

# Small, High-Performance USB Switches Integrate Low Power and High-ESD Protection

## Multiplex Both USB and Analog Signals in Handheld Devices

The MAX14585\*/MAX14585A\* high-ESD-protected DPDT switches multiplex Hi-Speed USB (480Mbps) and analog signals such as AC-coupled audio or video. These devices combine the low on-capacitance ( $C_{ON}$ ) and low on-resistance ( $R_{ON}$ ) necessary for high-performance switching applications in portable electronics. They include an internal negative supply to pass audio signals that swing down to -1.8V below ground.

### Low Power Consumption for Extended Battery Operation

- Low supply current 6 $\mu$ A (typ)
- Single 2.7V to 5.5V supply operation ( $V_{CC}$ )

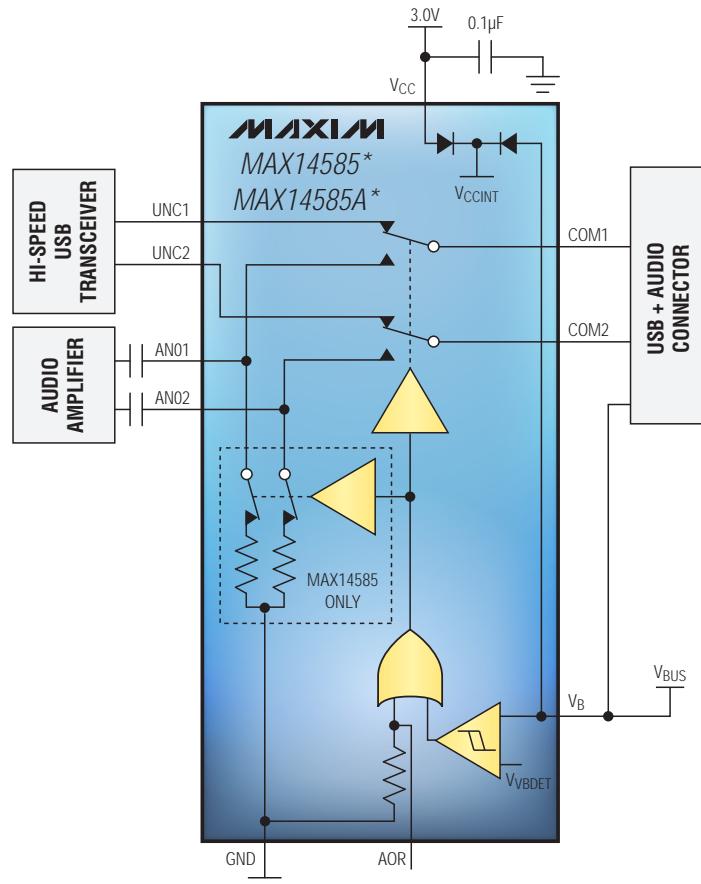
### High Level of Integration for Design

#### Flexibility and Performance

- 3 (typ) on-resistance
- 950MHz bandwidth
- 0.05% THD+N audio channel
- Audio channel override control input
- Distortion-free negative signal throughput down to -1.8V on audio channel
- 28V-capable  $V_B$  input with automatic USB selection by  $V_{BUS}$  detection
- Low-capacitance Hi-Speed USB for both USB inputs
- Dual power supply architecture ( $V_B$  and  $V_{CC}$ )
- $\pm 15kV$  HBM\*\* ESD protection on COM\_ pins

#### Reduces Required Board Space

- Internal shunt resistor reduces click and pop (MAX14585)
- 1.4mm x 1.8mm, 10-pin UTOFN package



### High-Performance USB Switches

| Part       | Configuration | Supply Voltage (V)      | $V_{BUS}$ Detection/Enable | Shunt Resistor | Package (mm x mm)    |  |  |  |  |
|------------|---------------|-------------------------|----------------------------|----------------|----------------------|--|--|--|--|
| MAX14585*  | DPDT          | 2.7 to 5.5 or $V_{BUS}$ | Detection                  |                | 10-UTQFN (1.4 x 1.8) |  |  |  |  |
| MAX14585A* |               |                         |                            |                |                      |  |  |  |  |
| MAX14508E  |               | 2.7 to 5.0              | Enable                     |                |                      |  |  |  |  |
| MAX14509AE |               |                         |                            |                |                      |  |  |  |  |
| MAX14510E  |               | 2.7 to 5.5              | Detection                  |                | 12-WLP (1.5 x 2)     |  |  |  |  |
| MAX14531E  | DP3T          |                         |                            |                |                      |  |  |  |  |
| MAX14532E  |               |                         |                            |                |                      |  |  |  |  |

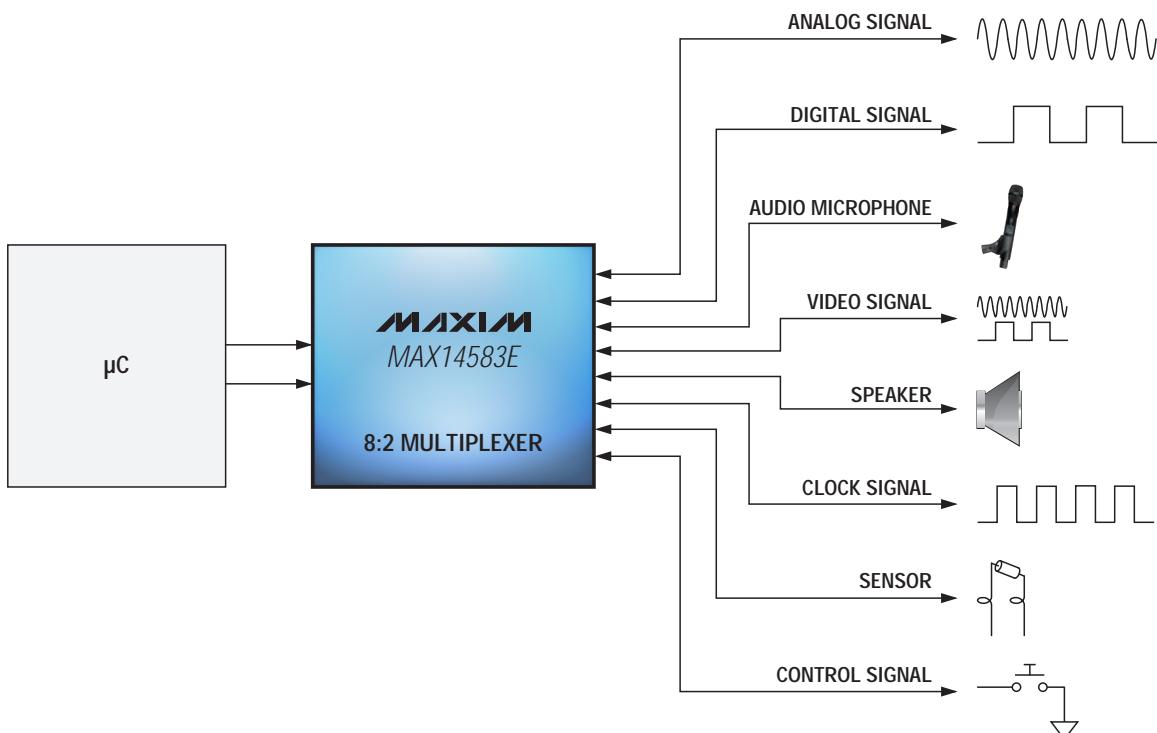
\*Future product—contact factory for availability.

\*\*Human Body Model.

# Tiny 8:2 Multiplexer Provides Design Flexibility for Portable Applications

Features I<sup>2</sup>C Interface and  $\pm 5V$  Signal Range in Only 2.8mm<sup>2</sup>

The MAX14583E is an independently controlled, high-density 8:2 multiplexer that supports signal levels from -5.5V to +5.5V. This device features a bidirectional I<sup>2</sup>C serial interface, allowing the microprocessor to control the switching paths in either direction.



