LC898214XD

CMOS LSI

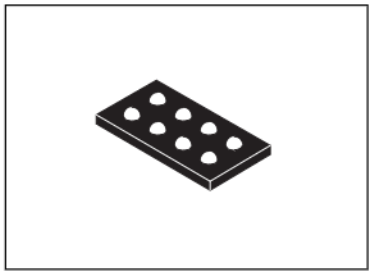
AF Controller

ON Semiconductor®

www.onsemi.com

Overview

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



WLCSP8, 1.15x2.37, 0.5P

Features

- Built-in equalizer circuit using digital operation
  - AF control equalize circuit
  - Any coefficient can be specified by I^2C I/F
- I^2C 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
  - Pb-Free, Halogen Free
- Supply voltage
  - V_{DD} (2.6V to 3.6V)

* I^2C 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^2C interface

I2CCK	B	I^2C Clock pin
I2CDT	B	I^2C 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

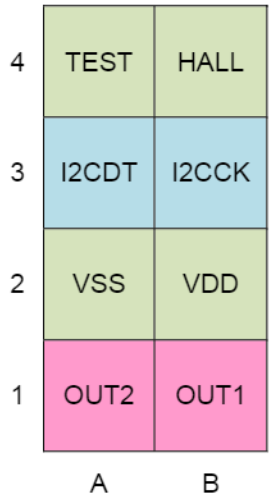
PIN TYPE "O" – Ensure that it is set to OPEN.
PIN TYPE "I" – OPEN is inhibited. Ensure that it is connected to the V_{DD} or V_{SS} even when it is unused.
(Please contact ON Semiconductor for more information about selection of V_{DD} or V_{SS}.)
PIN TYPE "B" – If you are unsure about processing method on the pin description of pin layout table, please contact us.

Note that incorrect processing of unused pins may result in defects.

