

# Single-Channel, 12- and 16-Bit Programmable Current Output Digital-to-Analog Converters for 4-mA to 20-mA Current Loop Applications

 Check for Samples: [DAC7750](#), [DAC8750](#)

## FEATURES

- Output Current: 0 mA to 24 mA;  
4 mA to 20 mA; 0 mA to 20 mA
- Max Loop Compliance Voltage:  $AV_{DD} - 2.5\text{ V}$
- INL: DAC7750:  $\pm 1\text{ LSB}$ ; DAC8750:  $\pm 6\text{ LSB Max}$
- DNL:  $\pm 1\text{ LSB Max}$
- User-Calibration for Offset and Gain
- $\pm 0.1\%$  FSR Total Unadjusted Error (TUE) Max
- Internal Reference (10 ppm/°C, max)
- Internal 4.5-V Power-Supply Generator
- HART®-Compatible Input
- Parity Error Check
- Watchdog Timer
- Thermal Shutdown
- On-Chip Fault Alarm
- Wide Temperature Range:  $-40^\circ\text{C}$  to  $+125^\circ\text{C}$
- 6-mm x 6-mm QFN-40 and TSSOP-24 Packages

## APPLICATIONS

- 4-mA to 20-mA Current Loops
- Industrial Automation
- Programmable Logic Controllers (PLCs)
- Sensors and Transducers

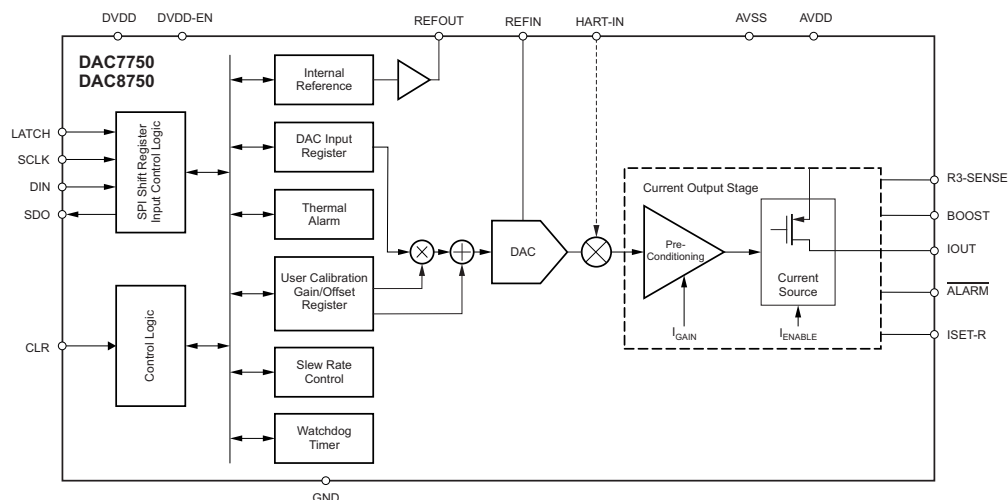
## DESCRIPTION

The [DAC7750](#) and [DAC8750](#) are low-cost, precision, fully-integrated 12-bit and 16-bit digital-to-analog converters (DACs) designed to meet the requirements of industrial process-control applications. These devices can be programmed as a current output with a range of 4 mA to 20 mA, 0 mA to 20 mA, or 0 mA to 24 mA.

These devices include a power-on-reset function to ensure that the device powers up in a known state ( $I_{OUT}$  is disabled and in a Hi-Z state). The CLR pin sets the current output to the low end of the range if output is enabled. The offset and gain registers can be programmed to calibrate the device in the end system. The output slew rate is also programmable by register. These devices can superimpose an external HART signal on the current output, and can operate with either a single +10-V to +36-V supply, or dual supplies up to  $\pm 18\text{ V}$ . All versions are available in both 6-mm x 6-mm QFN-40 and TSSOP-24 packages.

## RELATED DEVICES

RESOLUTION (BITS)	CURRENT OUTPUT	CURRENT AND VOLTAGE OUTPUT
12	<a href="#">DAC7750</a>	<a href="#">DAC7760</a>
16	<a href="#">DAC8750</a>	<a href="#">DAC8760</a>



