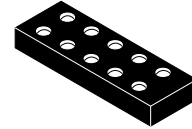


New Closed Loop Auto Focus (AF) Driver

LC898262XHTBG



WLCSP10 0.77x2.27x0.33
CASE 567YK

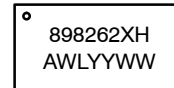
Overview

This LSI is New Closed Loop Auto Focus control LSI. It consists of sensorless damping control function, temperature compensation function, and bi-direction constant current driver.

Features

- Built-in Equalizer Circuit Using Digital Operation
 - ◆ Sensorless Damping Control Function
 - ◆ Any Coefficient can be Specified by 2-wire Serial I/F (TWIF)
- Temperature Compensation Function
- 2-wire Serial Interface (The Communication Protocol is Compatible with I²C.)
 - ◆ 8 Selectable Slave Addresses
 - 50h (W) / 51h (R)
 - 74h (W) / 75h (R)
 - E8h (W) / E9h (R)
 - E4h (W) / E5h (R) [Factory-configured]
 - Other 4 Addresses can be Selected
- Digital Gyro I/F (SPI Master / Slave)
- Built-in A/D Converter
- Built-in D/A Converter
- Built-in Amplifier
- Built-in EEPROM
 - ◆ 64 byte (16 byte/Page)
- Built-in OSC
- Built-in Bi-Direction Constant Current Driver
 - ◆ 130 mA
 - ◆ 150 mA (High Current Mode)
- Package
 - ◆ WL-CSP 10-pin (2 x 5 Pin), Thickness Max 0.35 mm, with Backside Coat
 - ◆ Pb-Free, Halogen Free/BFR Free and RoHS Compliant
- Supply Voltage
 - ◆ VDD (2.6 V to 3.3 V)
 - ◆ IOVDD (1.7 V to 3.3 V)

MARKING DIAGRAM



- | | |
|----|---------------------|
| A | = Assembly Location |
| WL | = Wafer Lot |
| YY | = Year |
| WW | = Work Week |

ORDERING INFORMATION

See detailed ordering and shipping information on page 10 of this data sheet.

LC898262XHTBG

PIN DESCRIPTION

Table 1. PIN DESCRIPTION

Symbol	Description
I	Input
O	Output
P	Power supply, GND
NC	Not connect
B	Bidirection

- 2-wire serial interface
 - SCL I 2-wire serial interface clock pin
 - SDA B 2-wire serial interface data pin
- Digital gyro interface
 - SSB B Digital Gyro Data I/F Chip Select
 - SCLK B Digital Gyro Data I/F Clock
 - SDIO B Digital Gyro Data I/F Data InOut
- Driver interface
 - OUT1 O Driver output (to Actuator)
 - OUT2 O Driver output (to Actuator)
- Power supply pin
 - VDD P Power Supply
 - VSS P GND
 - IOVDD P I/O Power of Digital Gyro Data I/F (1.7 V to 3.3 V)

**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 **onsemi** 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.

