

## Single-Wire 16-Bit DAC

Check for Samples: [DAC161P997-DIE](#)

### FEATURES

- 16-Bit Linearity
- Single-Wire Interface (SWIF) With Handshake
- Digital Data Transmission (No Loss of Fidelity)
- Pin Programmable Power-Up Condition
- Self Adjusting to Input Data Rate
- Loop Error Detection and Reporting
- Programmable Output Current Error Level
- No External Precision Components
- Simple Interface to HART Modulator

### APPLICATIONS

- Current Loop Transmitter
- Industrial Process Control
- Actuator Control
- Factory Automation
- Building Automation
- Precision Instruments
- Data Acquisition Systems
- Test Systems

### DESCRIPTION

The DAC161P997-DIE is a 16-bit  $\Sigma\Delta$  digital-to-analog converter (DAC) for transmitting an analog output current.

The data link to the DAC161P997-DIE is a single wire interface (SWIF) which allows sensor data to be transferred in digital format over an isolation boundary using a single isolation component. The DAC161P997-DIE's digital input is compatible with standard isolation transformers and optocouplers. Error detection and handshaking features within the SWIF protocol ensure error free communication across the isolation boundary. For applications where isolation is not required, the DAC161P997-DIE interfaces directly to a microcontroller.

The loop drive of the DAC161P997-DIE interfaces to a highway addressable remote transducer (HART) modulator, allowing injection of FSK modulated digital data into the current loop. This combination of specifications and features makes the DAC161P997-DIE ideal for 2- and 4-wire industrial transmitters.

### ORDERING INFORMATION<sup>(1)</sup>

PRODUCT	PACKAGE DESIGNATOR	PACKAGE	ORDERABLE PART NUMBER	PACKAGE QUANTITY
DAC161P997	TD	Bare die in waffle pack <sup>(2)</sup>	DAC161P997TDA1	324
			DAC161P997TDA2	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](http://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.



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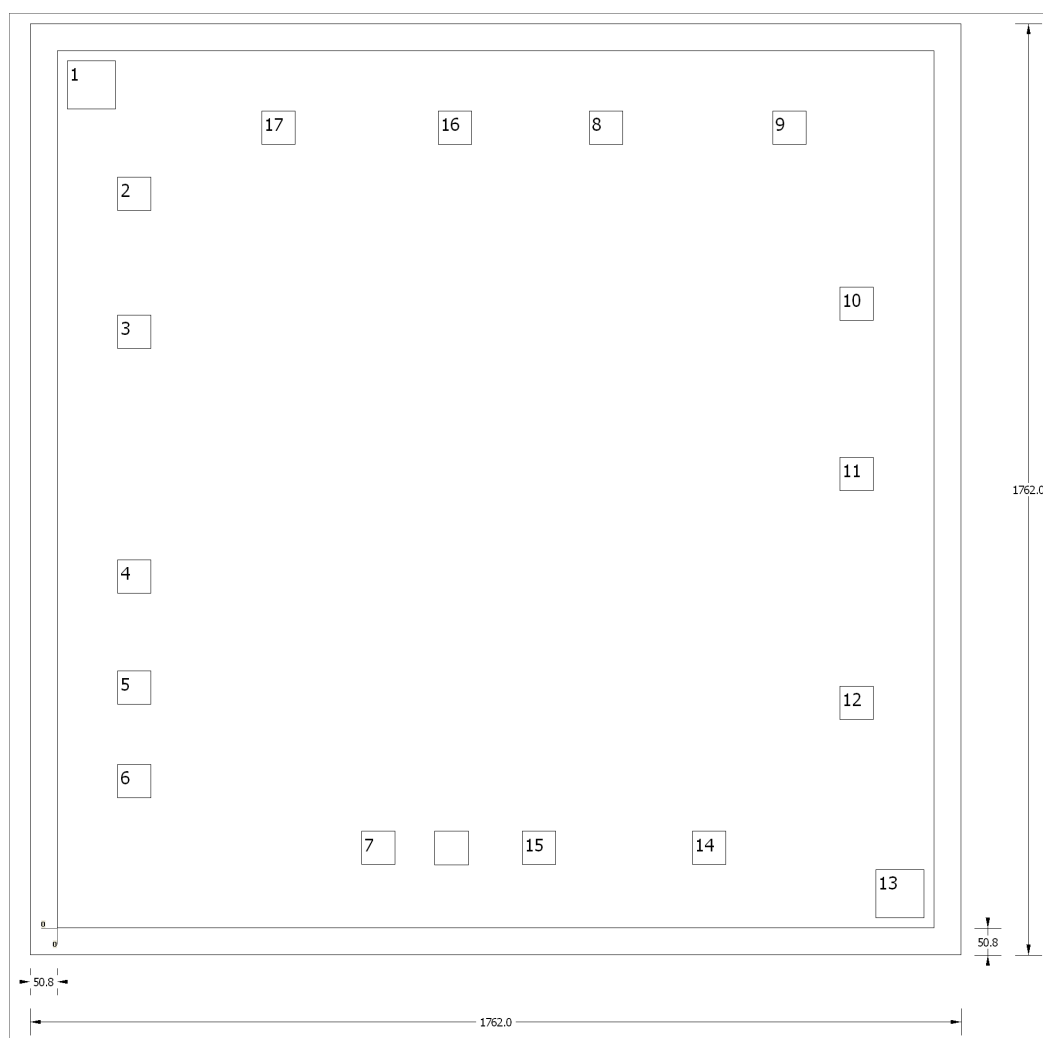


This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

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
10.5 mils.	Silicon with backgrind	Floating	AlCu (0.5%)	850 nm



**Table 1. Bond Pad Coordinates in Microns**

DESCRIPTION	PAD NUMBER	X MIN	Y MIN	X MAX	Y MAX
COMA	1	-811	719	-719	811
COMA	2	-715.5	527	-651.5	591
COMD	3	-715.5	266.25	-651.5	330.25
VD	4	-715.5	-196.95	-651.5	-132.95
DIN	5	-715.5	-406.95	-651.5	-342.95
DBACK	6	-715.5	-583.55	-651.5	-519.55
ACKB	7	-254.2	-710.5	-190.2	-646.5
C1	8	177.15	651.6	241.15	715.6
C2	9	524	651.6	588	715.6
C3	10	650.95	319	714.95	383
NC	11	650.95	-3.15	714.95	60.85
LOW	12	650.95	-436.2	714.95	-372.2
OUT	13	719	-811	811	-719
ERRLVL	14	371.9	-710.5	435.9	-646.5
ERRB	15	49.6	-710.5	113.6	-646.5
VA	16	-108.65	651.6	-44.65	715.6
BASE	17	-443.1	651.6	-379.1	715.6

## PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
DAC161P997TDA1	LIFEBUY			0	324	RoHS & Green	Call TI	N / A for Pkg Type	25 to 25		
DAC161P997TDA2	LIFEBUY			0	10	RoHS & Green	Call TI	N / A for Pkg Type	25 to 25		

(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) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(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 finish/Ball material - Orderable Devices 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.

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