## Suitable for Industrial Applications Environments

- -40°C to +85°C operating temperature range
- Protected against 0 to +5.5V input range at V<sub>CC</sub> = 0V
- $\pm 8kV$  HBM ESD protection on AA and BA output pins

## Space-Efficient IC for Reduced Design Size

- Small 1.68mm x 1.68mm, 16-bump WLP package

## High-Quality Audio Signal Performance

- Distortion-free negative signal throughput

## Enhanced Circuit Design Versatility

- I<sup>2</sup>C-controlled 8:2 multiplexer
- Slave address select (SAS) input
- +2.8V to +4.5V single-supply voltage
- Wide power-supply range and various signal levels
  - V<sub>CC</sub> > +2V: -5.5V to +5.5V
  - V<sub>CC</sub> < +2V: 0 to +5.5V

| Part      | Configuration | Control          | Signal Voltage Range (V) | Package (mm x mm)    |
|-----------|---------------|------------------|--------------------------|----------------------|
| MAX14583E | 8:2           | I <sup>2</sup> C | -5.5 to +5.5             | 16-WLP (1.68 x 1.68) |

# Low-Voltage, High-Performance, Versatile Switches Selector Guide

## Negative-Rail Audio/Video Switches

| Part          | Interface | Signal Voltage Range (V)      | Supply Range (V) | Package (mm x mm)    |
|---------------|-----------|-------------------------------|------------------|----------------------|
| MAX4902       | 2 x SPST  | $(V_{CC} - 5.5V)$ to $V_{CC}$ | 1.8 to 5.5       | 9-UCSP™ (1.5 x 1.5)  |
| MAX4903       | 1 x SPDT  |                               |                  |                      |
| MAX4908       | 2 x SP3T  |                               |                  |                      |
| MAX4910       | 4 x SPDT  |                               |                  |                      |
| MAX14504      | 1 x DPDT  | ±5.5                          | 2.3 to 5.5       | 12-WLP (1.56 x 2.14) |
| MAX14535E     |           | -1.5 to min ( $V_{CC}$ , 3V)  | 1.8 to 5.5       | 10-UTQFN (1.4 x 1.8) |
| MAX14589*/94* |           | ±5.5                          | 1.6 to 5.5       | 9-WLP (1.25 x 1.25)  |

## Data/USB Switches

| Part           | Interface | Signal Input         | Supply Range (V) | Package (mm x mm)                           |
|----------------|-----------|----------------------|------------------|---------------------------------------------|
| MAX4760        | 4 x DPDT  | USB                  | 1.8 to 5.5       | 36-UCSP (3 x 3)                             |
| MAX4761        | 4 x SPST  |                      |                  |                                             |
| MAX4948        | 6 x SPDT  |                      |                  |                                             |
| MAX4983E       | 2 x SPDT  | SDIO<br>Hi-Speed USB | 2.8 to 5.5       | 24-UCSP (2.5 x 2.5)<br>10-UTQFN (1.4 x 1.8) |
| MAX4996        | 6 x SPDT  |                      |                  |                                             |
| MAX14510E      | 1 x DPDT  |                      |                  |                                             |
| MAX14531E      | 2 x SP3T  |                      |                  |                                             |
| MAX14585*/85A* | 1 x DPDT  | Hi-Speed USB/audio   | 2.7 to 5.0       | 12-WLP (1.5 x 2)                            |
|                |           |                      |                  |                                             |

## Low- $R_{ON}$ Switches

| Part          | Interface | $R_{ON}$ (Ω) | Supply Range (V) | Package (mm x mm)    |
|---------------|-----------|--------------|------------------|----------------------|
| MAX4714       | 1 x SPDT  | 0.8          | 1.6 to 3.6       | 6-µDFN (1 x 1.5)     |
| MAX4740       | 4 x SPDT  | 0.6          | 1.6 to 5.5       | 16-UTQFN (2.5 x 2.5) |
| MAX4751       | 4 x SPST  | 0.9          | 1.6 to 3.6       | 16-TQFN (3 x 3)      |
| MAX4992       | 2 x SPDT  | 0.6          | 1.8 to 5.5       | 10-UTQFN (1.4 x 1.8) |
| MAX14589*/94* | 1 x DPDT  | 0.5          | 1.6 to 5.5       | 9-WLP (1.25 x 1.25)  |

UCSP is a trademark of Maxim Integrated Products, Inc.

\*Future product—contact factory for availability.

# Charger Detector Enables Universal USB Charging

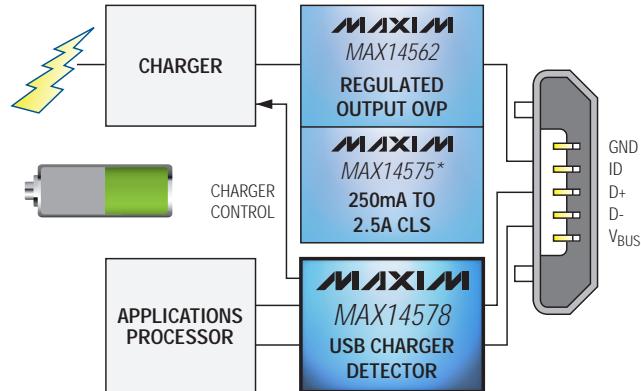
As consumers buy more portable devices, they become overwhelmed with managing the various power adapters that have nonstandard connectors. Solving this issue, the micro USB connector has been universally accepted for battery charging and data transfer. Though USB requirements are complex, the MAX14578's charger detection, overvoltage protection, and current-limit switching ease the implementation of micro USB connectors to simplify the user experience.

## Nonstandard Chargers—Wasteful and Inconvenient

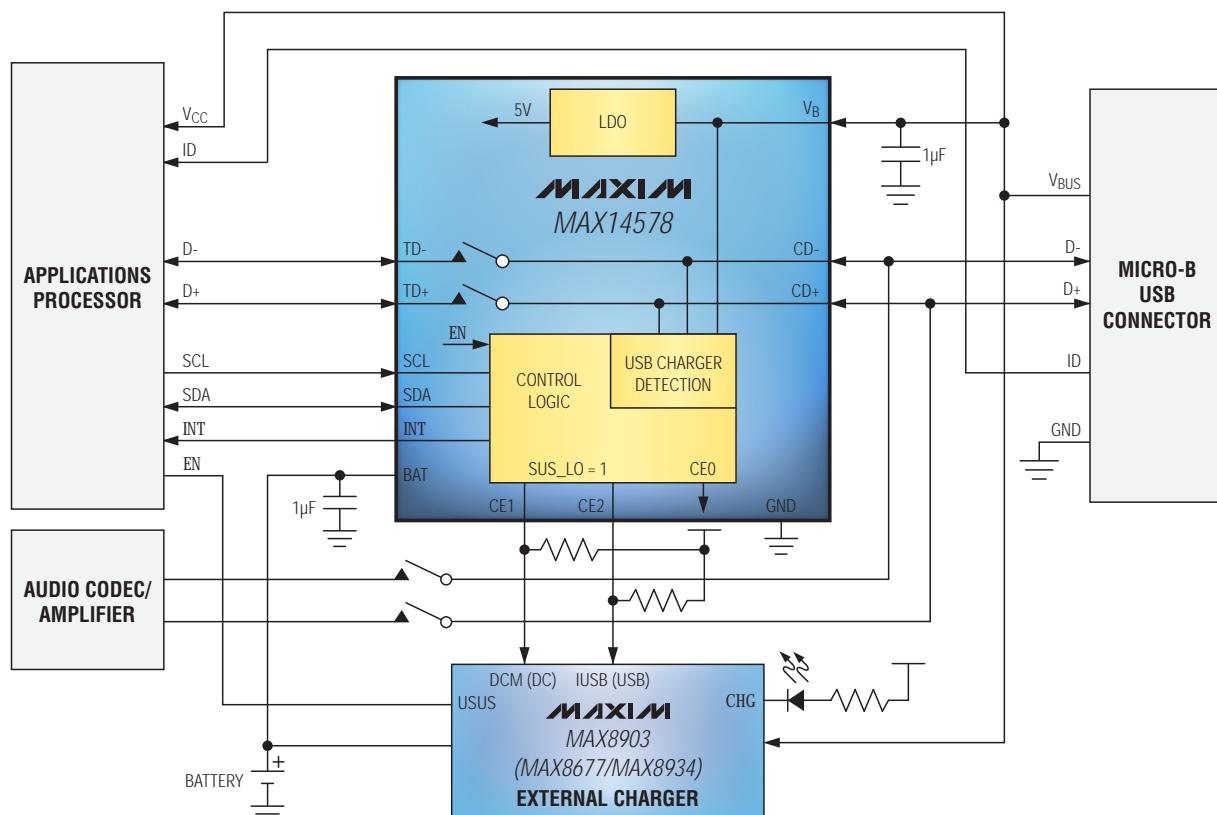


- Mobile device vendors ship proprietary AC charger adapter with their products
- Accumulation of incompatible charger adapters is wasteful and inconvenient for the user