LC898262XHTBG

PIN LAYOUT

Circuit Name	Number of PINs
Driver	2
Power	3
I/O (VDD)	2
I/O (IOVDD)	3

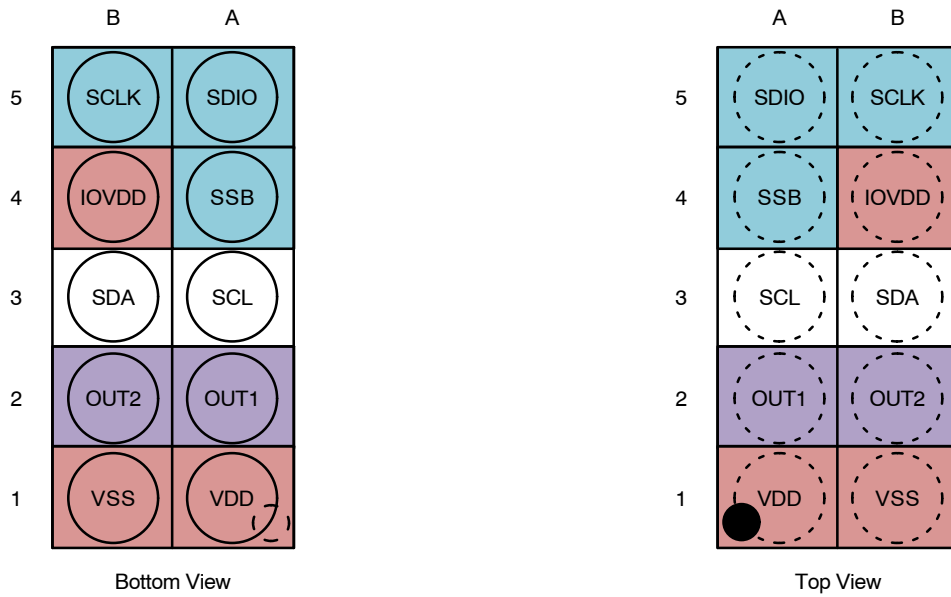
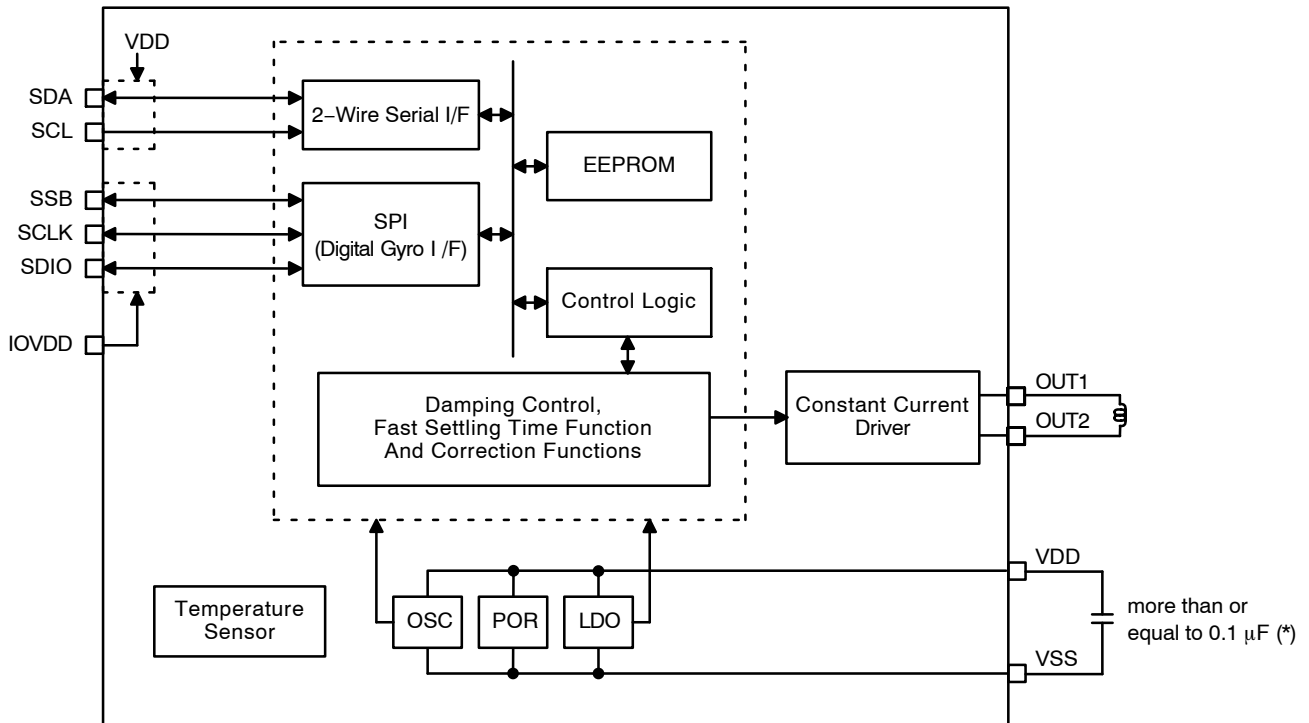


Figure 1. Pin Layout

LC898262XHTBG

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

LC898262XHTBG

ELECTRICAL CHARACTERISTICS

Table 2. ABSOLUTE MAXIMUM RATINGS (VSS = 0 V)

