

# LC898214XC

CMOS LSI

## AF Controller



**ON Semiconductor®**

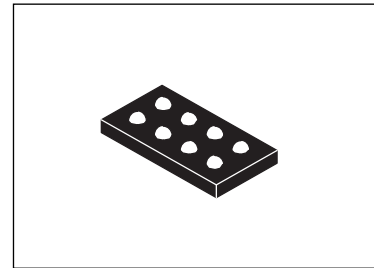
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### Overview

This LSI is AF control LSI. It consists of 1 system of feedback circuit for AF control.

### Features

- Built-in equalizer circuit using digital operation
  - AF control equalize circuit
  - Any coefficient can be specified by I<sup>2</sup>C I/F
- I<sup>2</sup>C Interface
- Built-in A/D converter
  - Maximum 10-bit
  - Input 2 channel
- Built-in D/A converter
  - 8-bit
  - Output 2-channel (Hall offset, Constant current Bias)
- Built-in Hall Sensor
  - Si Hall sensor
- Built-in EEPROM
  - 128 byte (8 byte/page)
- Built-in VGA
  - Hall Amp
- Built-in OSC
  - 48MHz
- Built-in Constant Current Driver
- Package
  - WL-CSP 8-pin
  - Lead-free, halogen-free
- Supply voltage
  - V<sub>DD</sub> (2.6V to 3.6V)



WLCSP8, 1.15x2.37, 0.5P

\* I<sup>2</sup>C Bus is a trademark of Philips Corporation.

### ORDERING INFORMATION

See detailed ordering and shipping information on page 9 of this data sheet.

**Pin Description**

TYPE					
I	INPUT	P	Power supply, GND	NC	NOT CONNECT
O	OUTPUT				
B	BIDIRECTION				

- I<sup>2</sup>C interface
  - I2CCK            B     I<sup>2</sup>C Clock pin
  - I2CDT           B     I<sup>2</sup>C Data pin
  
- Hall interface
  - HALL            O     Hall amp output
  
- Driver interface
  - OUT1            O     Actuator output pin
  - OUT2            O     Actuator output pin
  
- Power supply pin
  - VDD            P     Power supply
  - VSS            P     GND
  
- Test pin
  - TEST            O     Test pin

\*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.



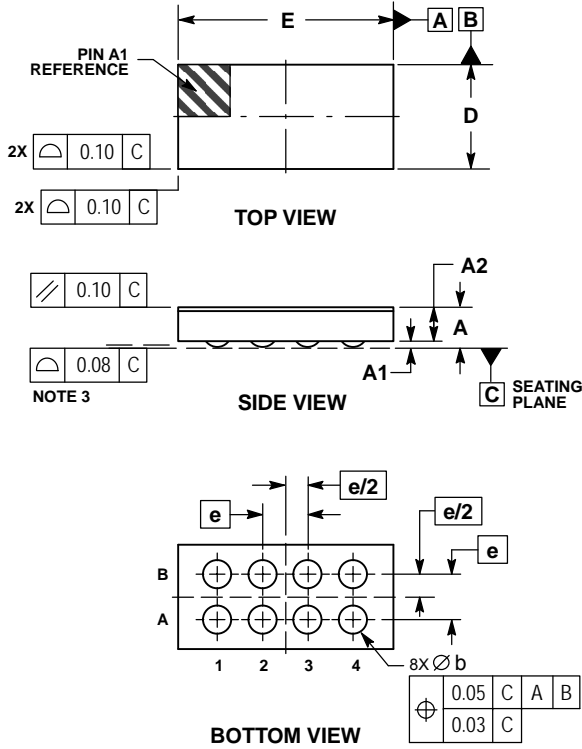
**Package Dimensions**

unit : mm

**WLCSP8, 1.15x2.37, 0.5P**

CASE 567JT

ISSUE A

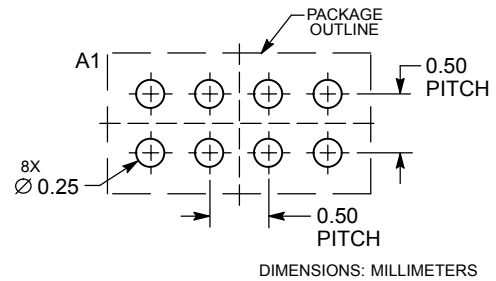


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. COPLANARITY APPLIES TO THE SPHERICAL CROWNS OF SOLDER BALLS.

DIM	MILLIMETERS	
	MIN	MAX
A	0.35	0.45
A1	0.045	0.115
b	0.20	0.30
D	1.12	1.18
E	2.34	2.40
e	0.50 BSC	

**RECOMMENDED SOLDERING 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.

**Electrical Characteristics**

**1) Absolute maximum rating** at  $V_{SS} = 0V$

Item	Symbol	Condition	Rating	Unit
Supply voltage	$V_{DD33 \text{ max}}$	$T_a \leq 25^\circ C$	-0.3 to 4.6	V
Input/output voltage	$V_{I33}, V_{O33}$	$T_a \leq 25^\circ C$	-0.3 to $V_{DD33} + 0.3$	V
Storage ambient temperature	Tstg		-55 to 125	°C
Operating ambient temperature	Topr		-30 to 70	°C
Continuous output current	Iomax	OUT1, OUT2	150	mA

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.