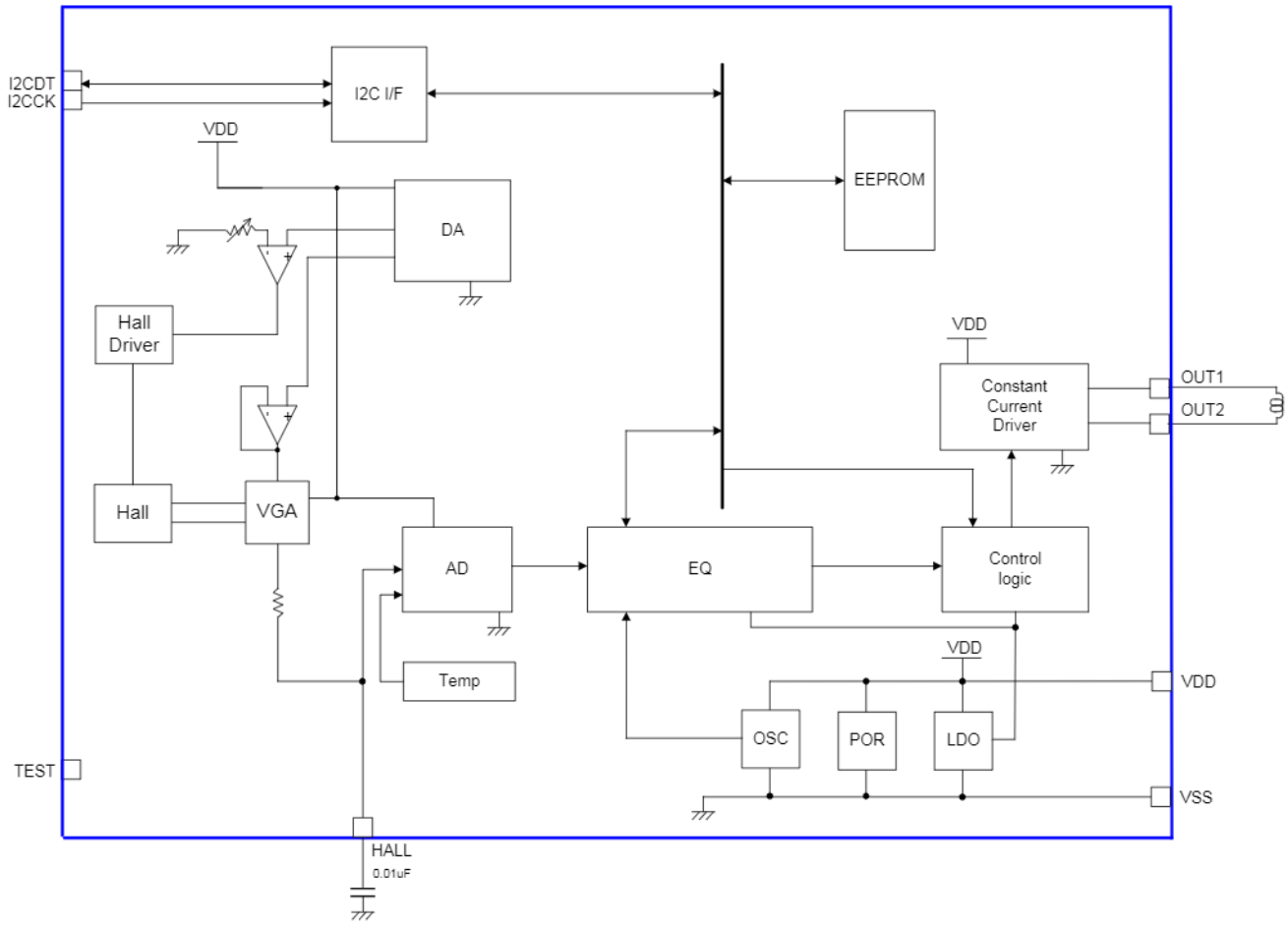
Pin Layout

Circuit Name	Number of Pins	Circuit Name	Number of Pins
Analog	4	Driver	2
Logic	2		

Backside pin layout diagram (Top View from the mold side)



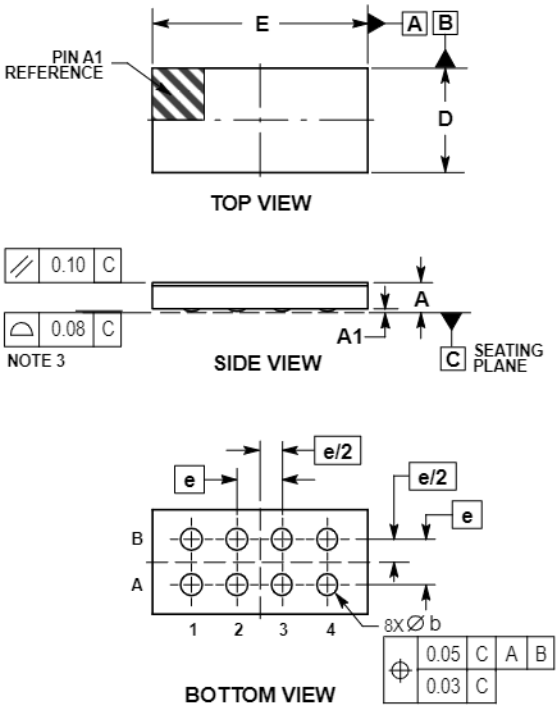
Block Diagram



Package Dimensions

unit : mm

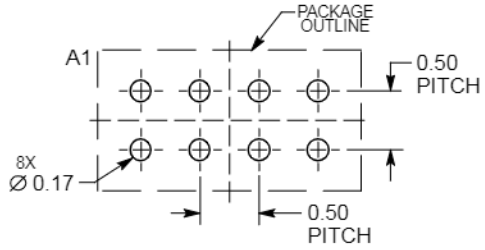
WLCSP8, 1.15x2.37, 0.5P
CASE 567KL
ISSUE A



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

	MILLIMETERS	
DIM	MIN	MAX
A	0.27	0.33
A1	0.04 REF	
b	0.12	0.22
D	1.12	1.18
E	2.34	2.40
e	0.50 BSC	

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*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	$V_{DD}33$ max	Ta ≤25°C	–0.3 to 4.6	V
Input/output voltage	V_I33,V_O33	Ta ≤25°C	–0.3 to $V_{DD}33$+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 Ta = –30 to 70 °C, V_{SS} = 0V

3V power supply (V_{DD})

Item	Symbol	Min	Std	Max	Unit
Supply voltage	$V_{DD}33$	2.6	2.8	3.6	V
Input voltage range	V_{IN}	0	-	$V_{DD}33$	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, Ta = –30 to 70 °C

Item	Symbol	Condition	Min	Std	Max	Unit	Applicable pins
High-level input voltage	VIH	CMOS compliant Schmidt	1.4			V	I2CCK, I2CDT,
Low-level input voltage	VIL				0.4	V	
Low-level output voltage	VOL	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, Ta = 25 °C

Item	Symbol	Condition	Min	Std	Max	Unit	Applicable pins
Maximum current	Ifull		108		137	mA	OUT1, OUT2
Output ON resistance	Ronu	Io=120mA Pch		2.8		Ω	
Compliance voltage	Vcomp		0.5			V	
Output leak current	Ioleak			1		μA	
Diode forward voltage	VD	ID=–120mA		0.9		V	

Actuator resistance (Ract) = (VM-(Ronu*Io+Vcomp)) / Io [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

