

# LC898229XI

## AF Control LSI

### 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 I2C)
- 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
  - ◆ 64byte (16byte/page)
- Built-in OSC
- Built-in Constant Current Driver
  - ◆ 110 mA
- Package
  - ◆ WL-CSP 6-pin (2 x 3pin) , Thickness Max 0.29 mm, with Backside Coat
  - ◆ Lead-free, Halogen-free
- Supply voltage
  - ◆ V<sub>DD</sub> (2.6 V to 3.3 V)



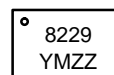
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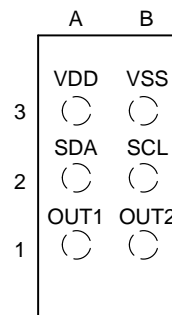
**WLCSP  
6 BUMP  
CASE 567UK**

### DEVICE MARKING INFORMATION



8229= Specific Device Code  
Y = Year  
M = Month  
ZZ = Assembly Lot

### PIN LAYOUT



(Top View)

Circuit Name	Number of PINs
Driver	2
Power	2
Logic	2

### ORDERING INFORMATION

Device	Package	Shipping†
LC898229XI	WLCSP6	4000 / Tape & Reel

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

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## Pin Description

Type	
I	Input
O	Output
B	Bidirection
P	Power supply, GND
NC	Not Connected

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		
V <sub>DD</sub>	P	Power supply
V <sub>SS</sub>	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.

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**Table 1. ABSOLUTE MAXIMUM RATING** (VSS = 0 V)

Item	Symbol	Condition	Rating	Unit
Supply voltage	V <sub>DD33</sub> max	T <sub>a</sub> ≤ 25°C	-0.3~4.6	V
Input/output voltage	V <sub>I33</sub> , V <sub>O33</sub>	T <sub>a</sub> ≤ 25°C	-0.3~V <sub>DD33</sub> +0.3	V
Storage ambient temperature	T <sub>stg</sub>		-55~125	°C
Operating ambient temperature	T <sub>opr</sub>		-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 2. ACCEPTABLE OPERATION RANGE** at T<sub>a</sub> = -30 ~ 70°C, VSS = 0 V

Item	Symbol	Min	Typ	Max	Unit
Supply voltage	V <sub>DD33</sub>	2.6	2.8	3.3	V
Input voltage range	V <sub>IN</sub>	0		V <sub>DD33</sub>	V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

**Table 3. DC CHARACTERISTICS:** Input/output level at VSS = 0 V, VDD = 2.6 V ~ 3.3V, T<sub>a</sub> = -30 ~ 70°C

Item	Symbol	Condition	Min	Typ	Max	Unit	Applicable Pins
High-level input voltage	V <sub>IH</sub>	CMOS compliant Schmidt	1.4		0.4	V	SCL, SDA
Low-level input voltage	V <sub>IL</sub>						
Low-level output voltage	V <sub>OL</sub>	IOL= 2mA			0.2	V	SDA

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

**Table 4. DRIVER OUTPUT (OUT1, OUT2)** at VSS = 0 V, VDD = 2.8 V, T<sub>a</sub> = 25°C

Item	Symbol	Condition	Min	Typ	Max	Unit	Applicable Pins
Maximum current	I <sub>full</sub>		105	110	115	mA	OUT1, OUT2

**Table 5. NON-VOLATILE MEMORY CHARACTERISTICS**

Item	Symbol	Condition	Min	Typ	Max	Unit	Applicable Circuit
Endurance	EN				1000	Cycles	EEPROM
Data retention	RT		10			Years	
Write time	t <sub>WT</sub>				20	ms	

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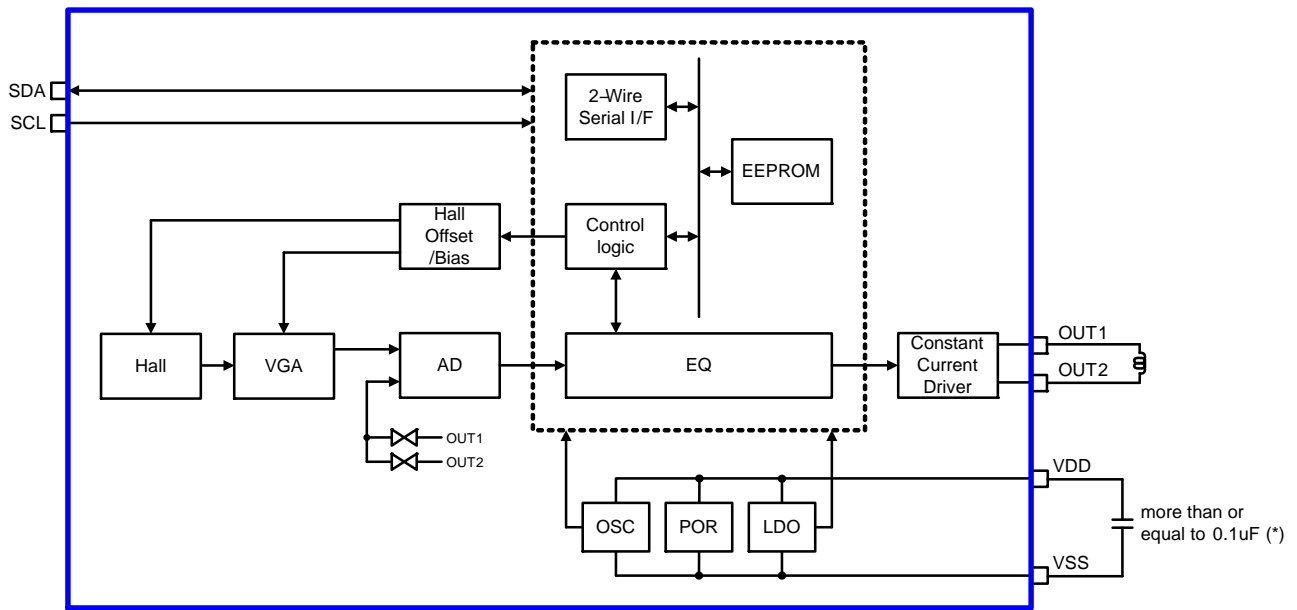


