



LP5910 Ultra Low-Noise, 300-mA Linear Regulator for RF and Analog Circuits - Requires No Bypass Capacitor

1 Features

- Input Voltage Range: 1.3 V to 3.3 V
- Output Voltage Range: 0.8 V to 2.3 V
- Output Current: 300 mA
- PSRR: 75 dB at 1 kHz
- Output Voltage Tolerance: $\pm 2\%$
- Low Dropout : 120 mV (typical)
- Very Low I_Q (Enabled, No Load): 12 μA
- Very Low Noise Without a Noise Bypass Capacitor
- Stable with Ceramic Input and Output Capacitors
- Thermal Overload Protection
- Short-Circuit Protection
- Reverse Output Current Protection

2 Applications

- Cellular Phones
- PDA Handsets
- Wireless LAN Devices
- Post BUCK/DC-DC Regulation for RF, VCO, and PLL Device Bias

3 Description

The LP5910 is a linear regulator capable of supplying up to 300 mA of output current. Designed to meet the requirements of RF/Analog circuits, this device provides low noise, high PSRR, low quiescent current, and low line/load transient response figures. Using new innovative design techniques the LP5910 offers class-leading noise performance without a noise bypass capacitor and with the option for remote output capacitor placement. The device contains a reverse current protection circuit that prevents a backward current flow through the LDO.

With its low input and low output voltage range the LP5910 suits well as a post DC-DC regulator (post BUCK regulator) or for single- or dual-cell applications.

The device is designed to work with a 1- μF input and a 1- μF output ceramic capacitor. A separate noise bypass capacitor is not required. For specific voltage option needs, contact Texas Instruments Sales.

Device Information ⁽¹⁾

PART NUMBER	PACKAGE	BODY SIZE (NOM)
LP5910	WSO8 (6)	2.00 mm $\times$ 2.00 mm
	DSBGA (4)	0.70 mm $\times$ 0.70 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

Simplified Schematic

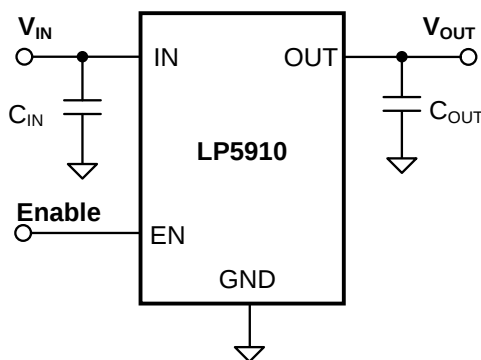


Table of Contents

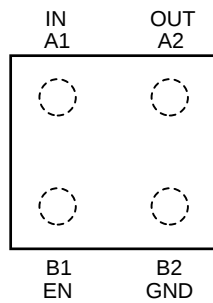
1 Features	1	6.1 Documentation Support	4
2 Applications	1	6.2 Community Resources.....	4
3 Description	1	6.3 Trademarks	4
4 Revision History	2	6.4 Electrostatic Discharge Caution	4
5 Pin Configuration and Functions	3	6.5 Glossary	4
6 Device and Documentation Support	4	7 Mechanical, Packaging, and Orderable Information	4

4 Revision History

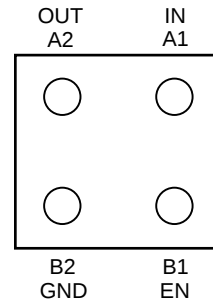
DATE	REVISION	NOTES
September 2015	*	Initial release.