## MAX14578—Truly Universal Charging Solution



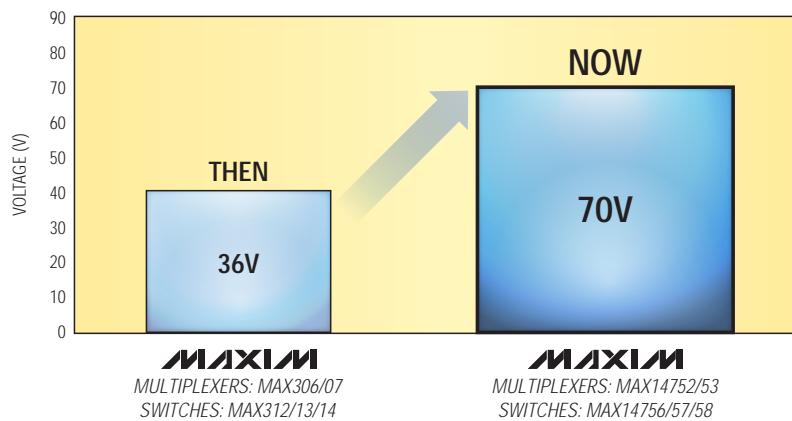
- Provides USB power adapter detection
- Allows USB charging from various adapters
- Enables USB dead battery charging support without complex software modification



\*Future product—contact factory for availability.

# New Family of 70V Switches and Multiplexers Provides Superior Robustness

Ideal for Both Industrial and Battery-Management Applications



## Industrial PLC and Test & Measurement

- Wide single 70V (max) and dual  $\pm 35V$  (max) supply voltages eliminate external OVP diodes and opto relays
- Excellent  $R_{ON}$  flatness improves voltage measurements
- Device enable pin (EN) provides flexible logic level interfacing for multivoltage systems



## Li+ Battery-Management Systems

- Wide single 70V (max) supply voltage meets high-cell-count requirements
- Single 8:1 and dual 4:1 configurations enable flexible system design
- Low  $R_{ON}$  flatness allows highly accurate measurements across each cell voltage

## 70V Multiplexers and Switches

| Part     | Configuration | Function    | Channels | Single Voltage Supply (V) | Dual Voltage Supply (V) | $R_{ON}$ ( , max) | $R_{FLAT(ON)}$ ( , typ) | $I_{L(OFF)}$ (nA) | Package (mm x mm)  |  |
|----------|---------------|-------------|----------|---------------------------|-------------------------|-------------------|-------------------------|-------------------|--------------------|--|
| MAX14752 | 8:1           | Open        | 1        | 70                        | $\pm 10$ to $\pm 35$    | 130               | 0.03                    | 20                | 16-TSSOP (5 x 6.4) |  |
| MAX14753 | 4:1           |             | 2        |                           |                         |                   |                         |                   |                    |  |
| MAX14756 | SPST          | Closed      | 4        | 70                        | $\pm 10$ to $\pm 35$    | 10                | 0.004                   | 2.5               |                    |  |
| MAX14757 |               | Open        |          |                           |                         |                   |                         |                   |                    |  |
| MAX14758 |               | Open/closed |          |                           |                         |                   |                         |                   |                    |  |

# Midvoltage ( $\pm 4.5V$ to $\pm 20V$ ) Switches and Multiplexers

## General Purpose

| Part          | Function       | Supply Voltage (V)    | $R_{ON}$ ( , max) | $I_{L(OFF)}$ (nA) | $R_{FLAT(ON)}$ ( , max) | Packages                                      |  |
|---------------|----------------|-----------------------|-------------------|-------------------|-------------------------|-----------------------------------------------|--|
| MAX312/13/14  | 4 x SPST NC/NO | $\pm 4.5$ to $\pm 20$ | 10                | 0.5               | 1.5                     | 16-PDIP/SO/TSSOP, 16-DIP (ceramic), dice      |  |
| MAX317/18/19  | SPST NC/NO     |                       | 45                | 0.25              | 2                       | 8-SO/PDIP, 8-DIP (ceramic), dice              |  |
| MAX333A       | 4 x SPST NC/NO |                       | 35                |                   |                         | 20-TSSOP/PDIP/SO/SSOP, 20-DIP (ceramic), dice |  |
| MAX4647/48/49 | SPST/SPDT      |                       | 45                | 4                 | 7                       | 6-SOT23                                       |  |
| MAX306/07     | 2 x 8:1/16:1   |                       | 100               | 0.75              |                         | 28-SO/PDIP/TSSOP/PLCC, 28-DIP (ceramic), dice |  |
| MAX308/09     | 2 x 4:1/8:1    |                       | 100               |                   |                         |                                               |  |

## Fault Protection

| Part            | Function       | Supply Voltage (V)    | $R_{ON}$ ( , max) | $I_{L(OFF)}$ (nA) | Fault Protection (V)      | Packages                           |
|-----------------|----------------|-----------------------|-------------------|-------------------|---------------------------|------------------------------------|
| MAX312F/13F/14F | 4 x SPST NC/NO | $\pm 4.5$ to $\pm 20$ | 10                | 1                 | $\pm 40$ off, $\pm 36$ on | 16-PDIP/SO                         |
| MAX4885         |                |                       | 160               | 0.5               |                           | 16-PDIP/SO, 16-DIP (ceramic), dice |
| MAX4885E        |                |                       | 400               | 2                 | $\pm 40$ off, $\pm 25$ on |                                    |
| MAX4885AE       | 2 x 4:1/8:1    | $\pm 4.5$ to $\pm 18$ | 350               | 0.5               | $\pm 40$                  |                                    |

## 3V Low-Logic Compatible

| Part            | Function       | Supply Voltage (V)    | $R_{ON}$ ( , max) | $I_{L(OFF)}$ (nA) | $R_{FLAT(ON)}$ ( , max) | Packages             |
|-----------------|----------------|-----------------------|-------------------|-------------------|-------------------------|----------------------|
| MAX312L/13L/14L | 4 x SPST NC/NO | $\pm 4.5$ to $\pm 20$ | 10                | 0.5               | 2                       | 16-PDIP/SO/TSSOP     |
| DG417L/18L/19L  | SPST NC/NO     |                       | 35                | 0.25              | 4                       | 8-PDIP/SO/ $\mu$ MAX |