Figure 1. Block Diagram

NOTE: Consider capacitance of capacitor between  $V_{DD}$  and  $V_{SS}$ . According to power source environment, attach an additional capacitor in camera module.

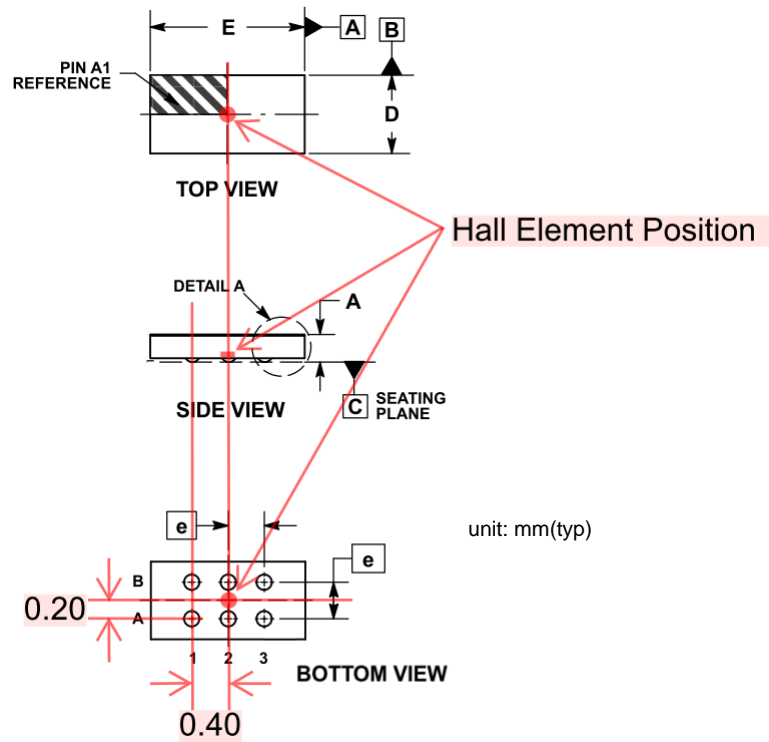


Figure 2. Hall Element Position

NOTE: Please refer to package diagram for each dimension.

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## AC Characteristics

### VDD Supply Timing

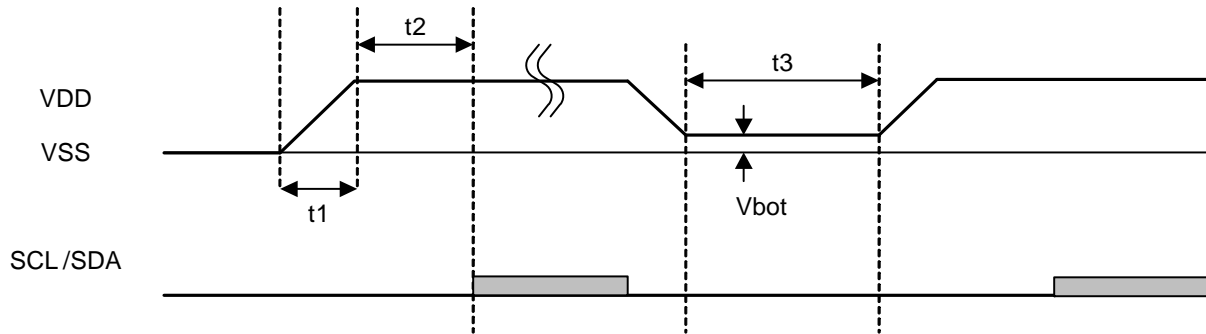


Figure 3. VDD Supply Timing

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

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

AC Specification

Figure 4 shows interface timing definition and Table 6 shows electric characteristics.