Symbol	Parameter	Condition	Rating	Unit
V _{DD} max	Supply Voltage (VDD)	T _a ≤ 25°C	-0.3 to 4.6	V
V _{I1} max, V _{O1} max	Input/Output Voltage (SCL,SDA)	T _a ≤ 25°C	-0.3 to V _{DD} + 0.3	V
V _{IO} max	Supply Voltage (IOVDD)	T _a ≤ 25°C	-0.3 to 4.6	V
V _{I2} max, V _{O2} max	Input/Output Voltage (SSB,SCLK,SDIO)	T _a ≤ 25°C	-0.3 to V _{IO} + 0.3	V
T _{stg}	Storage Ambient Temperature		-55 to +125	°C
T _{opr}	Operating Ambient Temperature		-30 to +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 3. RECOMMENDED OPERATING CONDITIONS (T_A = -30 to +70°C, VSS = 0 V)

Symbol	Parameter	Min	Max	Max	Unit
V _{DD}	Supply Voltage (VDD)	2.6	2.8	3.3	V
V _{I1}	Input Voltage Range (SCL,SDA)	0	-	V _{DD}	V
V _{IO}	Supply Voltage (IOVDD)	1.7	1.8	3.3	V
V _{I2}	Input Voltage Range (SSB,SCLK,SDIO)	0	-	V _{IO}	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 4. DC CHARACTERISTICS (VSS = 0 V, VDD = 2.6 V to 3.3 V, T_A = -30 to +70°C)

Symbol	Parameter	Condition	Min	Max	Max	Unit	Applicable Pins
V _{IH1}	High-level Input Voltage	CMOS schmitt	1.4	-	-	V	SCL, SDA
V _{IL1}	Low-level Input Voltage		-	-	0.4	V	
V _{OL1}	Low-level Output Voltage	IOL= 3 mA	-	-	0.2	V	SDA
V _{IH2}	High-level Input Voltage	CMOS schmitt	0.7 x V _{IO}	-	-	V	SSB, SCLK, SDIO
V _{IL2}	Low-level Input Voltage		-	-	0.3 x V _{IO}	V	
V _{OH2}	High-level Output Voltage	IOH= -3 mA	V _{IO} - 0.2	-	-	V	
V _{OL2}	Low-level Output Voltage	IOL= 3 mA	-	-	0.2	V	
R _{UP}	Pull Up Resistor	V _{IO} = 1.8 V	50	-	250	kΩ	
R _{DN}	Pull Down Resistor	V _{IO} = 1.8 V	50	-	250	kΩ	

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 5. DRIVER OUTPUT (OUT1, OUT2) (VSS = 0 V, VDD = 2.8 V, T_A = 25°C)

Symbol	Parameter	Condition	Min	Max	Max	Unit	Applicable Pins
I _{full}	Maximum Current		123.5	130	136.5	mA	OUT1, OUT2
I _{fullHC}	Maximum Current (High Current Mode)		138	150	162	mA	OUT1, OUT2

Table 6. NON-VOLATILE MEMORY CHARACTERISTICS

Symbol	Parameter	Condition	Min	Max	Max	Unit	Applicable Circuits
EN	Endurance	(Note 1)	-	-	1000	Cycles	EEPROM
RT	Data Retention		10	-	-	Years	
t _{WT}	Write Time		-	-	20	ms	

1. The number of write access executable times per page

LC898262XHTBG

AC CHARACTERISTICS

VDD Supply Timing

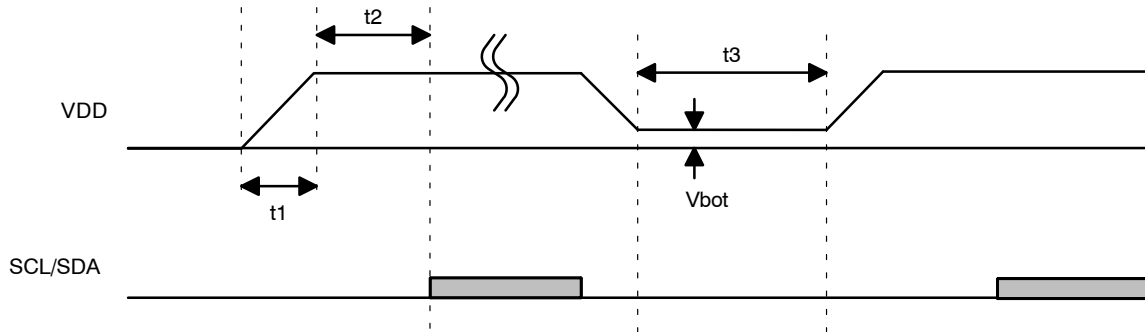


Figure 3. VDD Supply Timing

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

Table 7. 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

Injection order between IOVDD and VDD is below.