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**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
DAC7750IPWP	PREVIEW	HTSSOP	PWP	24	60	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 125	DAC7750	
DAC7750IPWPR	PREVIEW	HTSSOP	PWP	24	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 125	DAC7750	
DAC7750IRHAR	PREVIEW	VQFN	RHA	40	2500	Green (RoHS & no Sb/Br)	CU NIPDAUAG	Level-3-260C-168 HR	-40 to 125	DAC7750	
DAC7750IRHAT	PREVIEW	VQFN	RHA	40	250	Green (RoHS & no Sb/Br)	CU NIPDAUAG	Level-3-260C-168 HR	-40 to 125	DAC7750	
DAC8750IPWP	PREVIEW	HTSSOP	PWP	24	60	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 125	DAC8750	
DAC8750IPWPR	PREVIEW	HTSSOP	PWP	24	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 125	DAC8750	
DAC8750IRHAR	PREVIEW	VQFN	RHA	40	2500	Green (RoHS & no Sb/Br)	CU NIPDAUAG	Level-3-260C-168 HR	-40 to 125	DAC8750	
DAC8750IRHAT	PREVIEW	VQFN	RHA	40	250	Green (RoHS & no Sb/Br)	CU NIPDAUAG	Level-3-260C-168 HR	-40 to 125	DAC8750	

(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.

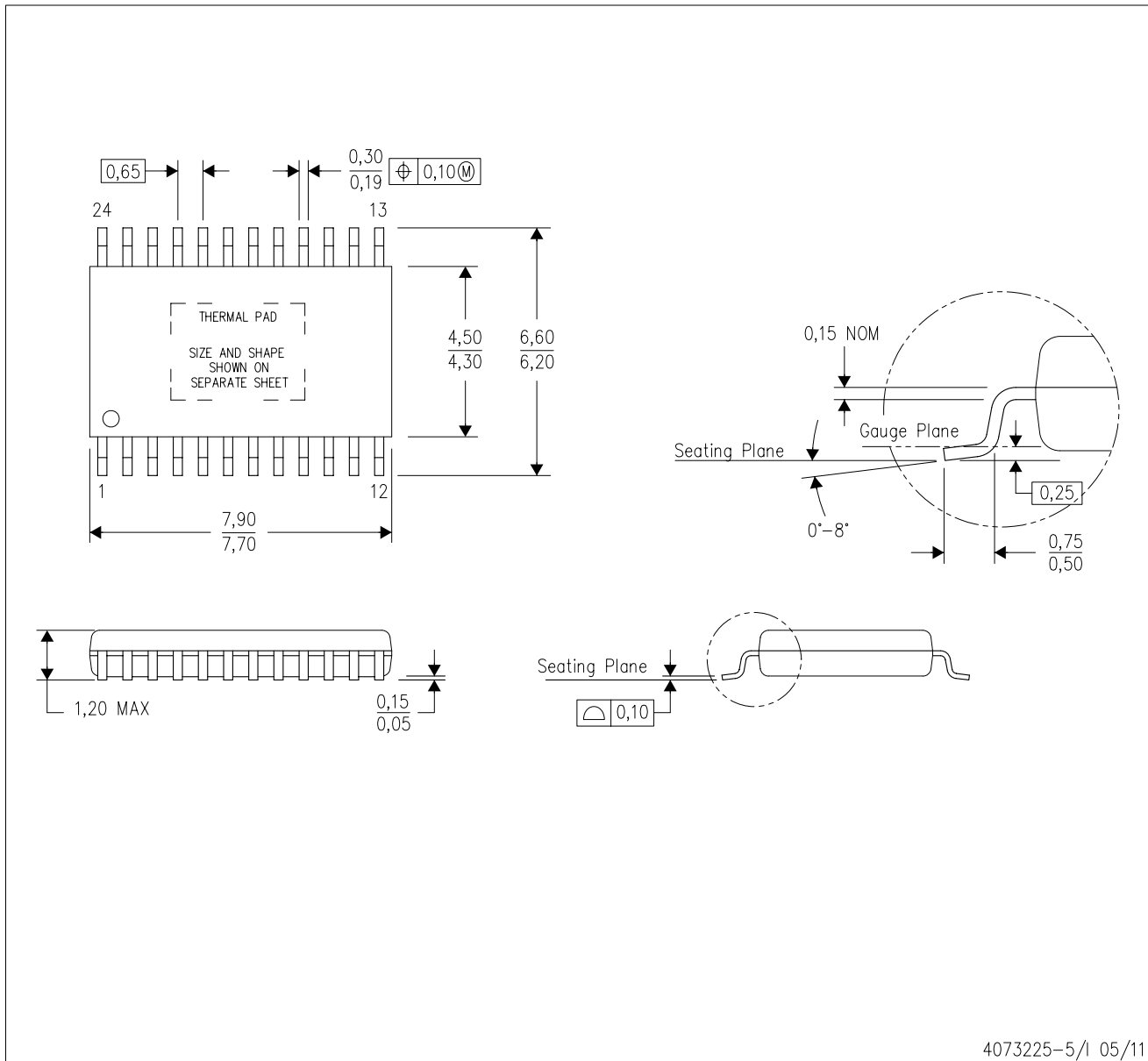
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# MECHANICAL DATA

PWP (R-PDSO-G24)