## Low $R_{ON}$

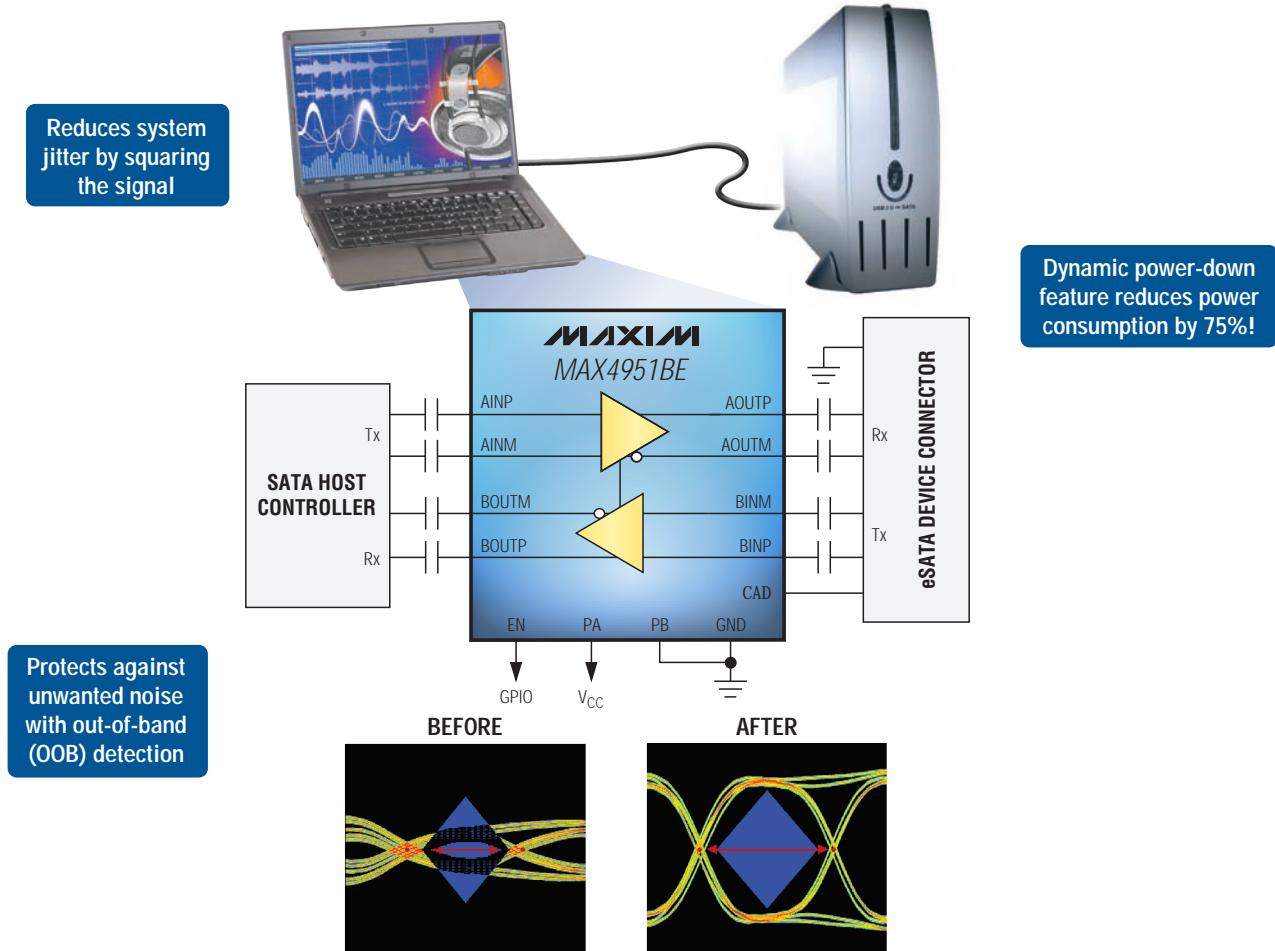
| Part          | Function       | Supply Voltage (V)    | $R_{ON}$ ( , max) | $I_{L(OFF)}$ (nA) | $R_{FLAT(ON)}$ ( , max) | Packages        |  |  |
|---------------|----------------|-----------------------|-------------------|-------------------|-------------------------|-----------------|--|--|
| MAX4667/68/69 | 2 x SPST NC/NO | $\pm 4.5$ to $\pm 20$ | 2.5               | 0.5               | 0.4                     | 16-PDIP/SO      |  |  |
| MAX4601/02/03 | 4 x SPST NC/NO |                       |                   |                   |                         | 16-PDIP/SO/SSOP |  |  |
| MAX4604/05/06 | 5              |                       | 0.5               |                   | 16-PDIP/SO              |                 |  |  |

## Low Leakage

| Part      | Function     | Supply Voltage (V)    | $R_{ON}$ ( , max) | $I_{L(OFF)}$ (nA) | $R_{FLAT(ON)}$ ( , max) | Packages                                     |
|-----------|--------------|-----------------------|-------------------|-------------------|-------------------------|----------------------------------------------|
| MAX336/37 | 2 x 8:1/16:1 | $\pm 4.5$ to $\pm 20$ | 400               | 0.05              | —                       | 28-SO/SSOP/PDIP, dice                        |
| MAX338/39 | 2 x 4:1/8:1  |                       |                   |                   |                         | 16-QSOP/PDIP/SO/TQFN, 16-DIP (ceramic), dice |

# Dual-Channel Buffers Support Up to 6Gbps Data Rates and Minimize Jitter Effects

Save Space and Cost in Enterprise and Computing Applications



## Save Space and Reduces BOM Cost

- Single +3.3V supply operation eliminates need for costly LDO
- Integrated 50Ω input/output termination resistors

## Two Integrated Modes Conserve Power and Battery Life

- SATA cable/drive detect consumes only 500µA (typ)
- Dynamic power reduction reduces power by 70%

## High Performance Increases Design Flexibility

- Supports SATA Rev 2.0 and 3.0 output levels
- Supports SATA OOB signaling
- Input equalization and selectable preemphasis compensate for longer traces

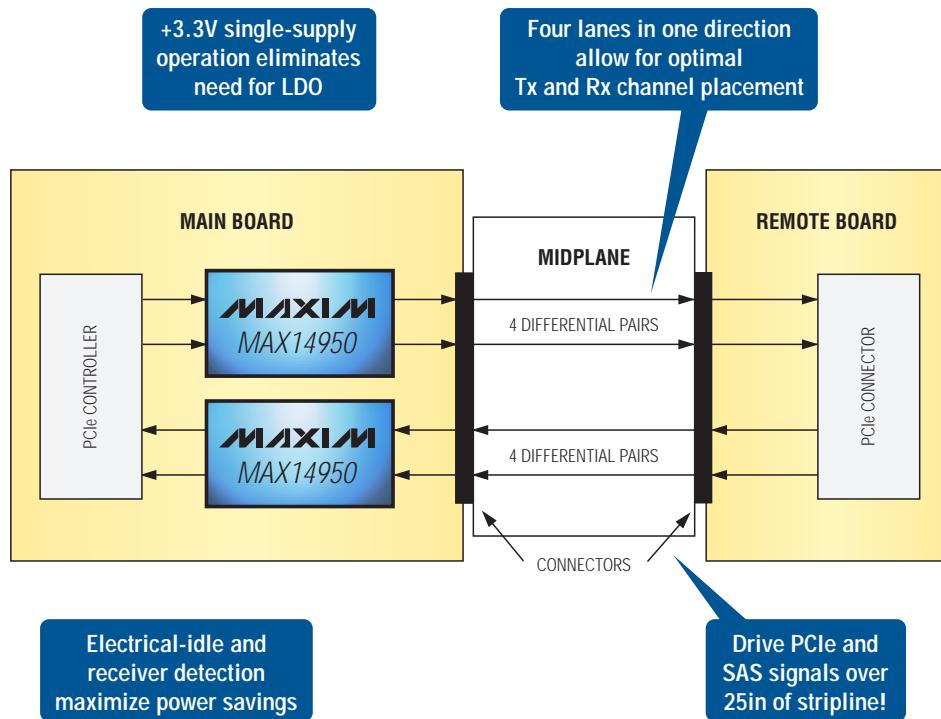
| Part      | Supply Voltage (V) | Channels | Interface* (Speed) | OOB Detection | Power-Save Mode | Programmable Input Equalization | Output De/Preemphasis | Deterministic Jitter | Package (mm x mm) |
|-----------|--------------------|----------|--------------------|---------------|-----------------|---------------------------------|-----------------------|----------------------|-------------------|
| MAX4951BE | 3.3                | 2        | eSATA (6Gbps)      |               |                 |                                 |                       | 20                   | 20-TQFN (4 x 4)   |
| MAX4951C  |                    |          | iSATA (6Gbps)      |               |                 |                                 |                       |                      |                   |

\*eSATA = external SATA; iSATA = internal SATA

# Integrated Redriver Enhances Signal Integrity at PCIe 3.0 Speeds

Ideal for Enterprise Systems with Long Traces of Stripline, Microstrip, or Cables

The MAX14950 is a 4-channel redriver/equalizer with programmable input equalization and output deemphasis to compensate for circuit board loss, all while redriving high-speed signals at PCIe® 3.0 (up to 8.0 GTps) data rates.