5 Pin Configuration and Functions

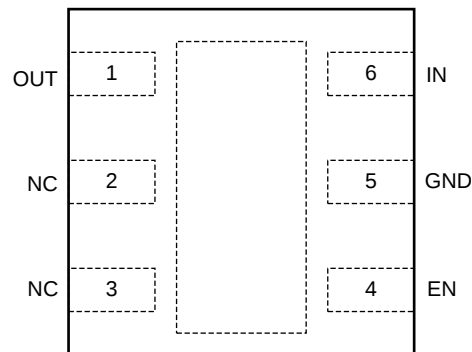
**YKA Package
4-Pin Ultra-Thin DSBGA
Top View**



**YKA Package
4-Pin Ultra-Thin DSBGA
Bottom View**



**DRV Package
6-Pin WSON
Top View**



Pin Functions

NAME	PIN		I/O	DESCRIPTION
	DSBGA	WSON		
IN	A1	6	I	Voltage supply input. A 1- μ F capacitor should be connected at this input.
OUT	A2	1	O	Voltage output. A 1- μ F low-ESR capacitor should be connected from this pin to the GND pin. Connect this output to the load circuit.
EN	B1	4	I	Enable input; disables the regulator when logic low. Enables the regulator when logic high. An internal 1-M Ω pull down resistor connects this input to ground.
GND	B2	5	—	Common ground
NC	—	2, 3	—	No internal connection. Connect to ground or leave open.
Exposed Pad	—	Thermal Pad	—	The exposed thermal pad on the bottom of the package should be connected to a copper area under the package on the PCB. Connect to ground potential or leave floating. Do not connect to any potential other than the same ground potential seen at device pin 5 (GND).

PRODUCT PREVIEW

6 Device and Documentation Support

6.1 Documentation Support

6.1.1 Related Documentation

For related documentation, see the following:

TI Application Report *Semiconductor and IC Package Thermal Metrics* ([SPRA953](#)).

TI Application Report *Using New Thermal Metrics* ([SBVA025](#)).

TI Application Report *Thermal Characteristics of Linear and Logic Packages Using JEDEC PCB Designs* ([SZZA017](#)).

Texas Instruments Application Note *DSBGA Wafer Level Chip Scale Package* ([SNVA009](#)).

6.2 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

TI E2E™ Online Community *TI's Engineer-to-Engineer (E2E) Community*. Created to foster collaboration among engineers. At [e2e.ti.com](#), you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

Design Support *TI's Design Support* Quickly find helpful E2E forums along with design support tools and contact information for technical support.

6.3 Trademarks

E2E is a trademark of Texas Instruments.

All other trademarks are the property of their respective owners.

6.4 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

6.5 Glossary

[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

7 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
LP5910-1.0DRV	PREVIEW	SON	DRV	6	3000	TBD	Call TI	Call TI	-40 to 125		
LP5910-1.0YKAR	PREVIEW	DSBGA	YKA	4	3000	TBD	Call TI	Call TI	-40 to 125		
LP5910-1.2YKAR	PREVIEW	DSBGA	YKA	4	3000	TBD	Call TI	Call TI	-40 to 125		
LP5910-1.8DRV	PREVIEW	SON	DRV	6	3000	TBD	Call TI	Call TI	-40 to 125		
LP5910-1.8YKAR	PREVIEW	DSBGA	YKA	4	3000	TBD	Call TI	Call TI	-40 to 125		

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBsolete: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

