

# MAX5991A/MAX5991B

## IEEE 802.3af-Compliant, High-Efficiency, Class 1/Class 2, Powered Devices with Integrated DC-DC Converter

### General Description

The MAX5991A/MAX5991B provide a complete power-supply solution as IEEE® 802.3af-compliant Class 1/Class 2 Powered Devices (PDs) in a Power-over-Ethernet (PoE) system. The devices integrate the PD interface with an efficient DC-DC converter, offering a low external part count PD solution. The devices also include a low-drop-out regulator, MPS, sleep, and ultra-low power modes.

The PD interface provides a detection signature and a Class 1/Class 2 classification signature with a single external resistor. The PD interface also provides an isolation power MOSFET, a 60mA (max) inrush current limit, and a 321mA (typ) operating current limit.

The integrated step-down DC-DC converter uses a peak current-mode control scheme and provides an easy-to-implement architecture with a fast transient response. The step-down converter operates in a wide input voltage range from 8.7V to 60V and supports up to 6.49W of input power at 1.3A load. The DC-DC converter operates at a fixed 430kHz switching frequency, with an efficiency-boosting frequency foldback that reduces the switching frequency by half at light loads.

The devices feature an input undervoltage-lockout (UVLO) with wide hysteresis and long deglitch time to compensate for twisted-pair cable resistive drop and to assure glitch-free transition during power-on/-off conditions. The devices also feature overtemperature shutdown, short-circuit protection, output overvoltage protection, and hiccup current limit for enhanced performance and reliability.

All devices are available in a 20-pin, 4mm x 4mm, TQFN power package and operate over the -40°C to +85°C temperature range.

### Applications

IEEE 802.3af-Powered Devices  
IP Phones  
Wireless Access Nodes  
IP Security Cameras  
WiMAX® Base Stations

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### Benefits and Features

- ◆ IEEE 802.3af Compliant
- ◆ PoE Class 1/Class 2 Classification
- ◆ Intelligent Maintain Power Signature (MPS)
- ◆ Sleep and Ultra-Low Power Mode
- ◆ Simplified Wall Adapter Interface
- ◆ Efficient, Integrated DC-DC Converter (with Integrated Switches)
- ◆ 8.7V to 60V Wide Input Voltage Range
- ◆ 3.2V to 14V Programmable Output Voltage Range
- ◆ Internal Compensation
- ◆ Fixed 430kHz Switching Frequency
- ◆ Frequency Foldback for High-Efficiency Light-Load Operation
- ◆ Built-In Output-Voltage Monitoring
- ◆ Open-Drain  $\overline{\text{RESET}}$  Output
- ◆ Protects Against Overload, Output Short Circuit, Output Overvoltage, and Overtemperature
- ◆ Hiccup-Mode Runaway Current Limit
- ◆ Back-Bias Capability to Optimize the Efficiency
- ◆ Integrated TVS Diode Withstands Cable Discharge Event (CDE)
- ◆ Internal LDO Regulator with Up to 100mA Load
- ◆ 49mA (typ) Inrush Current Limit
- ◆ Pass 2kV, 200m CAT-6 Cable Discharge Event

*[Ordering Information](#) appears at end of data sheet.*

*For related parts and recommended products to use with this part, refer to [www.maximintegrated.com/MAX5991A/MAX5991B.related](http://www.maximintegrated.com/MAX5991A/MAX5991B.related).*

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

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### Chip Information

PROCESS: BiCMOS

### Package Information

For the latest package outline information and land patterns (footprints), go to [www.maximintegrated.com/packages](http://www.maximintegrated.com/packages). Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

PACKAGE TYPE	PACKAGE CODE	OUTLINE NO.	LAND PATTERN NO.
20 TQFN-EP	T2044+4	<a href="#">21-0139</a>	<a href="#">90-0037</a>

### Ordering Information

PART	PIN-PACKAGE	SLEEP/ULP MODE	LDO	UVLO (V)	RESET	MPS/CLASS2	OUTPUT <sub>ADJ</sub>
MAX5991AETP+	20 TQFN-EP*	Yes	Yes	38.7	Yes	Yes	Yes
MAX5991BETP+	20 TQFN-EP*	Yes	Yes	38.7	Yes	Yes	Yes

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

\*EP = Exposed pad.