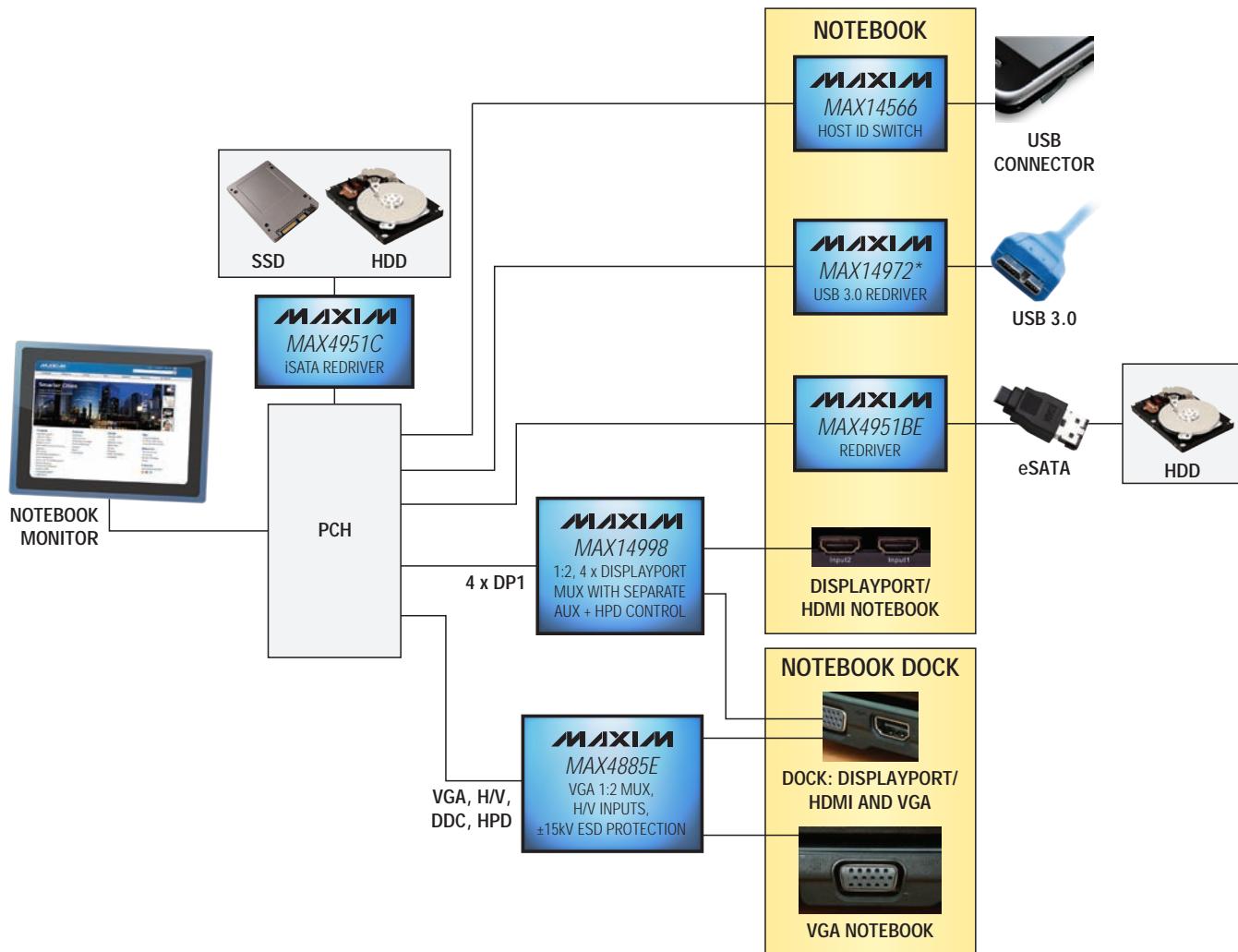
## Power-Saving Redrivers for Enterprise Applications

| Part     | Supply Voltage (V) | Channels | Interface (Speed)               | OOB Detection | Power-Save Mode | Programmable Input Equalization | Output De/Preemphasis | Deterministic Jitter (ps, max) | Package (mm x mm)   |  |
|----------|--------------------|----------|---------------------------------|---------------|-----------------|---------------------------------|-----------------------|--------------------------------|---------------------|--|
| MAX4952  | 3.3                | 4        | SAS 2.0 (6Gbps)                 |               |                 |                                 |                       | 20                             | 42-TQFN (3.5 x 9)   |  |
| MAX4952A |                    | 2        |                                 |               |                 |                                 |                       |                                | 28-TQFN (3.5 x 5.5) |  |
| MAX4952B |                    |          |                                 |               |                 |                                 |                       |                                | 20-TQFN (4 x 4)     |  |
| MAX4950  |                    | 4        | PCI Express® (PCIe) 2.0 (5GTps) |               |                 |                                 |                       | 15                             | 42-TQFN (3.5 x 9)   |  |
| MAX4950A |                    | 2        | PCIe 2.0 (5GTps)                |               |                 |                                 |                       |                                | 36-TQFN (6 x 6)     |  |
| MAX14950 |                    | 4        | PCIe 3.0 (8GTps)                |               |                 |                                 |                       |                                | 42-TQFN (3.5 x 9)   |  |

PCI Express and PCIe are registered trademarks of PCI-SIG Corporation.

# High-Speed Devices Save Power and Simplify Notebook Design While Improving Signal Integrity

Let Maxim's High-Speed Switches Inspire Your Next-Generation Notebook Designs



## Maxim's Total System Solution Optimizes Performance with Enhanced Feature Set

- Video devices include ultra-high bandwidth and ±15kV ESD performance

## All Redriver Solutions Integrate a Low-Power Setting Ideal for Saving Power in Portable Applications

- Dynamic power reduction and cable-detection modes (**MAX4951BE/MAX4951C**)

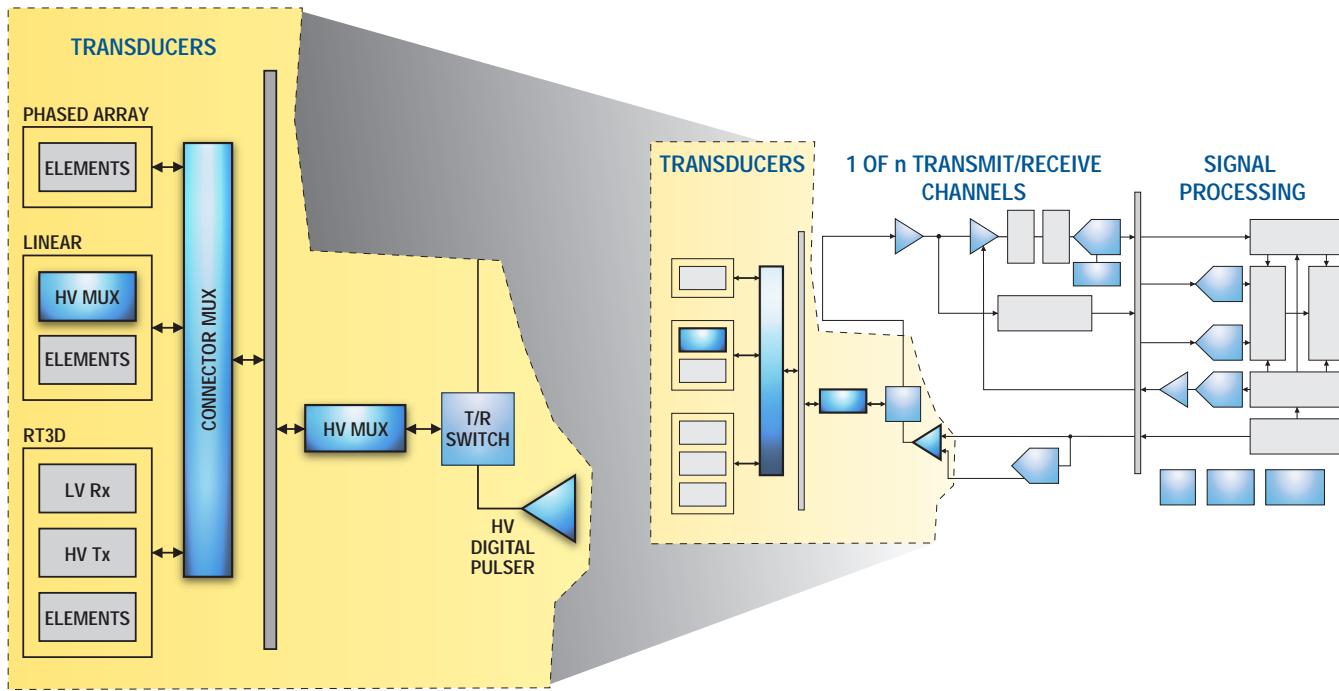
## Innovative Designs Eliminate Need for Costly LDOs/Linear Regulators

- Redrivers and high-speed digital video passive switches use Maxim's +3.3V single-supply operation
- Low  $R_{ON}$ , compensation, and fast timings enable high resolution and fast synching, plus prevent signal loss

\*Future product—contact factory for availability.