**2) Acceptable operation range** at  $T_a = -30$  to  $70^\circ C$ ,  $V_{SS} = 0V$   
3V power supply (DVDD)

Item	Symbol	Min	Std	Max	Unit
Supply voltage	$V_{DD33}$	2.6	2.8	3.6	V
Input voltage range	$V_{IN}$	0	-	$V_{DD33}$	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.

**3) DC characteristics : Input/output level** at  $V_{SS} = 0V$ ,  $V_{DD} = 2.6V$  to  $3.6V$ ,  $T_a = -30$  to  $70^\circ C$

Item	Symbol	Condition	Min	Std	Max	Unit	Applicable pins
High-level input voltage	$V_{IH}$	CMOS compliant Schmidt	1.4			V	I2CCK, I2CDT,
Low-level input voltage	$V_{IL}$				0.4	V	
Low-level output voltage	$V_{OL}$	IOL= 2mA			0.4	V	I2CDT

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.

**4) Driver output (OUT1, OUT2)** at  $V_{SS} = 0V$ ,  $V_{DD} = 2.8V$ ,  $T_a = 25^\circ C$

Item	Symbol	Condition	Min	Std	Max	Unit	Applicable pins
Maximum current	I <sub>full</sub>		108		137	mA	OUT1, OUT2
Output ON resistance	R <sub>onu</sub>	I <sub>o</sub> =120mA Pch		2.8		Ω	
Compliance voltage	V <sub>comp</sub>		0.5			V	
Output leak current	I <sub>oleak</sub>			1		μA	
Diode forward voltage	V <sub>D</sub>	I <sub>D</sub> =-120mA		0.9		V	

Actuator resistance (R<sub>act</sub>) =  $(V_M - (R_{onu} \cdot I_o + V_{comp})) / I_o$  [Ω]

**5) Non-volatile Memory Characteristics**

Item	Symbol	Condition	Min	Std	Max	Unit	Applicable pins
Endurance	EN				1000	Cycles	E2PROM
Data retention	RT		10			Years	

Hall element position

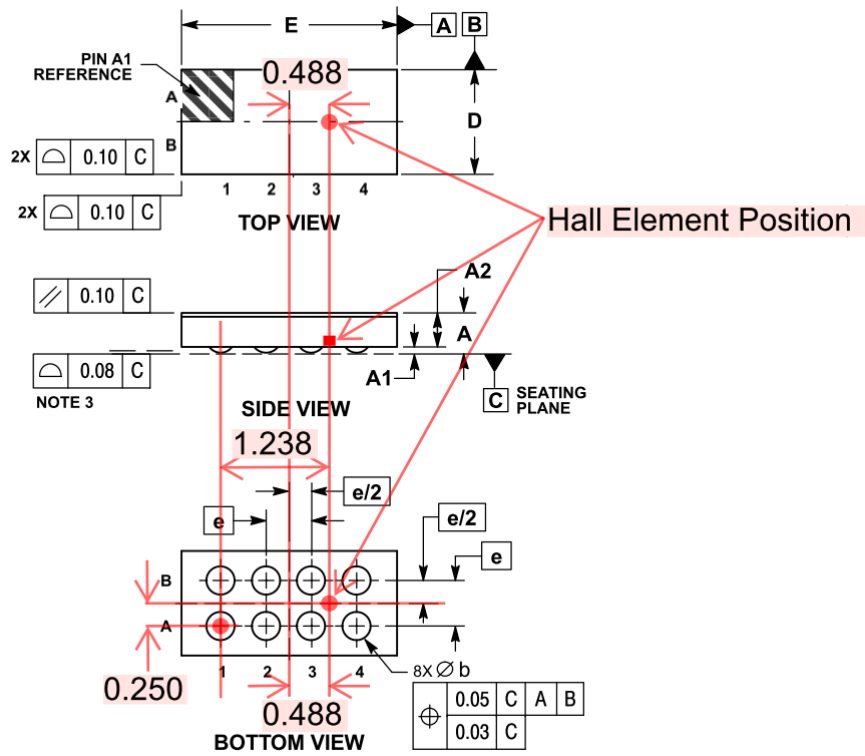


Figure 1 : Hall element position

Please refer to package diagram for each dimension.