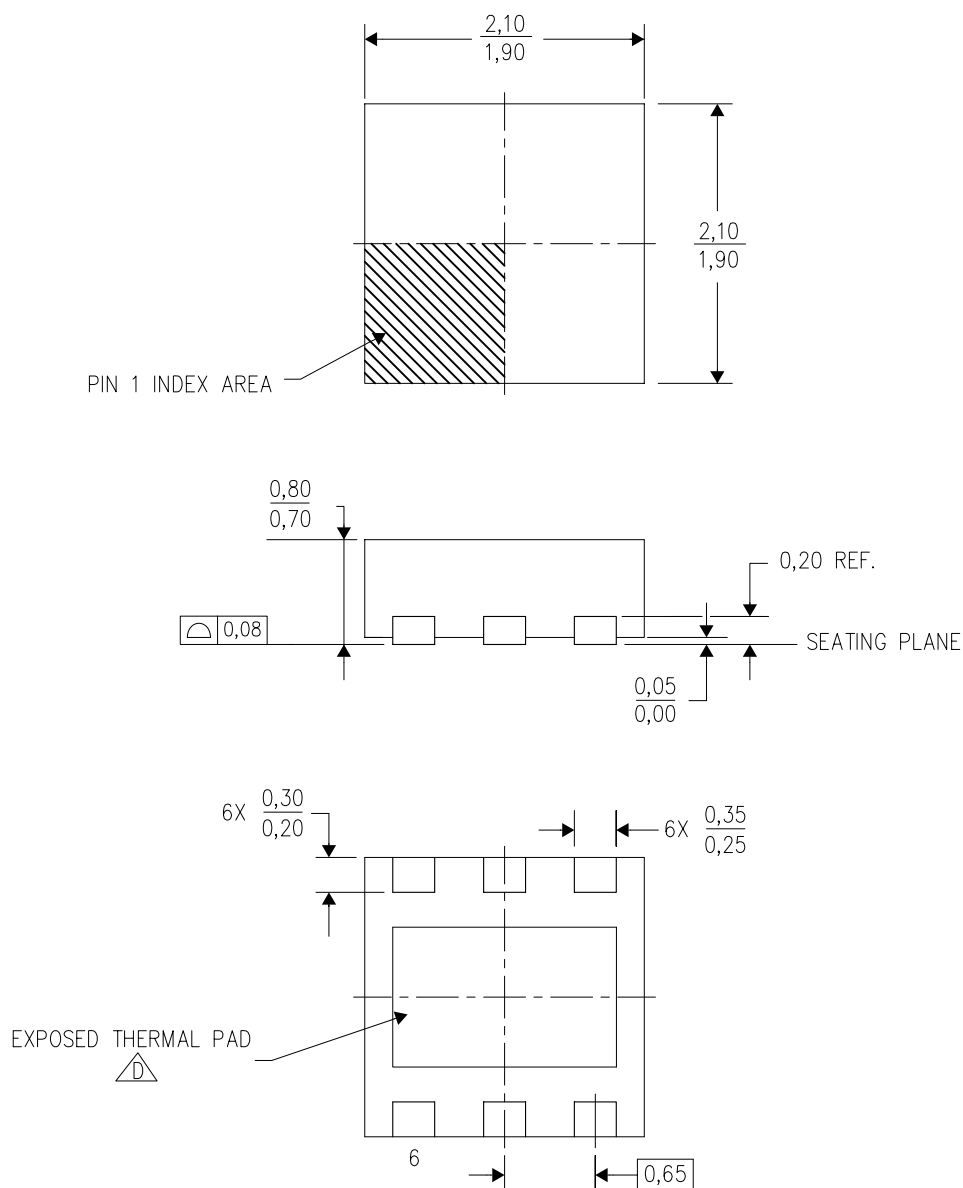
Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and

continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

DRV (S-PWSON-N6)

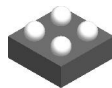
PLASTIC SMALL OUTLINE NO-LEAD



4206925/E 10/10

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
 - B. This drawing is subject to change without notice.
 - C. Small Outline No-Lead (SON) package configuration.
 -  D. The package thermal pad must be soldered to the board for thermal and mechanical performance. See the Product Data Sheet for details regarding the exposed thermal pad dimensions.