# High-Voltage Ultrasound Pulsers and Switches Enhance Ultrasound Images

Provide Superior Performance and Design Flexibility



## Improvements Over the Competition

### MAX4940/MAX4940A

Quad-Channel, High-Voltage, 2.0A Digital Pulsers

- Integrated active clamps minimize 2nd-harmonic distortion and reduce power consumption by 66% vs. HDL6V5581
- Capacitive architecture eliminates need for large, costly floating regulators and complex power sequencing
- AC-coupled architecture reduces overall footprint by up to 45% vs. HDL6V5581
- Five-level pulsing with active damping enables transmission for complex systems (MAX4940A)

### MAX14802/MAX14803/MAX14803A

### MAX4968\*/MAX4968A\*

16-Channel, High-Voltage Muxes

- Industry's smallest ( $32\text{mm}^2$ )—saves > 60% space over the competition (MAX14803A)
- Innovative architecture eliminates need for two dedicated high-voltage supplies (MAX4968/68A)
- > 50% better charge injection performance than the competition (MAX4968/68A)
- Latch-free design eliminates reliability issues (MAX4968/68A)

For More Information on Maxim's Industry-Leading Ultrasound Solutions,  
Visit: [www.maxim-ic.com/Ultrasound](http://www.maxim-ic.com/Ultrasound)

\*Future product—contact factory for availability. Specifications are preliminary.

# High-Bandwidth ICs Selector Guide

## High-Speed Redrivers (PCIe, SAS, SATA, etc.)

| Part      | Supply Voltage (V) | Channels | Mux | Interface (Speed) | OOB Detection | Power-Save Mode | Programmable Input Equalization | Output De/Preemphasis | Deterministic Jitter (ps, max) | Package (mm x mm)   |  |  |  |  |
|-----------|--------------------|----------|-----|-------------------|---------------|-----------------|---------------------------------|-----------------------|--------------------------------|---------------------|--|--|--|--|
| MAX4951BE | 3.3                | 2        | —   | eSATA (6Gbps)     |               |                 |                                 |                       | 20                             | 20-TQFN (4 x 4)     |  |  |  |  |
| MAX4951C  |                    |          |     | iSATA (6Gbps)     |               |                 |                                 |                       |                                | 42-TQFN (3.5 x 9)   |  |  |  |  |
| MAX4952   |                    | 4        |     | SAS 2.0 (6Gbps)   |               |                 |                                 |                       |                                | 28-TQFN (3.5 x 5.5) |  |  |  |  |
| MAX4952A  |                    | 2        |     | SAS 2.0 (6Gbps)   |               |                 |                                 |                       |                                | 20-TQFN (4 x 4)     |  |  |  |  |
| MAX4952B  |                    | 2        |     | PCIe 2.0 (5Gbps)  |               |                 |                                 |                       | 15                             | 42-TQFN (3.5 x 9)   |  |  |  |  |
| MAX4950   |                    | 4        |     | PCIe 2.0 (5Gbps)  |               |                 |                                 |                       |                                | 36-TQFN (6 x 6)     |  |  |  |  |
| MAX4950A  |                    | 2        |     | PCIe 3.0 (8Gbps)  |               |                 |                                 |                       |                                | 42-TQFN (3.5 x 9)   |  |  |  |  |
| MAX14950  |                    | 4        |     | PCIe 3.0 (8Gbps)  |               |                 |                                 |                       |                                | 20                  |  |  |  |  |
| MAX4986   |                    | 2        | 1:2 | SAS 2.0 (6Gbps)   |               |                 |                                 |                       |                                | 20-TQFN (4 x 4)     |  |  |  |  |
| MAX4969   |                    |          |     | PCIe 2.0 (5Gbps)  |               |                 |                                 |                       |                                | 42-TQFN (3.5 x 9)   |  |  |  |  |

## High-Frequency Analog Video Switches

| Part      | Supply Voltage (V) | Channels/Configuration | Interface | Bandwidth (MHz) | On-Resistance ( ) | Package (mm x mm) |
|-----------|--------------------|------------------------|-----------|-----------------|-------------------|-------------------|
| MAX4887   | 5                  | 1:2/2:1                | RGB       | 500             | 4                 | 16-TQFN (3 x 3)   |
| MAX4885   |                    |                        |           | 350             | 7                 | 32-TQFN (5 x 5)   |
| MAX4885E  |                    | 1:2                    | VGA       | 1000            | 6                 | 24-TQFN (4 x 4)   |
| MAX4885AE |                    | 2:1                    |           | 900             | 5                 | 28-TQFN (4 x 4)   |
| MAX14885E |                    | 2:2                    |           | 700             |                   | 40-TQFN (5 x 5)   |

## High-Speed Passive PCIe and Digital Video Switches

| Part         | Supply Voltage (V) | Channels | Configuration                                  | Interface (Speed)                                 | On-Resistance ( ) | Package (mm x mm)   |
|--------------|--------------------|----------|------------------------------------------------|---------------------------------------------------|-------------------|---------------------|
| MAX4888/88A  | 3.3                | 2        | 1:2/2:1                                        | PCIe 1.0, 2.0 (5Gbps)                             | 7                 | 28-TQFN (3.5 x 5.5) |
| MAX4889/89A  |                    |          |                                                |                                                   | 7                 | 42-TQFN (3.5 x 9)   |
| MAX4889B/89C |                    | 4        |                                                | PCIe 3.0 (8Gbps)                                  | 6.4               |                     |
| MAX4928A/28B |                    | 6        | 1:2                                            | PCIe 1.0, 2.0 (5Gbps); DisplayPort 1.2 (21.6Gbps) | 8                 | 56-TQFN (5 x 11)    |
| MAX4998      |                    | 4        | 1:2/2:1                                        | PCIe 3.0 (8Gbps); DisplayPort 1.2 (21.6Gbps)      | 7                 | 28-TQFN (3.5 x 5.5) |
| MAX14998     |                    | 6        |                                                |                                                   |                   | 42-TQFN (3.5 x 9)   |
| MAX14886     |                    | 2:1      | HDMI 1.4 (100Mbps); DisplayPort 1.2 (21.6Gbps) | 6                                                 | 40-TQFN (5 x 5)   |                     |
| MAX14979E    |                    | 1:2/2:1  |                                                | LVDS (up to 1.3Gbps)                              | 4                 | 36-TQFN (6 x 6)     |

## Design Resources

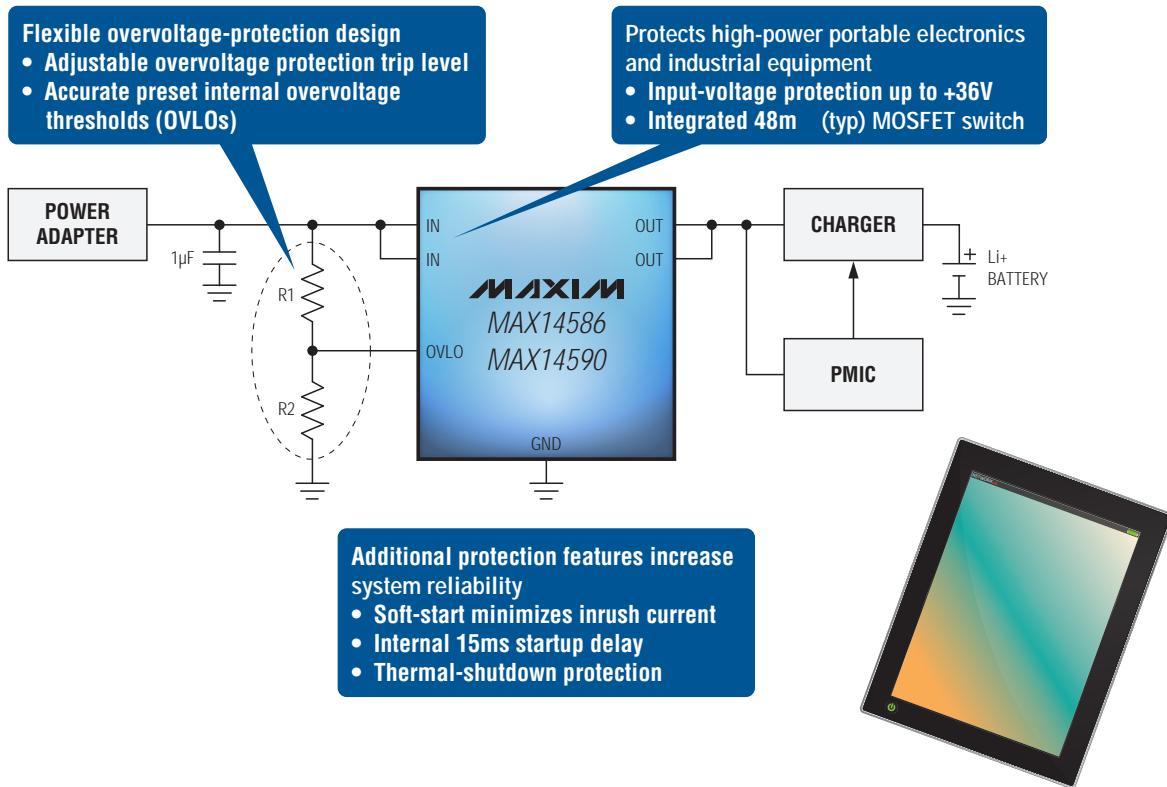
Application Notes: [www.maxim-ic.com/MuxSwitch-AppNotes](http://www.maxim-ic.com/MuxSwitch-AppNotes)

