

# Low-Power, Single, 16-/12-Bit, Buffered Voltage-Output DACs

## General Description

The MAX5138/MAX5139 are a family of single-channel pin-compatible and software-compatible 16-bit and 12-bit DACs. The MAX5138/MAX5139 are low-power, 16-bit/12-bit, buffered voltage-output, high-linearity DACs. They use a precision internal reference or a precision external reference for rail-to-rail operation. The MAX5138/MAX5139 accept a wide +2.7V to +5.25V supply-voltage range to accommodate most low-power and low-voltage applications. These devices accept a 3-wire SPI™-/QSPI™-/MICROWIRE™-/DSP-compatible serial interface to save board space and reduce the complexity of optically isolated and transformer-isolated applications. The digital interface's double-buffered hardware and software LDAC provide simultaneous output update. The serial interface features a  $\overline{\text{READY}}$  output for easy daisy-chaining of several MAX5138/MAX5139 devices and/or other compatible devices. The MAX5138/MAX5139 include a hardware input to reset the DAC outputs to zero or midscale upon power-up or reset, providing additional safety for applications that drive valves or other transducers that need to be off during power-up. The high linearity of the DACs makes these devices ideal for precision control and instrumentation applications. The MAX5138/MAX5139 are available in an ultra-small (3mm x 3mm), 16-pin TQFN package and are specified over the -40°C to +105°C extended industrial temperature range.

## Applications

Automatic Test Equipment  
Automatic Tuning  
Communication Systems  
Data Acquisition  
Gain and Offset Adjustment  
Portable Instrumentation  
Power-Amplifier Control  
Process Control and Servo Loops  
Programmable Voltage and Current Sources

**Functional Diagram and Typical Operating Circuit appear at end of data sheet.**

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MICROWIRE is a trademark of National Semiconductor Corp.

**For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim's website at [www.maxim-ic.com](http://www.maxim-ic.com).**

## Features

- ◆ 16-/12-Bit Resolution in a 3mm x 3mm, 16-Pin TQFN Package
- ◆ Hardware-Selectable on Power-Up or Reset-to-Zero/Midscale DAC Output
- ◆ Double-Buffered Input Registers
- ◆ LDAC Asynchronously Updates DAC Output
- ◆  $\overline{\text{READY}}$  Facilitates Daisy Chaining
- ◆ High-Performance 10ppm/°C Internal Reference
- ◆ Guaranteed Monotonic Over All Operating Conditions
- ◆ Wide +2.7V to +5.25V Supply Range
- ◆ Rail-to-Rail Buffered Output Operation
- ◆ Low Gain Error (Less Than  $\pm 0.5\%$  FS) and Offset (Less Than  $\pm 10\text{mV}$ )
- ◆ 30MHz 3-Wire SPI-/QSPI-/MICROWIRE-/DSP-Compatible Serial Interface
- ◆ CMOS-Compatible Inputs with Hysteresis
- ◆ Low-Power Consumption ( $I_{\text{SHDN}} = 2\mu\text{A max}$ )

## Ordering Information

PART	PIN-PACKAGE	RESOLUTION (BITS)
MAX5138BGTE+	16 TQFN-EP**	16
MAX5139GTE+*	16 TQFN-EP**	12

+Denotes a lead-free(Pb)/RoHS-compliant package.

\*Future product—contact factory for availability.

\*\*EP = Exposed pad.

**Note:** All devices are specified over the -40°C to +105°C operating temperature range.

## Pin Configuration

