SINGLE-SUPPLY, AUTO-ZERO SENSOR AMPLIFIER WITH PROGRAMMABLE GAIN AND OFFSET

Check for Samples: PGA308-DIE

FEATURES

- **Digital Calibration for Bridge Sensors**
- **Offset Select: Coarse and Fine**
- **Gain Select: Coarse and Fine**
- **Bridge Fault Monitor**
- **Input Mux for Lead Swap**
- **Over/Under Scale Limits**
- **D_{OUT}/ V_{OUT} Clamp Function**
- **Seven Banks OTP Memory**
- **One-Wire Digital UART Interface**
- **Operating Voltage: 2.7 V to 5.5 V**

APPLICATIONS

- **Bridge Sensors**
- **Remote Transmitters**
- **Strain, Load, Weigh Scales**
- **Automotive Sensors**

DESCRIPTION

The PGA308 is a programmable analog sensor signal conditioner. The analog signal path amplifies the sensor signal and provides digital calibration for offset and gain. Calibration is done via the 1W pin, a digital One-Wire, UART-compatible interface. For three-terminal sensor modules, 1W may be connected to V_{OUT} and the assembly programmed through the V_{OUT} pin. Gain and offset calibration parameters are stored onboard in seven banks of one-time programmable (OTP) memory. The power-on reset (POR) OTP bank may be programmed a total of four times.

The all-analog signal path contains a 2×2 input multiplexer (mux) to allow electronic sensor lead swapping, a coarse offset adjust, an auto-zero programmable gain instrumentation amplifier (PGA), a fine gain adjust, a fine offset adjust, and a programmable gain output amplifier. Fault monitor circuitry detects and signals sensor burnout, overload, and system fault conditions. Over/under-scale limits provide additional means for system level diagnostics. The dual-use D_{OUT}/V_{CLAMP} pin can be used as a programmable digital output or as a V_{OUT} over-voltage clamp.

ORDERING INFORMATION(1)

PRODUCT	PACKAGE DESIGNATOR	PACKAGE	ORDERABLE PART NUMBER	PACKAGE QUANTITY
PGA308	TD	Bare die in waffle pack(2)	PGA308TDD1	100
			PGA308TDD2	10

(1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at www.ti.com.

(2) Processing is per the Texas Instruments commercial production baseline and is in compliance with the Texas Instruments Quality Control System in effect at the time of manufacture. Electrical screening consists of DC parametric and functional testing at room temperature only. Unless otherwise specified by Texas Instruments AC performance and performance over temperature is not warranted. Visual Inspection is performed in accordance with MIL-STD-883 Test Method 2010 Condition B at 75X minimum.

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.

BARE DIE INFORMATION

DIE THICKNESS	BACKSIDE FINISH	BACKSIDE POTENTIAL	BOND PAD METALLIZATION COMPOSITION	BOND PAD THICKNESS
15 mils.	Silicon with backgrind	Floating	Al-Cu (0.5%)	598 nm

