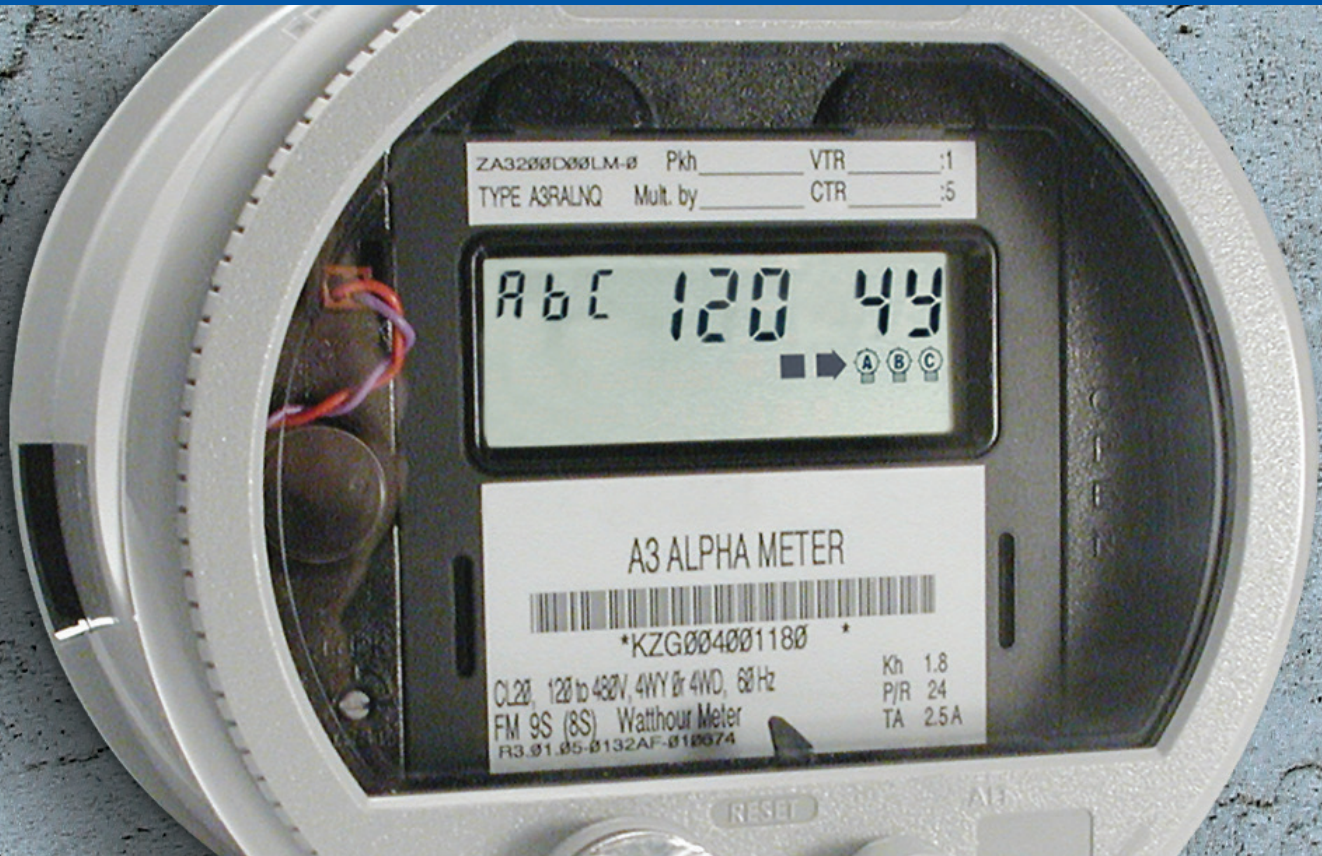


SMART METERS AND AUTOMATED METER READER (AMR) APPLICATION BRIEF



Keep data flowing, even when power isn't. The smart grid requires next-generation metrology and sensing to provide utilities and customers accurate and fail-safe data communication from an ever-increasing number of locations.

The demand for enhanced connectivity, dependability and security is rapidly driving the development of more powerful, outage-proof smart meter and automated meter reader (AMR) technologies based on Maxwell ultracapacitors. Maxwell is proud to offer an extensive product line to address the robust needs of the metering market, enabling key functionality such as data delivery, even when power is lost. Benefits of Maxwell ultracapacitors in gas, water, and electricity smart meters include:

- Short-term power hold to access critical information and functions in the event of primary power loss
- XP™: Extended performance in a high temperature and high humidity environment†
- Reduce or eliminate battery maintenance and replacement costs
- Compliant with UL, RoHS, and REACH requirements
- Long lifetime and reliable operation at temperatures ranging from -40° to $+85^{\circ}\text{C}$ (at 85°C , voltage derated from 3.0V to 2.7V)

*Results may vary. Additional terms and conditions, including the limited warranty, apply at the time of purchase. See the warranty details for applicable operating and use requirements.

†Based on results from biased humidity testing.

Ultracapacitors

Electrochemical double layer capacitors (EDLCs) are also known as electric double layer capacitors, supercapacitors or ultracapacitors. They deliver energy at relatively high rates (beyond those accessible with batteries) as the mechanism of energy storage is by charge-separation. Ultracapacitors store charge electrostatically (non-Faradaic) by reversible adsorption of the electrolyte onto electrochemically stable high surface area carbon electrodes. Charge separation occurs on polarization at the electrode/electrolyte interface, producing a double layer. This mechanism is highly reversible, allowing the ultracapacitor to be charged and discharged hundreds of thousands to even millions of times.

Background

Maxwell Technologies is the global leader in ultracapacitor technology, with over 100 million cells deployed in the field into applications such as grid energy storage, renewable energy generation, automotive, and consumer electronics. Our global R&D, manufacturing, and field support capabilities allow us to deliver unsurpassed value to our customers, from early design to solution launch.



Specifications

Model Number	BCAP0003 P300 X11/X12	BCAP0005 P300 X11	BCAP0010 P300 X11/X12	BCAP0025 P300 X11/X12	BCAP0050 P300 X11
Part Number	134995 / 134996	134997	134998 / 134999	135001 / 135002	135003
Rated Capacitance (F)	3	5	10	25	50
Typical ESR _{DC} (mΩ)	55	36	25	16	10
Impedance Match Specific Power, P _{max} (kW/kg)	16.9	23.8	29.0	15.5	14.9
Specific Energy, E _{max} (Wh/kg)	2.7	3.0	4.0	4.7	5.4

*Results may vary. Additional terms and conditions, including the limited warranty, apply at the time of purchase. See the warranty details for applicable operating and use requirements.

Please contact Maxwell Technologies directly for any technical specifications critical to application. Products and related processes may be covered by one or more U.S. or international patents and pending applications. Please see www.maxwell.com/patents for more information.

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