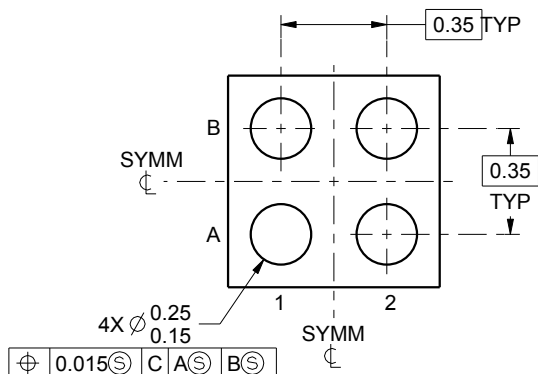
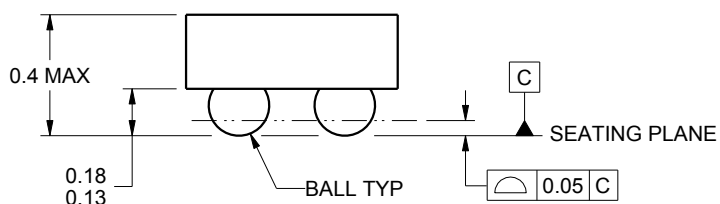
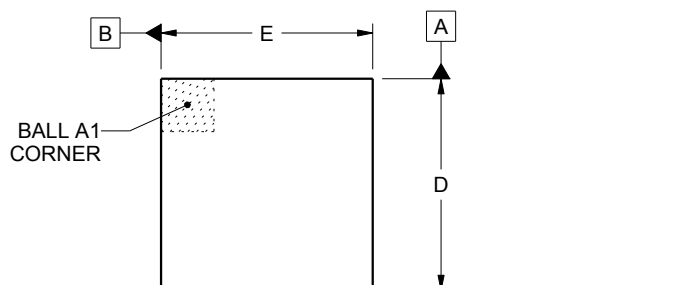
YKA0004



PACKAGE OUTLINE

DSBGA - 0.4 mm max height

DIE SIZE BALL GRID ARRAY



4221909/A 02/2015

NOTES:

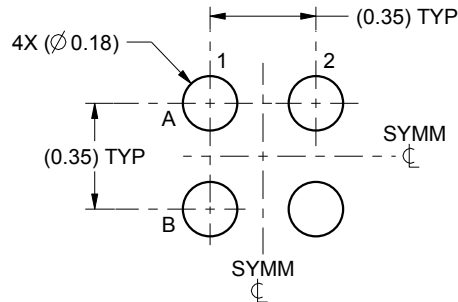
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

EXAMPLE BOARD LAYOUT

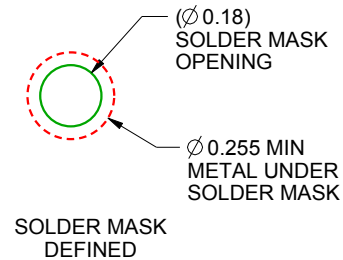
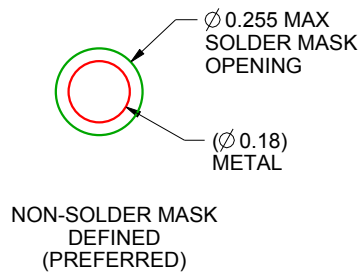
YKA0004

DSBGA - 0.4 mm max height

DIE SIZE BALL GRID ARRAY



LAND PATTERN EXAMPLE
SCALE:40X



SOLDER MASK DETAILS
NOT TO SCALE

4221909/A 02/2015

NOTES: (continued)

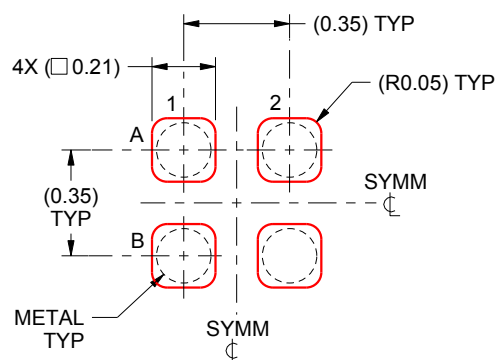
3. Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints.
For more information, see Texas Instruments literature number SNVA009 (www.ti.com/lit/snva009).

EXAMPLE STENCIL DESIGN

YKA0004

DSBGA - 0.4 mm max height

DIE SIZE BALL GRID ARRAY



SOLDER PASTE EXAMPLE
BASED ON 0.1 mm THICK STENCIL
SCALE:40X

4221909/A 02/2015

NOTES: (continued)

4. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Applications Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Automotive and Transportation	www.ti.com/automotive
Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Video and Imaging	www.ti.com/video

TI E2E Community

e2e.ti.com