Evaluation Kits: [www.maxim-ic.com/MuxSwitch-EVKits](http://www.maxim-ic.com/MuxSwitch-EVKits)

Frequently Asked Questions: [www.maxim-ic.com/MuxSwitch-FAQs](http://www.maxim-ic.com/MuxSwitch-FAQs)

Parametric Search: [www.maxim-ic.com/MuxSwitch-Search](http://www.maxim-ic.com/MuxSwitch-Search)

# 36V Overvoltage Protectors Handle 3A for High-Power Applications



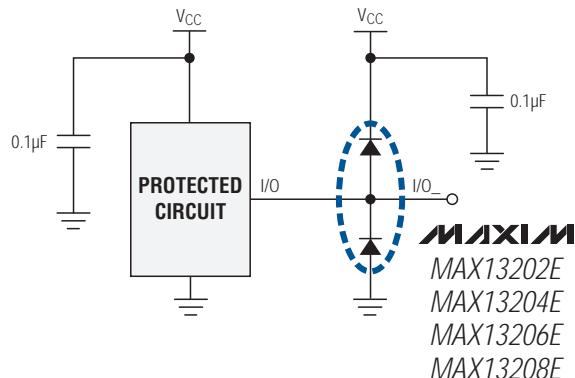
## Overvoltage Protectors with Integrated FET

| Part          | Supply Voltage (V) | OVLO (V) | UVLO (V) | R <sub>ON</sub> (mΩ) | Features                                               | Overcurrent Mode                          | Package (mm x mm) |
|---------------|--------------------|----------|----------|----------------------|--------------------------------------------------------|-------------------------------------------|-------------------|
| MAX14527/28   | 2.2 to 28          | 5.8/6.8  | —        | 100                  | Adjustable OVLO from 4V to 8V                          | —                                         | 8-TDFN (2 x 2)    |
| MAX14562      | 2.2 to 36          | 5.15     |          | 160                  | Regulated 5.15V output                                 |                                           |                   |
| MAX14586/90   |                    | 7/15     |          | 48                   | 3A continuous current capability, 4V to 20V (adj) OVLO |                                           |                   |
| MAX14529E/30E | 2.2 to 28          | 5.8/6.8  |          | 35                   | USB charger detection, 3.3V LDO, ±15kV ESD protection* | EN input, negative overvoltage protection |                   |
| MAX4970       |                    | 5.8      | 2.45     | 40                   | Autoretry                                              | 12-WLP (2 x 1.5)                          |                   |
| MAX4971       |                    | 6.35     |          |                      |                                                        |                                           |                   |
| MAX4972       |                    | 4.65     |          |                      |                                                        |                                           |                   |
| MAX4978       | 2.3 to 28          | 5.7      | 4.4      | 85                   | Active current limit, battery overcharge protection    | Autoretry                                 | 8-TDFN (2 x 2)    |
| MAX4980/81    |                    |          | 2.63     |                      |                                                        |                                           |                   |
| MAX4944       | 2.2 to 28          | 6.35     | 4.15     | 80                   | Negative polarity protection†                          | Latchoff                                  | 8-µDFN (2 x 2)    |
| MAX4945       |                    | 5.8      |          |                      |                                                        |                                           |                   |
| MAX4949       |                    | 8.9      |          |                      |                                                        |                                           |                   |

Additional overvoltage protectors are available—contact the factory for unlisted options.

\*Human Body Model (HBM). Requires 1μF capacitor on IN; no capacitor required for ±2kV HBM ESD protection.  
†Optional. Requires external pFET.

# Easily Add High-ESD Protection to an Existing System

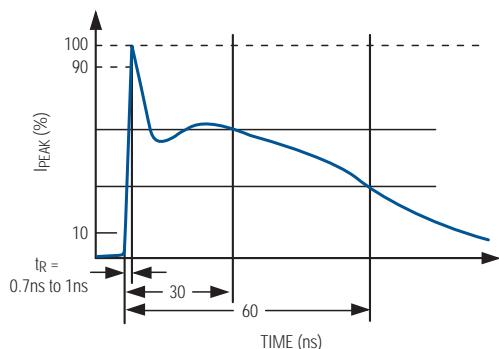


## MAX13202E/04E/06E/08E

### **±30kV ESD-Protection Diode Arrays**

- Protect sensitive electronics attached to communication lines
- Each channel consists of a pair of diodes that steer ESD current pulses away from protected circuitry to  $V_{CC}$  or GND
- Ultra-low 1nA (max) leakage current eases limited power budgets
- Low 6pF input capacitance is ideal for high-speed data lines

**ESD Generator Current Waveform**



ESD-protected up to  $\pm 15\text{kV HBM}$  and  $\pm 30\text{kV Air-Gap Discharge}$ , as specified in IEC 61000-4-2.



The MAX13204E quad-ESD structure is designed for Ethernet and FireWire® (IEEE 1394) applications, while other 2-/6-/8-channel configurations are suitable for phone and video connections, etc.

## ESD-Protection Diode Arrays

| Part      | Channels | ESD Protection (kV) |                                 |                                 | Input Capacitance (pF) | $V_{SUPPLY}$ (V) | Package               |     |                 |  |
|-----------|----------|---------------------|---------------------------------|---------------------------------|------------------------|------------------|-----------------------|-----|-----------------|--|
|           |          | Human Body Model    | IEC 61000-4-2 Contact Discharge | IEC 61000-4-2 Air-Gap Discharge |                        |                  |                       |     |                 |  |
| MAX3207E  | 2        | ±15                 | ±8                              | ±15                             | 2.5                    | 0.9 to 5.5       | 6-SOT23               |     |                 |  |
| MAX3202E  |          |                     |                                 |                                 | 5.0                    |                  | 6-TDFN, 4-UCSP, 4-WLP |     |                 |  |
| MAX13202E |          |                     | ±12                             | ±30                             | 6.0                    | 0.9 to 16.0      | 6-µDFN                |     |                 |  |
| MAX3203E  |          |                     | ±8                              | ±15                             | 5.0                    | 0.9 to 5.5       | 6-TDFN, 5-UCSP, 6-WLP |     |                 |  |
| MAX3208E  | 4        |                     |                                 |                                 | 2.6                    |                  | 10-µMAX, 16-TQFN      |     |                 |  |
| MAX3204E  |          |                     |                                 |                                 | 5.0                    |                  | 6-TDFN, 6-UCSP, 6-WLP |     |                 |  |
| MAX13204E | ±14      |                     | ±30                             | 6.0                             | 0.9 to 16.0            | 6-µDFN           |                       |     |                 |  |
| MAX3205E  | ±8       |                     | ±15                             | 2.5                             | 0.9 to 5.5             | 16-TQFN, 8-UCSP  |                       |     |                 |  |
| MAX3206E  |          |                     |                                 | 6                               |                        |                  |                       | 5.0 | 12-TQFN, 8-UCSP |  |
| MAX13206E | ±14      |                     | ±30                             | 6.0                             | 0.9 to 16.0            | 8-µDFN           |                       |     |                 |  |
| MAX13208E |          |                     |                                 | 10-µDFN                         |                        |                  |                       |     |                 |  |

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µMAX is a registered trademark of Maxim Integrated Products, Inc.

