

Introducing the *nanoDAC+* Family



nanoDAC+

Enhanced Specifications

- Resolution: 12-bit to 16-bit
- Accuracy: ± 2 LSB max INL
- 2.5 V reference tempco: 2 ppm/ $^{\circ}$ C typ, 5 ppm/ $^{\circ}$ C max
- Offset error: ± 1.5 mV max
- Gain error: 0.1% of FSR max
- Glitch energy: 0.5 nVs typ
- Power: 3.3 mW at 3 V typ

New Features

- Robust 4 kV HBM ESD rating
- 1.8 V logic compatibility (VLOGIC pin)
- User selectable output amplifier: gain of $\times 1$ or $\times 2$ (GAIN pin)
- DAC register readback (SDO pin)
- 3 mm \times 3 mm, 16-lead LFCSP and 16-lead TSSOP
- -40° C to $+105^{\circ}$ C temperature range

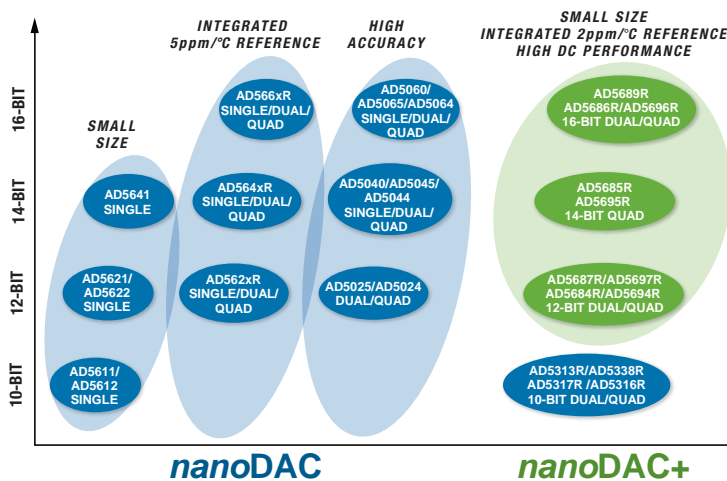
Target Markets

- Communications infrastructure
- Industrial process control
- Healthcare
- Instrumentation

Analog Devices, Inc., *nanoDAC*[®] products feature rail-to-rail, 3 V/5 V, low power, monotonic, voltage output DACs in tiny packages. Building on the success of the *nanoDAC* brand, Analog Devices is now extending its digital-to-analog converter portfolio by launching the *nanoDAC+* series. These new industry-leading *nanoDAC+* products combine higher dc performance, lower drift 2.5 V reference, lower glitch energy, and a higher ESD rating, in even smaller packages, including 3 mm \times 3 mm, 16-lead LFCSP. In addition, they include useful pin functions such as VLOGIC, which facilitates 1.8 V logic levels, and GAIN, which enables the output range to be doubled.

With the launch of the [AD568xR](#) and [AD569xR](#) products, ADI has extended its precision DAC portfolio, which started with the highly popular [AD53xx](#) and [AD56xx](#) rail-to-rail string DACs. These new *nanoDAC+* products are optimized for high performance across multiple design needs, including accuracy, integrated reference options, and packaging, thus enabling analog designers to address an even wider range of applications without having to trade off performance for footprint.

Analog Devices now offers a complete series of *nanoDAC* products. Designers can select the exact *nanoDAC* required for the application, i.e., by resolution (12-, 14-, or 16-bit), grade (A or B), interface (SPI or I²C), and package (LFCSP/QFN or TSSOP). This provides a straightforward pin-compatible upgrade/downgrade path for tailored solutions.



