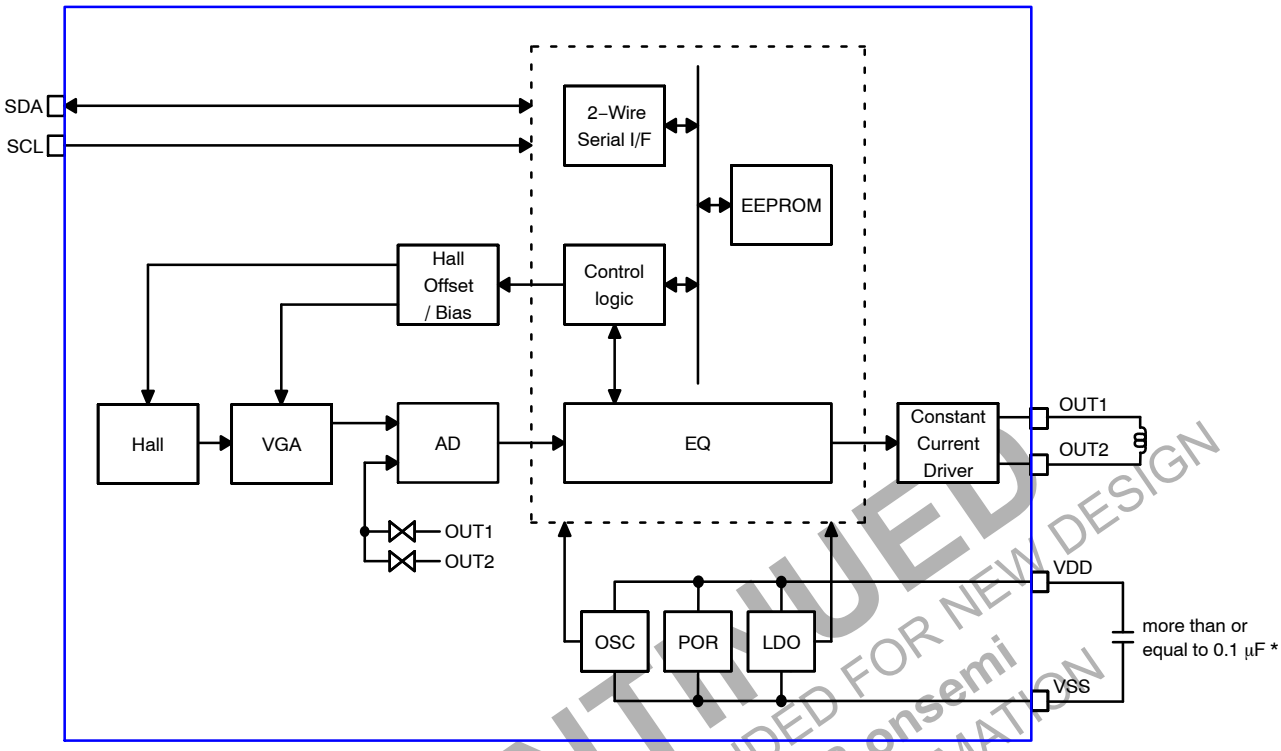
PIN LAYOUT

Table 2. PIN LAYOUT

Circuit Name	Number of PINs
Driver	2
Power	2
Logic	2

Figure 1. Pin Layout

BLOCK DIAGRAM



*Consider capacitance of capacitor between VDD and VSS. According to power source environment, attach an additional capacitor in camera module.