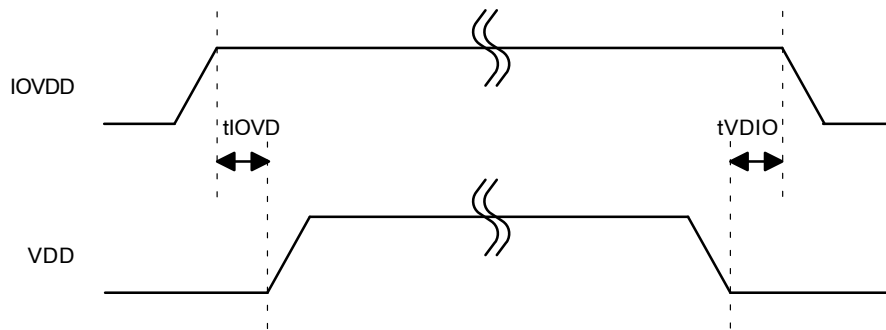


Figure 4. IOVDD Supply Timing

Table 8. IOVDD SUPPLY TIMING

Symbol	Item	Min	Typ	Max	Unit
t _{IOVD}	IOVDD ON to VDD ON	0	-	-	ms
t _{VDIO}	VDD OFF to IOVDD OFF	0	-	-	ms

At the time of power off, SCL, SDA, SCLK and SDIO tolerate 3.3 V input, and SSB pin needs to be low level.