nanoDAC Products

Part Number	Outputs	Bits	Interface	Package	Comments	
AD5601	1	8	SPI	6-lead SC70, 6-lead LFCSP	100 μ A max @ 5 V	
AD5602	1	8	I ² C	6-lead SC70, 6-lead LFCSP	100 μ A max @ 5 V; 100 kHz/400 kHz and 3.4 MHz I ² C	
AD5611	1	10	SPI	6-lead SC70, 6-lead LFCSP	100 μ A max @ 5 V	
AD5612	1	10	I ² C	6-lead SC70, 6-lead LFCSP	100 μ A max @ 5 V; 100 kHz/400 kHz and 3.4 MHz I ² C	
AD5620	1	12	SPI	8-lead SOT-23, 8-lead MSOP	5 ppm/ $^{\circ}$ C reference; VFB pin	
AD5621	1	12	SPI	6-lead SC70, 6-lead LFCSP	1 LSB INL; 100 μ A max @ 5 V	
AD5622	1	12	I ² C	6-lead SC70, 6-lead LFCSP	100 μ A max @ 5 V; 100 kHz/400 kHz and 3.4 MHz I ² C	
AD5626	1	12	SPI	8-lead LFCSP, 8-lead MSOP	1 LSB INL; LDAC and CLR pins (upgrade to DAC8512)	
AD5040	1	14	SPI	8-lead SOT-23	Buffered, 1 LSB INL max @ 5 V	
AD5640	1	14	SPI	8-lead SOT-23, 8-lead MSOP	5 ppm/ $^{\circ}$ C reference; VFB pin	
AD5641	1	14	SPI	6-lead SC70, 6-lead LFCSP	4 LSB INL; 100 μ A max @ 5 V	
AD5060	1	16	SPI	8-lead SOT-23	Buffered, 1 LSB INL max	
AD5061	1	16	SPI	8-lead SOT-23	Buffered, 4 LSB INL max	
AD5062	1	16	SPI	8-lead SOT-23	Unbuffered, 1 LSB INL max, on-chip precision resistors	
AD5063	1	16	SPI	10-lead MSOP	Unbuffered, 1 LSB INL max	
AD5660	1	16	SPI	8-lead SOT-23, 8-lead MSOP	5 ppm/ $^{\circ}$ C reference; VFB pin	
AD5662	1	16	SPI	8-lead SOT-23, 8-lead MSOP	VFB pin	
AD5680	1	18	SPI	8-lead SOT-23	Buffered	
AD5313R	New	2	10	SPI	16-lead TSSOP, 16-lead LFCSP	V _{LOGIC} , RSTSEL, LDAC, and SDO pins; ESD = 4 kV; 2 ppm/ $^{\circ}$ C 2.5 V reference
AD5338R	New	2	10	I ² C	16-lead TSSOP, 16-lead LFCSP	V _{LOGIC} , RSTSEL, and LDAC pins; ESD = 3.5 kV; 2 ppm/ $^{\circ}$ C 2.5 V reference
AD5025		2	12	SPI	14-lead TSSOP	1 LSB INL max; LDAC, CLR, SDO, PDL, and POR pins
AD5623R		2	12	SPI	10-lead LFCSP, 10-lead MSOP	5 ppm/ $^{\circ}$ C reference; LDAC and CLR pins
AD5627/AD5627R		2	12	I ² C	10-lead LFCSP, 10-lead MSOP	5 ppm/ $^{\circ}$ C reference, LDAC and CLR pins, 100 kHz/400 kHz and 3.4 MHz interface
AD5687/AD5687R	New	2	12	SPI	16-lead TSSOP, 16-lead LFCSP	nanoDAC+; V _{LOGIC} , RSTSEL, LDAC, and SDO pins; ESD = 4 kV; 2 ppm/ $^{\circ}$ C 2.5 V reference option
AD5697R	New	2	12	I ² C	16-lead TSSOP, 16-lead LFCSP	nanoDAC+; V _{LOGIC} , RSTSEL, and LDAC pins; ESD = 3.5 kV; 2 ppm/ $^{\circ}$ C 2.5 V reference
AD5045		2	14	SPI	14-lead TSSOP	1 LSB INL max; LDAC, CLR, SDO, and POR pins; four reference inputs, 4.5 V to 5.5 V
AD5643R		2	14	SPI	10-lead LFCSP, 10-lead MSOP	5 ppm/ $^{\circ}$ C reference; LDAC and CLR pins
AD5647R		2	14	I ² C	10-lead LFCSP, 10-lead MSOP	5 ppm/ $^{\circ}$ C reference; LDAC and CLR pins; 100 kHz/400 kHz and 3.4 MHz I ² C
AD5065		2	16	SPI	14-lead TSSOP	1 LSB INL; LDAC, CLR, SDO, and POR pins; four reference inputs
AD5663/AD5663R		2	16	SPI	10-lead LFCSP, 10-lead MSOP	LDAC and CLR pins, 5 ppm/ $^{\circ}$ C reference option
AD5667/AD5667R		2	16	I ² C	10-lead LFCSP, 10-lead MSOP	LDAC and CLR pins; 100 kHz/400 kHz and 3.4 MHz interface; 5 ppm/ $^{\circ}$ C reference option
AD5689/AD5689R	New	2	16	SPI	16-lead TSSOP, 16-lead LFCSP	nanoDAC+; 2 LSB INL max; V _{LOGIC} , RSTSEL, LDAC, and SDO pins; ESD = 4 kV; 2 ppm/ $^{\circ}$ C 2.5 V reference option
AD5317R	New	4	10	SPI	16-lead TSSOP, 16-lead LFCSP	V _{LOGIC} , RSTSEL, LDAC, and SDO pins; ESD = 4 kV; 2 ppm/ $^{\circ}$ C 2.5 V reference
AD5316R	New	4	10	I ² C	16-lead TSSOP, 16-lead LFCSP	V _{LOGIC} , RSTSEL, and LDAC pins; ESD = 3.5 kV; 2 ppm/ $^{\circ}$ C 2.5 V reference
AD5024		4	12	SPI	16-lead TSSOP	1 LSB INL; LDAC, CLR, and POR pins; four reference inputs, 4.5 V to 5.5 V
AD5624/AD5624R		4	12	SPI	10-lead LFCSP, 10-lead MSOP	Quad DAC in tiny 3 mm \times 3 mm footprint; 5 ppm/ $^{\circ}$ C reference option
AD5625/AD5625R		4	12	I ² C	10-lead LFCSP, 14-lead TSSOP	LDAC and CLR pins, 100 kHz/400 kHz and 3.4 MHz interface; 5 ppm/ $^{\circ}$ C reference option
AD5044		4	14	SPI	16-lead TSSOP	1 LSB INL; LDAC, CLR, and POR pins; four reference inputs
AD5644R		4	14	SPI	10-lead LFCSP, 10-lead MSOP	5 ppm/ $^{\circ}$ C reference
AD5645R		4	14	I ² C	10-lead LFCSP, 14-lead TSSOP	5 ppm/ $^{\circ}$ C reference; LDAC, CLR, and POR pins; 100 kHz/400 kHz and 3.4 MHz interface
AD5064		4	16	SPI	14-lead TSSOP, 16-lead TSSOP	1 LSB INL max; LDAC, CLR, and SDO pins; four reference inputs (except AD5064-1)
AD5066		4	16	SPI	16-lead TSSOP	Unbuffered; 1 LSB INL; LDAC, CLR, and POR pins; four reference inputs
AD5686/AD5686R	New	4	16	SPI	16-lead TSSOP, 16-lead LFCSP	nanoDAC+; 2 LSB INL max; V _{LOGIC} , RSTSEL, LDAC, and SDO pins; ESD = 4 kV; 2 ppm/ $^{\circ}$ C 2.5 V reference option
AD5696/AD5696R	New	4	16	I ² C	16-lead TSSOP, 16-lead LFCSP	nanoDAC+; 2 LSB INL max; V _{LOGIC} , RSTSEL, and LDAC pins; ESD = 3.5 kV; 2 ppm/ $^{\circ}$ C 2.5 V reference option
AD5685R	New	4	14	SPI	16-lead TSSOP, 16-lead LFCSP	nanoDAC+; V _{LOGIC} , RSTSEL, LDAC, and SDO pins; ESD = 4 kV; 2 ppm/ $^{\circ}$ C 2.5 V reference
AD5695R	New	4	14	I ² C	16-lead TSSOP, 16-lead LFCSP	nanoDAC+; V _{LOGIC} , RSTSEL, and LDAC pins; ESD = 3.5 kV; 2 ppm/ $^{\circ}$ C 2.5 V reference
AD5684/AD5684R	New	4	12	SPI	16-lead TSSOP, 16-lead LFCSP	nanoDAC+; V _{LOGIC} , RSTSEL, LDAC, and SDO pins; ESD = 4 kV; 2 ppm/ $^{\circ}$ C 2.5 V reference option
AD5694/AD5694R	New	4	12	I ² C	16-lead TSSOP, 16-lead LFCSP	nanoDAC+; V _{LOGIC} , RSTSEL, and LDAC pins; ESD = 3.5 kV; 2 ppm/ $^{\circ}$ C 2.5 V reference option
AD5664/AD5664R		4	16	SPI	10-lead LFCSP, 10-lead MSOP	Quad DAC in tiny 3 mm \times 3 mm footprint; 5 ppm/ $^{\circ}$ C reference option
AD5665/AD5665R		4	16	I ² C	10-lead LFCSP, 14-lead TSSOP	LDAC and CLR pins, 100 kHz/400 kHz and 3.4 MHz interface; 5 ppm/ $^{\circ}$ C reference option
AD5666		4	16	SPI	14-lead TSSOP	5 ppm/ $^{\circ}$ C reference; SDO, LDAC, and CLR