# Current-Limit Switches Selector Guide

## Adjustable Threshold

| Part      | Current Limit Threshold (mA) | Supply Voltage (V) | R <sub>ON</sub> (mΩ) | Overcurrent Mode                                  | Fault Output | Package                   |
|-----------|------------------------------|--------------------|----------------------|---------------------------------------------------|--------------|---------------------------|
| MAX4995   | 50 to 600                    | 1.7 to 5.5         | 130                  | Autoretry (A/AL/AF), latchoff (B), continuous (C) |              | 10-UTQFN, 6-SOT23, 8-TDFN |
| MAX14523  | 250 to 1500                  |                    | 70                   | Autoretry (A), latchoff (B), continuous (C)       |              | 8-TDFN                    |
| MAX14575* | 250 to 2500                  |                    | 2.3 to 5.5           | Autoretry (A/AL), latchoff (B), continuous (C)    |              |                           |

## Pin-Selectable Threshold

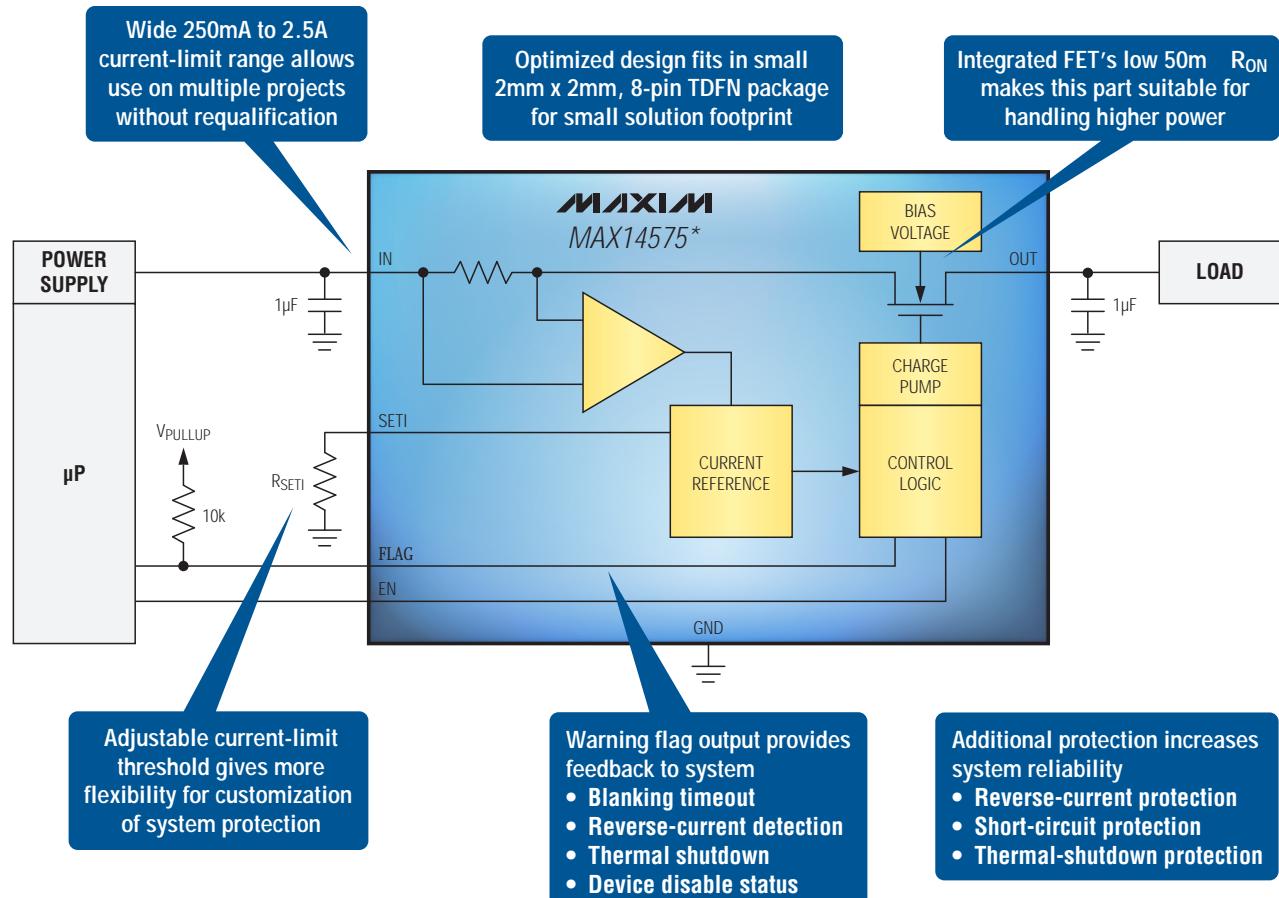
| Part    | Current Limit Threshold (mA) | Supply Voltage (V) | R <sub>ON</sub> (mΩ) | Overcurrent Mode | Fault Output | Package |
|---------|------------------------------|--------------------|----------------------|------------------|--------------|---------|
| MAX4772 | 200, 500                     | 2.0 to 4.5         | 200                  | Latchoff         |              | 6-SOT23 |
| MAX4773 |                              |                    |                      | Autoretry        |              |         |

## Fixed Threshold

| Part       | Current Limit Threshold (mA) | Supply Voltage (V) | R <sub>ON</sub> (mΩ) | Overcurrent Mode                          | Fault Output | Package                   |  |
|------------|------------------------------|--------------------|----------------------|-------------------------------------------|--------------|---------------------------|--|
| MAX4785    | 50                           | 2.3 to 5.5         | 700                  | Latchoff                                  |              | 4-/5-SC70                 |  |
| MAX4786    |                              |                    |                      | Autoretry                                 |              | 4-SC70                    |  |
| MAX4826    |                              |                    |                      | Latchoff                                  |              | 6-µDFN                    |  |
| MAX4830    |                              |                    |                      |                                           |              |                           |  |
| MAX4914B   | 100                          | 2.3 to 5.5         | 200                  | Autoretry                                 |              | 4-/5-SC70                 |  |
| MAX4787    |                              |                    |                      |                                           |              | 4-SC70                    |  |
| MAX4788    |                              |                    |                      | Continuous                                |              | 6-µDFN                    |  |
| MAX4829    |                              |                    |                      |                                           |              | 6-TDFN                    |  |
| MAX4832/33 | 2.5 to 5.5                   | 750                | 700                  | Latchoff                                  |              | 4-SOT143, 5-SOT23, 6-TDFN |  |
| MAX4789    |                              |                    |                      | Autoretry                                 |              | 4-SOT143, 6-TDFN          |  |
| MAX4790    |                              |                    |                      | Autoretry (MAX4915A), latchoff (MAX4915B) |              | 6-µDFN, 5-SOT23           |  |
| MAX4915A/B |                              |                    |                      | Latchoff                                  |              | 4-SOT143, 5-SOT23, 6-TDFN |  |
| MAX4791    | 250                          | 2.3 to 5.5         | 400                  | Autoretry                                 |              | 4-SOT143, 6-TDFN          |  |
| MAX4792    |                              |                    |                      | Continuous                                |              | 6-TDFN                    |  |
| MAX4834/35 |                              |                    |                      | Latchoff                                  |              | 4-SOT143, 5-SOT23, 6-TDFN |  |
| MAX4793    |                              |                    |                      | Autoretry                                 |              | 6-µDFN, 5-SOT23           |  |
| MAX4794    | 300                          | 2.3 to 5.5         | 200                  | Autoretry (MAX4917A), latchoff (MAX4917B) |              | 4-SOT143, 5-SOT23, 6-TDFN |  |
| MAX4917A/B |                              |                    |                      | Latchoff                                  |              | 4-SOT143, 6-TDFN          |  |
| MAX4795    |                              |                    |                      | Autoretry                                 |              | 6-µDFN, 5-SOT23           |  |
| MAX4796    |                              |                    |                      | Latchoff                                  |              | 5-SOT23                   |  |
| MAX4797    | 450                          | 2.0 to 4.5         | 400                  | Autoretry                                 |              | 4-SOT143, 6-TDFN          |  |
| MAX4798    |                              |                    |                      | Latchoff                                  |              | 6-TDFN                    |  |
| MAX4836/37 |                              |                    |                      | Autoretry                                 |              | 6-TDFN                    |  |
|            |                              |                    |                      | Continuous                                |              |                           |  |

\*Future product—contact factory for availability.

# Versatile 250mA to 2.5A Current-Limit Switches Ensure Reliability



\*Future product—contact factory for availability.

Signal Routing & Protection-2 Rev 1 US 5/11



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