LC898262XHTBG

AC Specification of TWIF

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

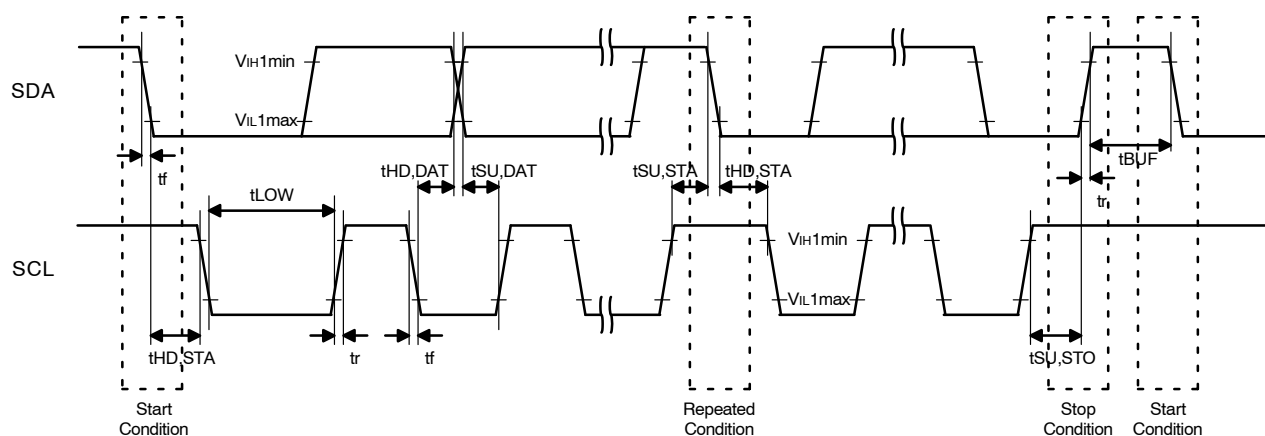


Figure 5. 2-wire Serial Interface Timing Definition

Table 9. 2-WIRE SERIAL INTERFACE AC CHARACTERISTICS

Symbol	Item	Pin Name	Fast-mode			Fast-mode Plus			Unit
			Min	Typ	Max	Min	Typ	Max	
F_SCL	SCL Clock Frequency	SCL	-	-	400	-	-	1000	kHz
t _{HD,STA}	START Condition Hold Time	SCL SDA	0.6	-	-	0.26	-	-	μs
t _{LOW}	SCL Clock Low Period	SCL	1.3	-	-	0.5	-	-	μs
t _{HIGH}	SCL Clock High Period	SCL	0.6	-	-	0.26	-	-	μs
t _{SU,STA}	Setup Time for Repetition START Condition	SCL SDA	0.6	-	-	0.26	-	-	μs
t _{HD,DAT}	Data Hold Time	SCL SDA	0 (Note 2)	-	0.9	0 (Note 2)	-	-	μs
t _{SU,DAT}	Data Setup Time	SCL SDA	100	-	-	50	-	-	ns
t _r	SDA, SCL Rising Time	SCL SDA	-	-	300	-	-	120	ns
t _f	SDA, SCL Falling Time	SCL SDA	-	-	300	-	-	120	ns
t _{SU,STO}	STOP Condition Setup Time	SCL SDA	0.6	-	-	0.26	-	-	μs
t _{BUF}	Bus Free Time between STOP and START	SCL SDA	1.3	-	-	0.5	-	-	μs

2. 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.

LC898262XHTBG

AC Specification of Digital Gyro I/F (Master)

Figure 6 shows interface timing definition and Table 10 shows electric characteristics.