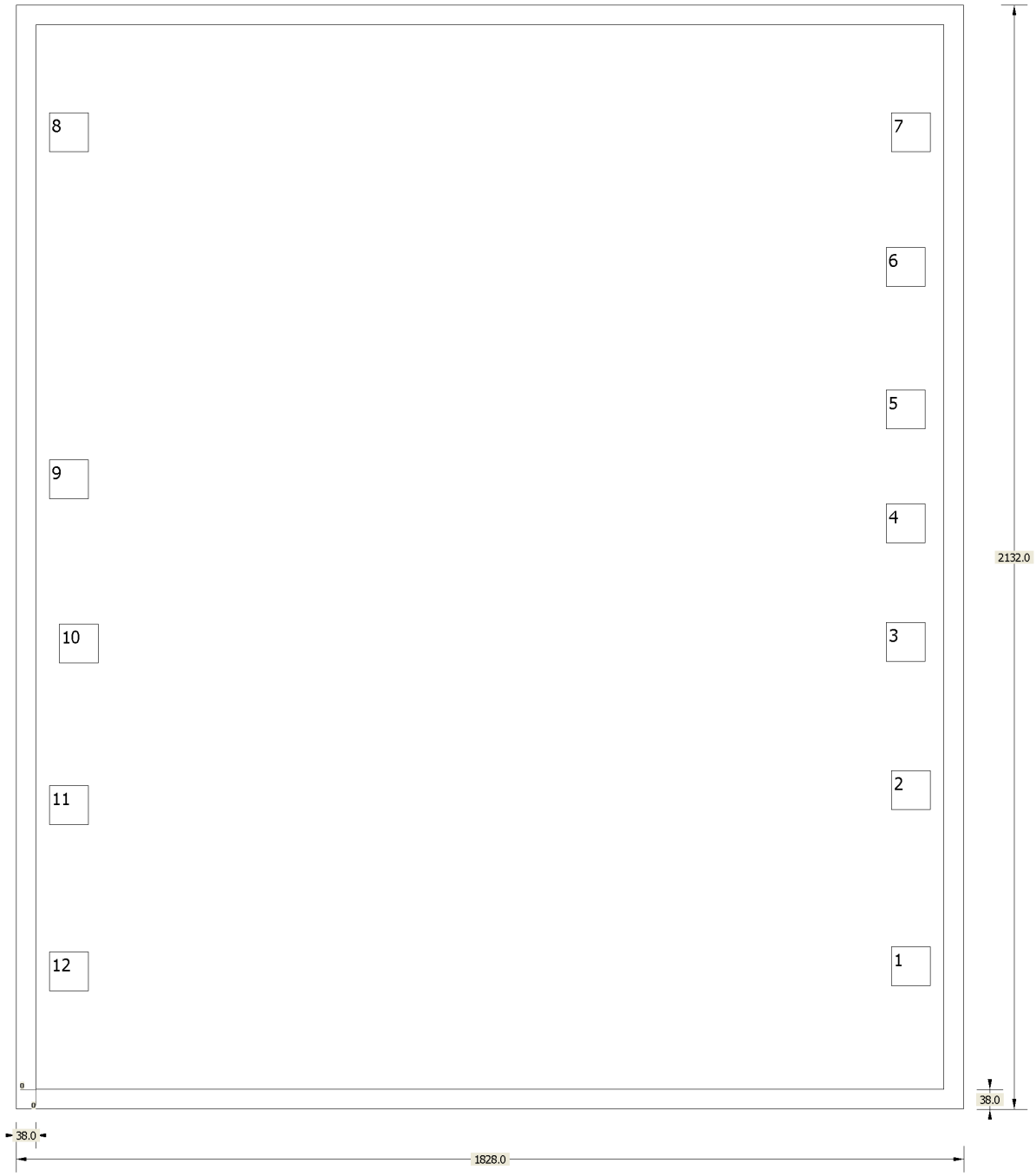

Table 1. Bond Pad Coordinates in Microns(1)

DESCRIPTION	PAD NUMBER	X MIN	Y MIN	X MAX	Y MAX
D_{out}/V_{clamp}	1	1649.8	200.1	1725.8	276.1
1W	2	1649.8	540	1725.8	616
GND	3	1639.7	826	1715.7	902
GND	4	1639.7	1055	1715.7	1131
V_S	5	1639.7	1275	1715.7	1351
V_S	6	1639.7	1550	1715.7	1626
V_{in1}	7	1649.8	1810.1	1725.8	1886.1
V_{in2}	8	26.2	1810.1	102.2	1886.1
V_{sj}	9	26.2	1140	102.2	1216
V_{fb}	10	44.55	823	120.55	899
V_{out}	11	26.2	510.85	102.2	586.85
V_{ref}	12	26.2	189.9	102.2	265.9

(1) Substrate N/C.

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package | Pins	Package qty | Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
PGA308TDD1	Active	Production	null (null) | 0	100 | OTHER	Yes	Call TI	N/A for Pkg Type	0 to 70	
PGA308TDD1.A	Active	Production	null (null) | 0	100 | OTHER	Yes	Call TI	N/A for Pkg Type	0 to 70	
PGA308TDD2	Active	Production	null (null) | 0	10 | OTHER	Yes	Call TI	N/A for Pkg Type	0 to 70	
PGA308TDD2.A	Active	Production	null (null) | 0	10 | OTHER	Yes	Call TI	N/A for Pkg Type	0 to 70	

(1) **Status:** For more details on status, see our product life cycle.

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

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

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

OTHER QUALIFIED VERSIONS OF PGA308-DIE :

- Automotive : PGA308-Q1

NOTE: Qualified Version Definitions:

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you fully indemnify TI and its representatives against any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI’s products are provided subject to TI’s Terms of Sale, TI’s General Quality Guidelines, or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI’s provision of these resources does not expand or otherwise alter TI’s applicable warranties or warranty disclaimers for TI products. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

TI objects to and rejects any additional or different terms you may propose.

Last updated 10/2025