Figure 2. Block Diagram

HALL ELEMENT POSITION

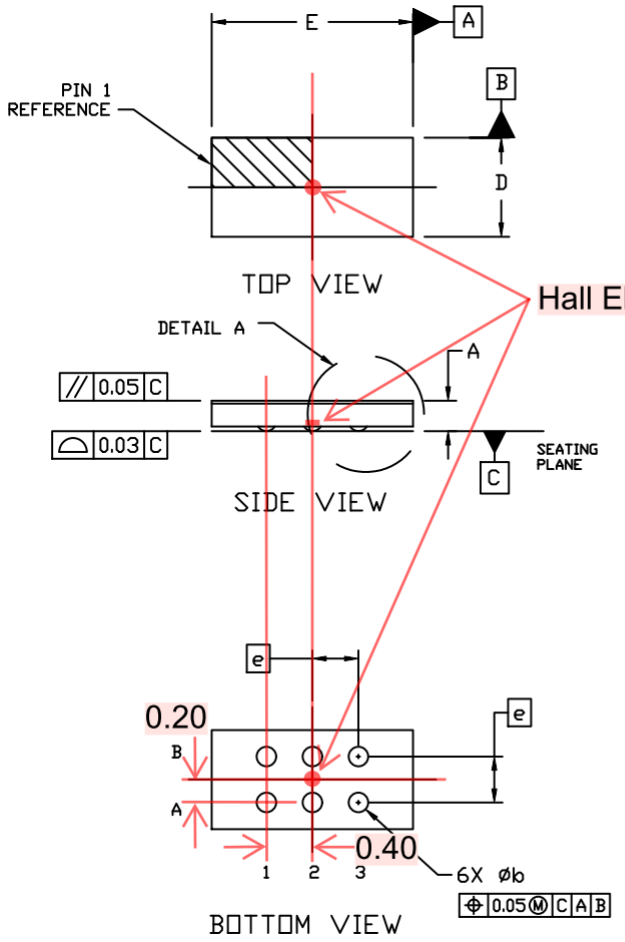


Figure 3. Hall Element Position

ELECTRICAL CHARACTERISTICS

Table 3. ABSOLUTE MAXIMUM RATINGS (VSS = 0 V)

Symbol	Item	Condition	Rating	Unit
$V_{DD}33$ max	Supply voltage	Ta ≤ 25°C	−0.3~4.6	V
V_I33,V_O33	Input/output voltage	Ta ≤ 25°C	−0.3~$V_{DD}33$ + 0.3	V
Tstg	Storage ambient temperature		−55~125	°C
Topr	Operating ambient temperature		−30~70	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Table 4. ACCEPTABLE OPERATION RANGE (Ta = −30~70°C, VSS = 0 V, 3 V power supply (VDD))

Symbol	Item	Min	Typ	Max	Unit
$V_{DD}33$	Supply voltage	2.6	2.8	3.3	V
V_{IN}	Input voltage range	0	−	$V_{DD}33$	V

Table 5. DC CHARACTERISTICS (Input / output level at VSS = 0 V, VDD = 2.6 V~3.3V, Ta = −30~70°C)

Symbol	Item	Condition	Min	Typ	Max	Unit	Applicable Pins
VIH	High−level input voltage	CMOS compliant schmitt	1.4	−	−	V	SCL, SDA
VIL	Low−level input voltage		−	−	0.4	V	
VOL	Low−level output voltage	IOL = 2 mA	−	−	0.2	V	SDA

Table 6. DRIVER OUTPUT (OUT1, OUT2) (VSS = 0 V, VDD = 2.8 V, Ta = 25°C)

Symbol	Item	Condition	Min	Typ	Max	Unit	Applicable Pins
Ifull	Maximum current		142.5	150	157.5	mA	OUT1, OUT2

Table 7. NON−VOLATILE MEMORY CHARACTERISTICS

Symbol	Item	Condition	Min	Typ	Max	Unit	Applicable Circuit
EN	Endurance		−	−	1000	Cycles	EEPROM
RT	Data retention		10	−	−	Years	
tWT	Write time		−	−	20	ms	