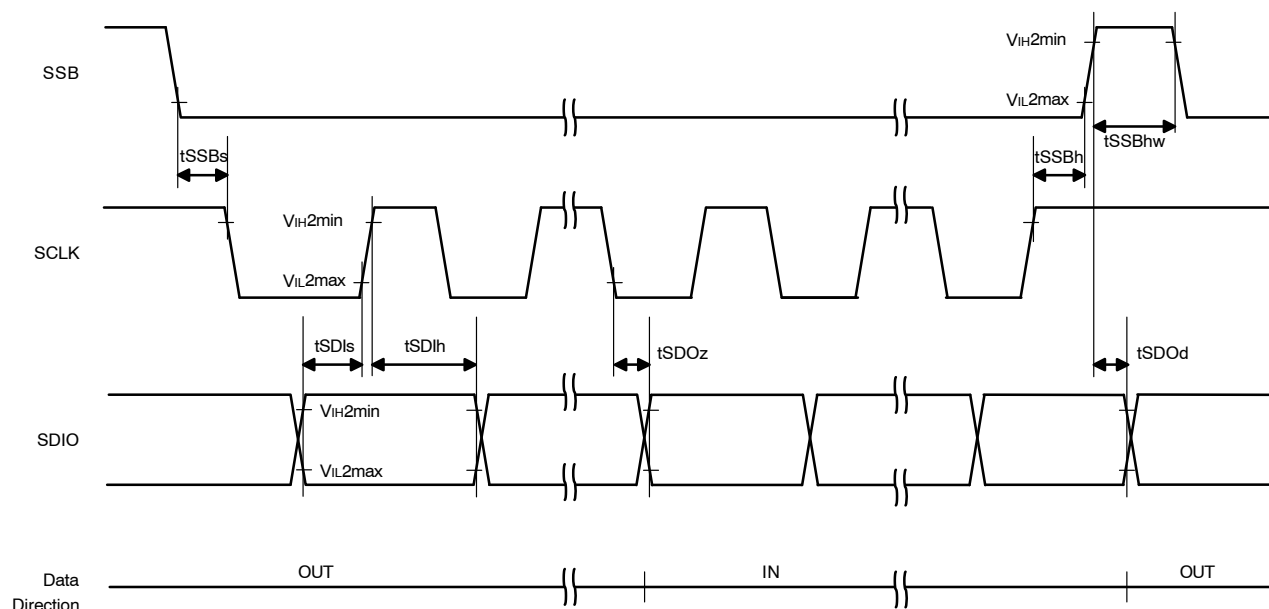


Figure 6. Digital Gyro interface (Master) Timing Definition

Table 10. DIGITAL GYRO INTERFACE(MASTER) AC CHARACTERISTICS

Symbol	Item	Pin Name	Min	Typ	Max	Unit
FCLK	SCLK Clock Frequency	SCLK	3.8	4	4.2	MHz
fCLKdu	SCLK Duty	SCLK	40	-	60	%
tSSBhw	SSB High Period	SSB	1.35	-	-	μ s
tSSBs	Setup Time for SCLK (F) of SSB	SSB SCLK	50	-	-	ns
tSSBh	Hold Time for SCLK (R) of SSB	SCLK SSB	160	-	-	ns
tSDIs	Setup Time for SCLK (R) of SDIO	SCLK SDIO	50	-	-	ns
tSDIh	Hold Time for SCLK (R) of SDIO	SCLK SDIO	50	-	-	ns
tSDOz	Delay Time from SCLK (F) to SDIO Invalid	SCLK SDIO	-	-	20	ns
tSDOd	Delay Time from SSB (R) to SDIO Update	SSB SDIO	-	-	20	ns
Cld	Load Capacitance	all	-	-	10	pF

LC898262XHTBG

AC Specification of Digital Gyro I/F (Slave)

Figure 7 shows interface timing definition and Table 11 shows electric characteristics.

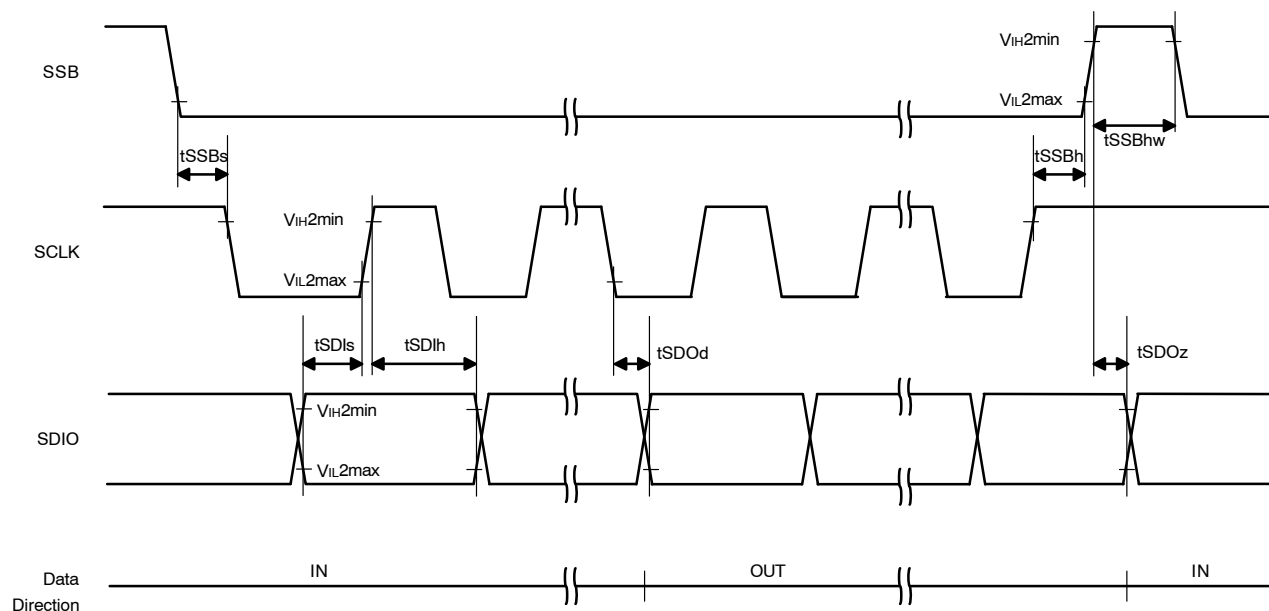


Figure 7. Digital Gyro Interface (Slave) Timing Definition

Table 11. DIGITAL GYRO INTERFACE(SLAVE) AC CHARACTERISTICS

Symbol	Item	Pin Name	Min	Typ	Max	Unit
fSCLK	SCLK Clock Frequency	SCLK	–	–	10	MHz
fSCLKdu	SCLK Duty	SCLK	30	–	70	%
tSSBhw	SSB High Period	SSB	100	–	–	ns
tSSBs	Setup Time for SCLK (F) of SSB	SSB SCLK	10	–	–	ns
tSSBh	Hold Time for SCLK (R) of SSB	SCLK SSB	10	–	–	ns
tSDIs	Setup Time for SCLK (R) of SDIO	SCLK SDIO	10	–	–	ns
tSDIh	Hold Time for SCLK (R) of SDIO	SCLK SDIO	10	–	–	ns
tSDOd	Delay Time from SCLK (F) to SDIO Update	SCLK SDIO	–	–	20	ns
tSDOz	Delay Time from SSB (R) to SDIO Invalid	SSB SDIO	–	–	20	ns
Cld	Load Capacitance	all	–	–	10	pF