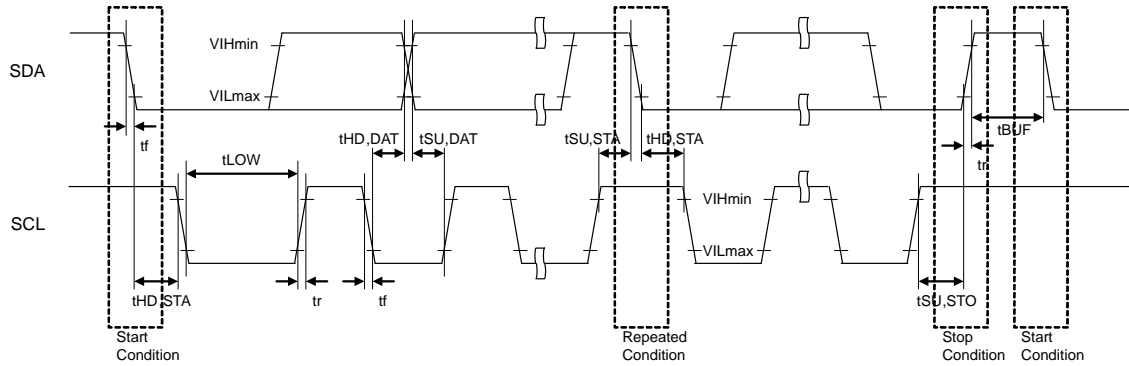


Figure 4. 2-wire Serial Interface Timing Definition

Table 6. ELECTRIC CHARACTERISTICS for 2-wire Serial Interface (AC Characteristics)

Item	Symbol	Pin Name	Fast-mode			Fast-mode Plus			Units
			Min	Typ	Max	Min	Typ	Max	
SCL clock frequency	F <sub>SCL</sub>	SCL			400			1000	KHz
START condition hold time	t <sub>HD, STA</sub>	SCL, SDA	0.6			0.26			μs
SCL clock Low period	t <sub>LOW</sub>	SCL	1.3			0.5			μs
SCL clock High period	t <sub>HIGH</sub>	SCL	0.6			0.26			μs
Setup time for repetition START condition	t <sub>SU, STA</sub>	SCL, SDA	0.6			0.26			μs
Data hold time	t <sub>HD, DAT</sub>	SCL, SDA	0 (Note 1)		0.9	0 (Note 1)			μs
Data setup time	t <sub>SU, DAT</sub>	SCL, SDA	100			50			ns
SDA, SCL rising time	t <sub>r</sub>	SCL, SDA			300			120	ns
SDA, SCL falling time	t <sub>f</sub>	SCL, SDA			300			120	ns
STOP condition setup time	t <sub>SU, STO</sub>	SCL, SDA	0.6			0.26			μs
Bus free time between STOP and START	t <sub>BUF</sub>	SCL, SDA	1.3			0.5			μs

1. This LSI is designed for a condition with typ. 20ns 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.

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

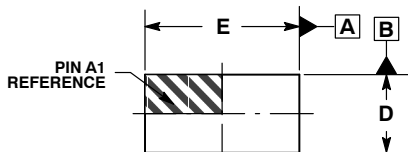
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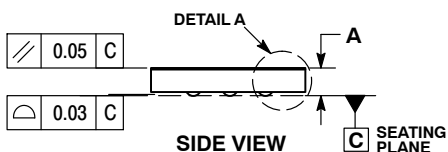
SCALE 4:1

WLCSP6 0.86x1.70x0.265  
CASE 567UK  
ISSUE A

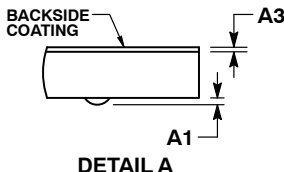
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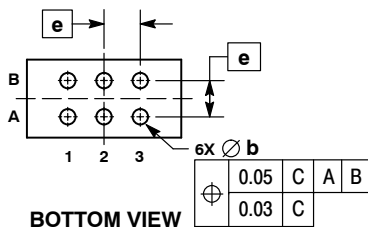
TOP VIEW



SIDE VIEW

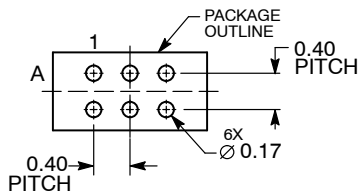


DETAIL A



BOTTOM VIEW

### RECOMMENDED SOLDERING FOOTPRINT\*



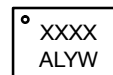
DIMENSIONS: MILLIMETERS

#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DATUM C, THE SEATING PLANE, IS DEFINED BY THE SPHERICAL CROWNS OF CONTACT BALLS.
4. COPLANARITY APPLIES TO SPHERICAL CROWNS OF 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		
A3	0.025 REF		
b	0.12	0.17	0.22
D	0.81	0.86	0.91
E	1.65	1.70	1.75
e	0.40 BSC		

### GENERIC MARKING DIAGRAM\*



- A = Assembly Location
- L = Wafer Lot
- Y = Year
- W = 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.

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

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