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Related denseDAC[®] Products

Part Number	Outputs	Bits	Interface	Package	Comments
AD5308	8	8	SPI	16-lead TSSOP	LDAC pin
AD5318	8	10	SPI	16-lead TSSOP	LDAC pin
AD5328	8	12	SPI	16-lead TSSOP	LDAC pin
AD5628	8	12	SPI	14-lead TSSOP, 16-lead TSSOP, 16-lead LFCSP, 16-ball WLCSOP	5 ppm/ $^{\circ}$ C reference; LDAC and CLR pins
AD5629R	8	12	I ² C	16-lead TSSOP, 16-lead LFCSP, 16-ball WLCSOP	5 ppm/ $^{\circ}$ C reference; LDAC and CLR pins
AD5678	8	12, 16	SPI	14-lead TSSOP, 16-lead TSSOP	4 \times 16-bit and 4 \times 12-bit DAC; 5 ppm/ $^{\circ}$ C reference; LDAC and CLR pins
AD5648	8	14	SPI	14-lead TSSOP, 16-lead TSSOP	5 ppm/ $^{\circ}$ C reference; LDAC and CLR pins
AD5668	8	16	SPI	16-lead TSSOP, 16-lead LFCSP, 16-ball WLCSOP	5 ppm/ $^{\circ}$ C reference; LDAC and CLR pins
AD5669R	8	16	I ² C	16-lead TSSOP, 16-lead LFCSP, 16-ball WLCSOP	5 ppm/ $^{\circ}$ C reference; LDAC and CLR pins

I²C refers to a communications protocol originally developed by Philips Semiconductors (now NXP Semiconductors).

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