AC CHARACTERISTICS

VDD Supply Timing

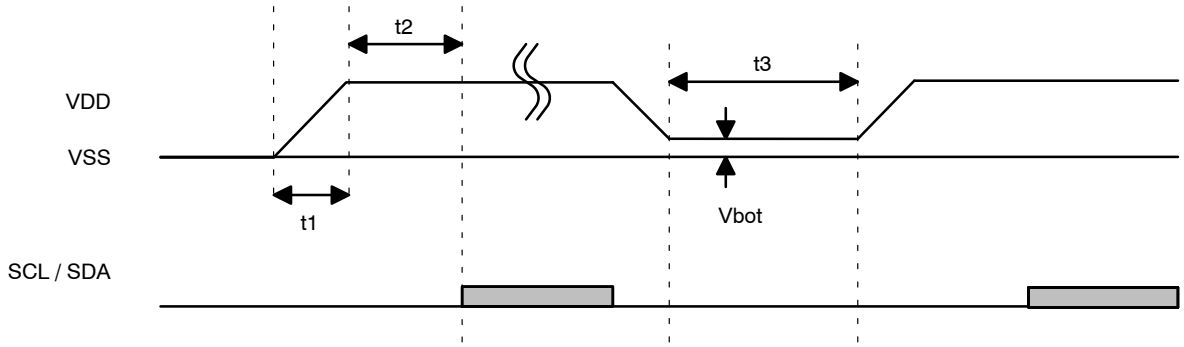


Figure 4. VDD Supply Timing

It is available to use 2−wire serial interface 5ms later for Power On Reset of VDD.

Table 8. VDD SUPPLY TIMING

Symbol	Item	Min	Typ	Max	Unit
t1	VDD turn on time	−	−	3	ms
t2	2−wire serial interface start time from VDD on	5	−	−	ms
t3	VDD off time	100	−	−	ms
Vbot	Bottom Voltage	−	−	0.1	V

AC Specification

Figure 5 shows interface timing definition and Table 9 shows electric characteristics.

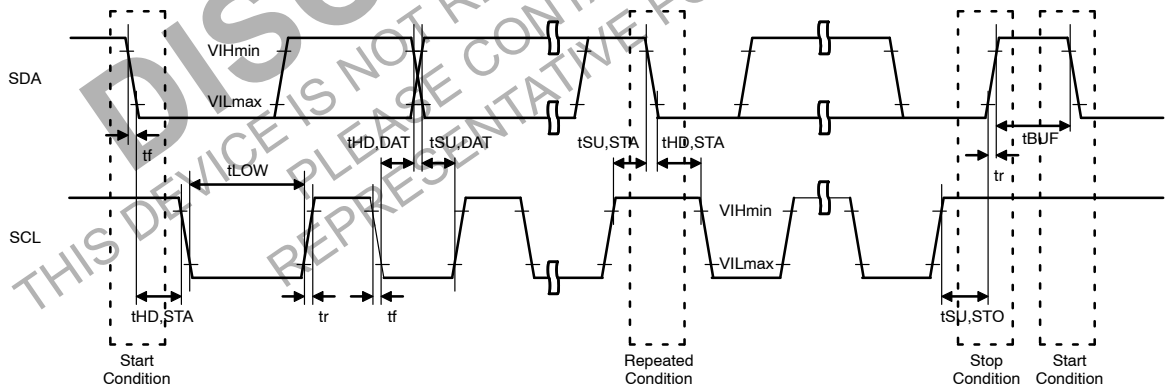


Figure 5. 2−wire Serial Interface Timing Definition

Table 9. ELECTRICAL CHARACTERISTICS FOR 2−WIRE SERIAL INTERFACE (AC CHARACTERISTICS)