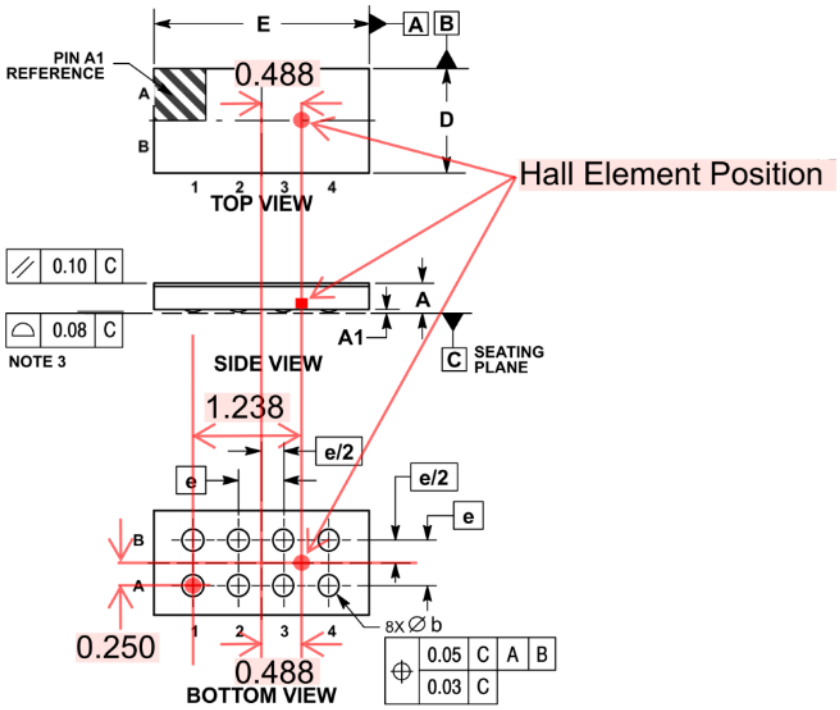


Figure 1 : Hall element position

Please refer to package diagram for each dimension.

AC Characteristics

V_{DD} supply timing

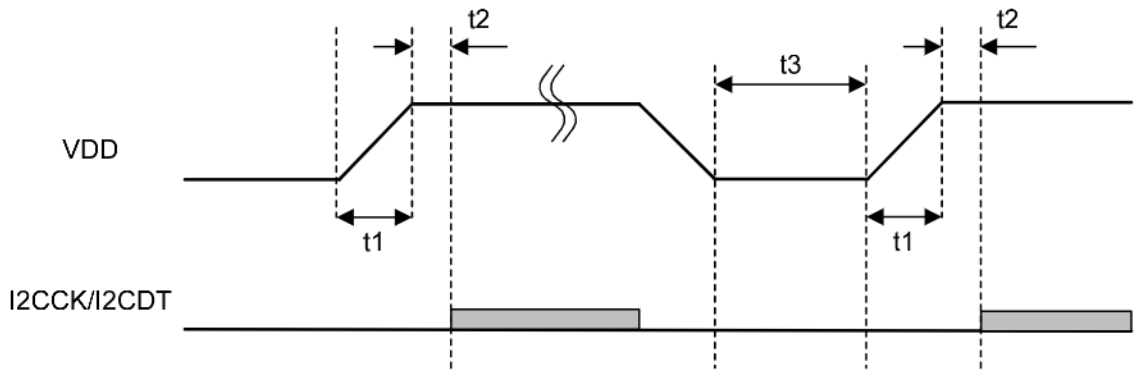


Figure 2 : V_{DD} supply timing

It is available to use I^2C 2ms later for Power On Reset of V_{DD}.

Item	Symbol	Min	Typ	Max	Unit
V_{DD} turn on time	t1			3	ms
I^2C start time from V_{DD} on	t2	2			ms
V_{DD} off time	t3	10			ms

AC specification

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

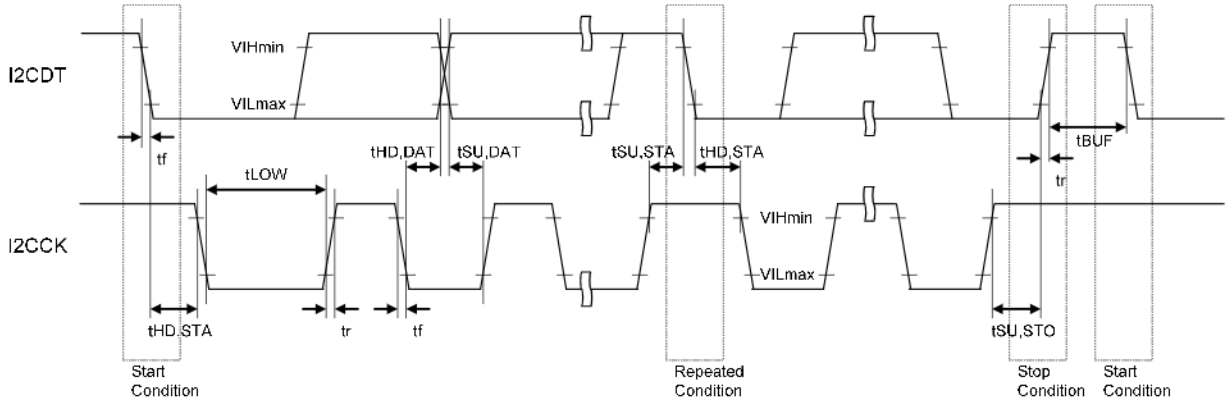


Figure 3 : I²C interface timing definition

Table 1 : Electric characteritics for I²C 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 I²C specification defines a condition that 300 ns of hold time is required internally, LC898214XD 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)
LC898214XD-MH	WLCSP8, 1.15x2.37, 0.5P (Pb-Free / Halogen Free)	5000 / Tape & Reel