PowerPAD™ PLASTIC SMALL OUTLINE

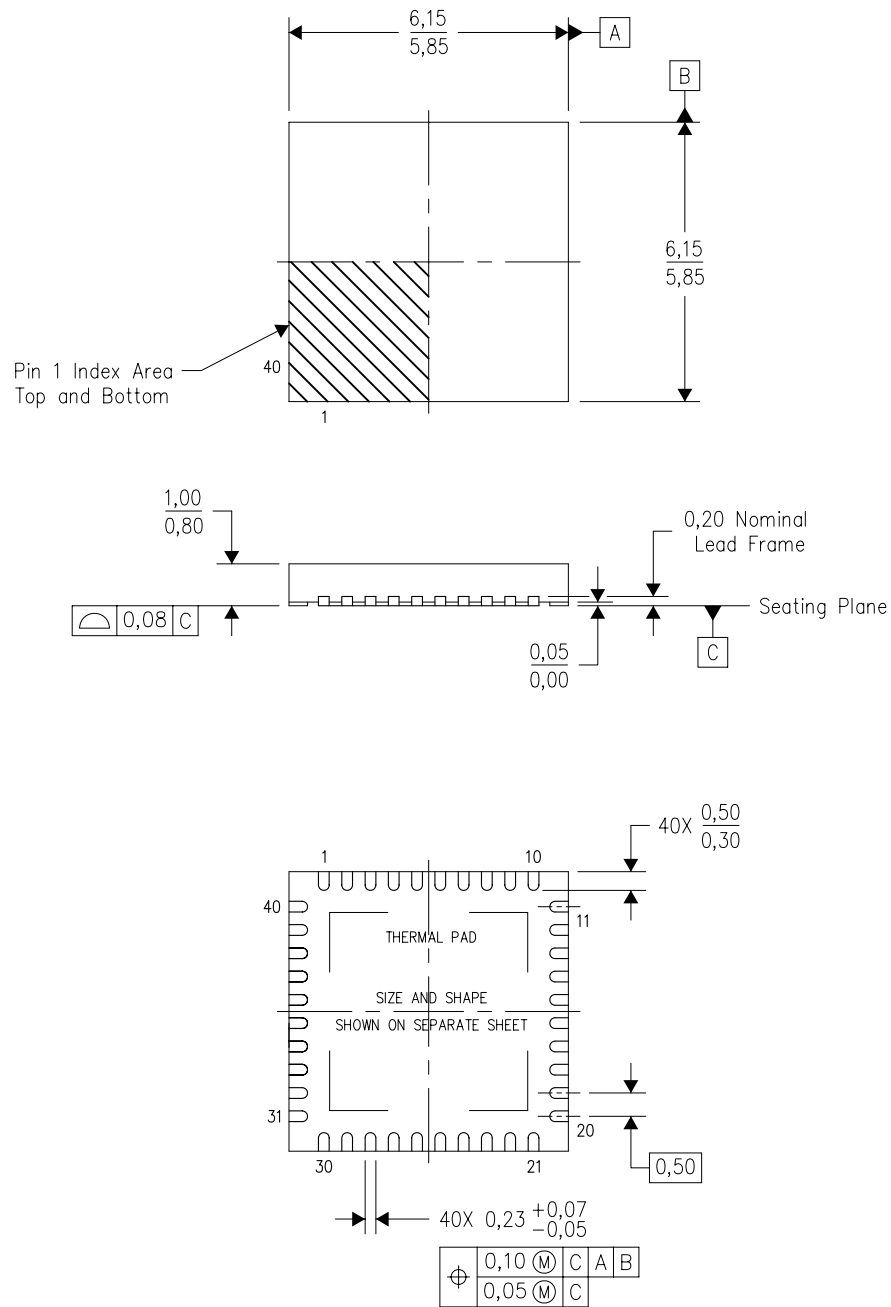


- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Body dimensions do not include mold flash or protrusions. Mold flash and protrusion shall not exceed 0.15 per side.
  - This package is designed to be soldered to a thermal pad on the board. Refer to Technical Brief, PowerPad Thermally Enhanced Package, Texas Instruments Literature No. SLMA002 for information regarding recommended board layout. This document is available at [www.ti.com](http://www.ti.com) <<http://www.ti.com>>.
  - See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.
  - Falls within JEDEC MO-153

PowerPAD is a trademark of Texas Instruments.

RHA (S-PVQFN-N40)

PLASTIC QUAD FLATPACK NO-LEAD



Bottom View

4204276/E 06/11

- NOTES:
- All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - This drawing is subject to change without notice.
  - QFN (Quad Flatpack No-Lead) Package configuration.
  - The package thermal pad must be soldered to the board for thermal and mechanical performance.
  - See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.
  - Package complies to JEDEC MO-220 variation VJJD-2.

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