AC Characteristics

VDD supply timing

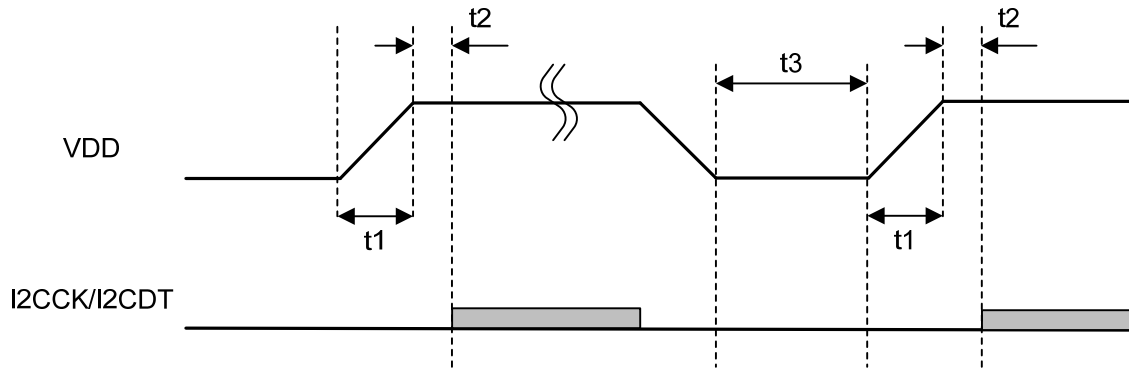


Figure 2 : VDD supply timing

It is available to use I<sup>2</sup>C 2ms later for Power On Reset of VDD.

Item	Symbol	Min	Typ	Max	Unit
VDD turn on time	t1			3	ms
I <sup>2</sup> C start time from VDD on	t2	2			ms
VDD off time	t3	10			ms

AC specification

Figure 2 shows interface timing definition and Table 1 shows electric characteristics.

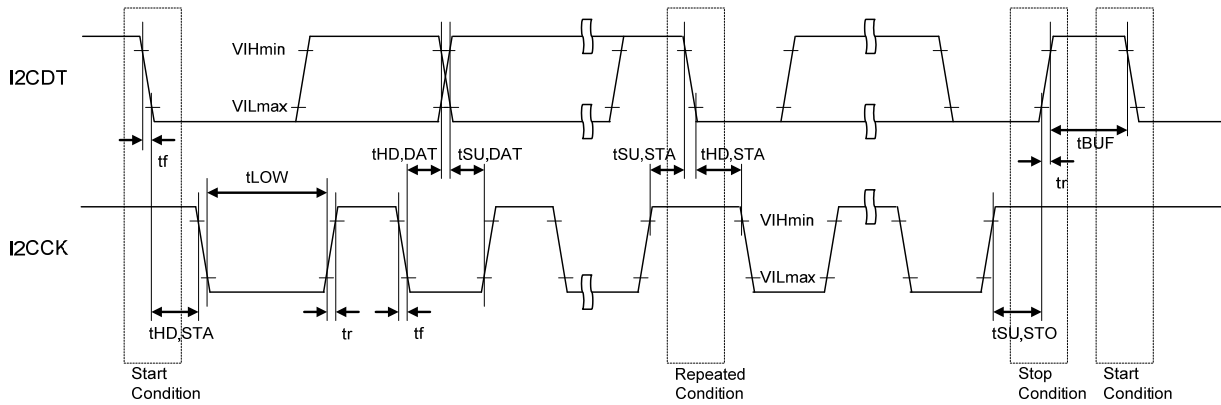


Figure 3 : I<sup>2</sup>C interface timing definition

Table 1 : Electric characteristics for I<sup>2</sup>C interface (AC characteristics)

Item	Symbol	Pin name	Min	Typ	Max	Unit
I2CCK clock frequency	Fi2cck	I2CCK			400	kHz
START condition hold time	tHD,STA	I2CCK I2CDT	0.6			μs
I2CCK clock Low period	tLOW	I2CCK	1.3			μs
I2CCK clock High period	tHIGH	I2CCK	0.6			μs
Setup time for repetition START condition	tSU,STA	I2CCK I2CDT	0.6			μs
Data hold time	tHD,DAT	I2CCK I2CDT	0 (*)		0.9	μs
Data setup time	tSU,DAT	I2CCK I2CDT	100			ns
I2CDT, I2CCK rising time	tr	I2CCK I2CDT			300	ns
I2CDT, I2CCK falling time	tf	I2CCK I2CDT			300	ns
STOP condition setup time	tSU,STO	I2CCK I2CDT	0.6			μs
Bus free time between STOP and START	tBUF	I2CCK I2CDT	1.3			μs

\* : Although the I<sup>2</sup>C specification defines a condition that 300 ns of hold time is required internally, LC898214XC is designed for a condition with typ. 20 ns of hold time. If I2CDT signal is unstable around falling point of I2CCK signal, please implement an appropriate treatment on board, such as inserting a resistor.



**ORDERING INFORMATION**

Device	Package	Shipping (Qty / Packing)
LC898214XC-MH	WLCSP8, 1.15x2.37, 0.5P (Pb-Free / Halogen Free)	4000 / Tape & Reel

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