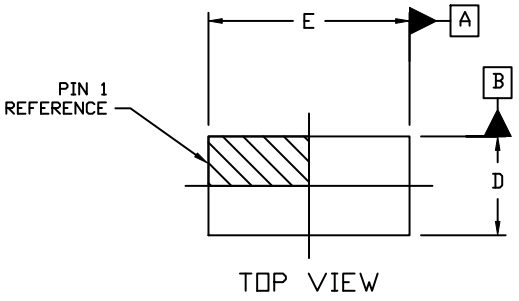
Symbol	Item	Pin Name	Fast−mode			Fast−mode Plus			Unit
			Min	Typ	Max	Min	Typ	Max	
FSCL	SCL clock frequency	SCL	−	−	400	−	−	1000	kHz
tHD,STA	START condition hold time	SCL SDA	0.6	−	−	0.26	−	−	μs
tLOW	SCL clock Low period	SCL	1.3	−	−	0.5	−	−	μs
tHIGH	SCL clock High period	SCL	0.6	−	−	0.26	−	−	μs
tSU,STA	Setup time for repetition START condition	SCL SDA	0.6	−	−	0.26	−	−	μs
tHD,DAT	Data hold time	SCL SDA	0 (Note 1)	−	0.9	0 (Note 1)	−	−	μs
tSU,DAT	Data setup time	SCL SDA	100	−	−	50	−	−	ns
tr	SDA, SCL rising time	SCL SDA	−	−	300	−	−	120	ns
tf	SDA, SCL falling time	SCL SDA	−	−	300	−	−	120	ns
tSU,STO	STOP condition setup time	SCL SDA	0.6	−	−	0.26	−	−	μs
tBUF	Bus free time between STOP and START	SCL SDA	1.3	−	−	0.5	−	−	μs

1. This LSI is designed for a condition with typ. 20 ns of hold time. If SDA signal is unstable around falling point of SCL signal, please implement an appropriate treatment on board, such as inserting a resistor.

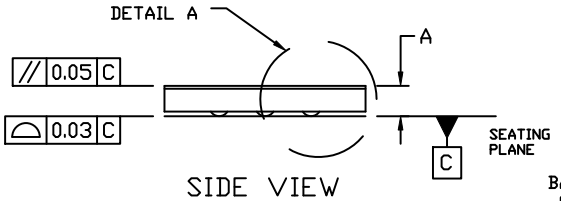
ON Semiconductor is licensed by the Philips Corporation to carry the I^2C bus protocol.

WLCSP6, 0.86x1.75x0.265
CASE 567XD
ISSUE O

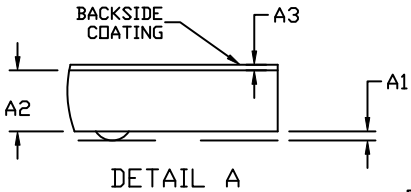
DATE 23 OCT 2018



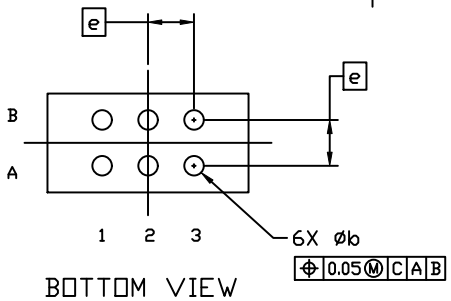
TOP VIEW



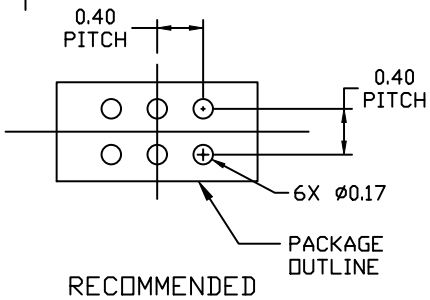
SIDE VIEW



DETAIL A



BOTTOM VIEW



RECOMMENDED
MOUNTING FOOTPRINT*

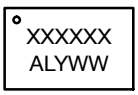
* For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DATUM C, THE SEATING PLANE, IS DEFINED BY THE SPERICAL CROWNS OF THE CONTACT BALLS.
4. COPLANARITY APPLIES TO THE SPHERICAL CROWNS OF THE CONTACT BALLS.
5. DIMENSION b IS MEASURED AT THE MAXIMUM CONTACT BALL DIAMETER PARALLEL TO DATUM C.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.24	0.265	0.29
A1		0.04 REF	
A2		0.20 REF	
A3		0.025 REF	
b	0.12	0.17	0.22
D	0.81	0.86	0.91
E	1.70	1.75	1.80
e		0.40 BSC	

GENERIC MARKING DIAGRAM*



XXXX = Specific Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
WW = Work Week

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

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