LC898262XHTBG

ORDERING INFORMATION

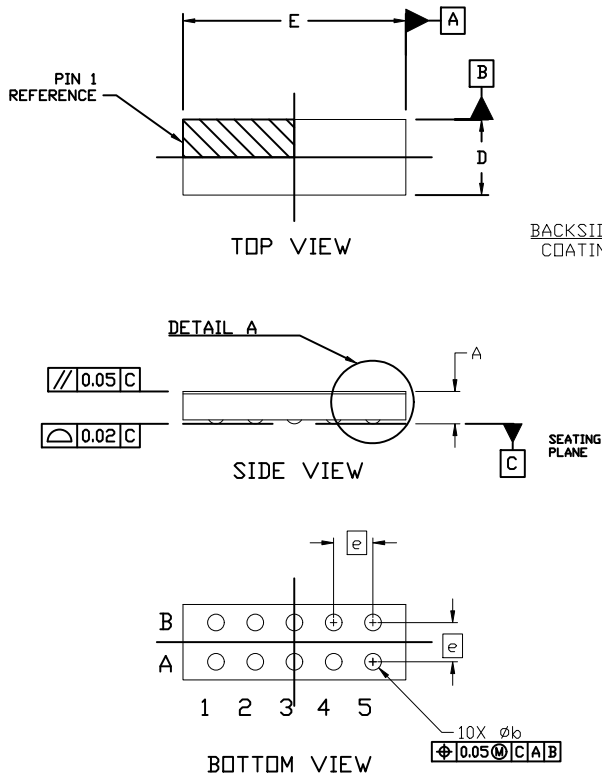
Device	Package Type	Shipping [†]
LC898262XHTBG	WLCSP10 0.77x2.27x0.33 (Pb-Free)	4000 / Tape & Reel

[†]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.



WLCSP10 0.77x2.27x0.33
CASE 567YK
ISSUE A

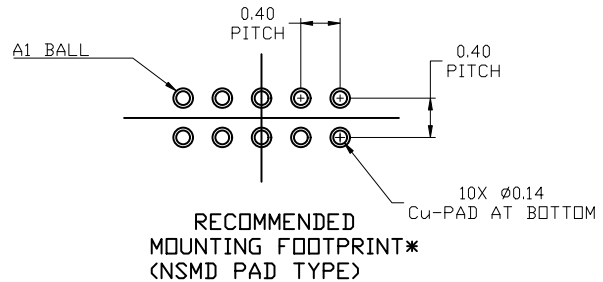
DATE 14 SEP 2020



NOTES:

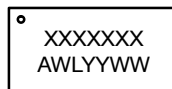
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DATUM C, THE SEATING PLANE, IS DEFINED BY THE SPHERICAL CROWNS OF THE CONTACT BALLS.
4. COPLANARITY APPLIES TO THE SPHERICAL CROWNS OF THE CONTACT BALLS.
5. DIMENSION b IS MEASURED AT THE MAXIMUM CONTACT BALL DIAMETER PARALLEL TO DATUM C.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.31	0.33	0.35
A1	0.034	0.040	0.046
A2	0.2525	0.265	0.2775
A3	0.025 REF		
b	0.15	0.17	0.19
D	0.720	0.770	0.820
E	2.220	2.270	2.320
e	0.40 BSC		



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

GENERIC MARKING DIAGRAM*



XXXX = Specific Device Code
 A = Assembly Location
 WL = Wafer Lot
 YY = 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.

DOCUMENT NUMBER:	98AON12407H	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	WLCSP10 0.77x2.27x0.33	PAGE 1 OF 1

ON Semiconductor and ON are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Email Requests to: orderlit@onsemi.com

onsemi Website: www.onsemi.com

TECHNICAL SUPPORT

North American Technical Support:
Voice Mail: 1 800-282-9855 Toll Free USA/Canada
Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative