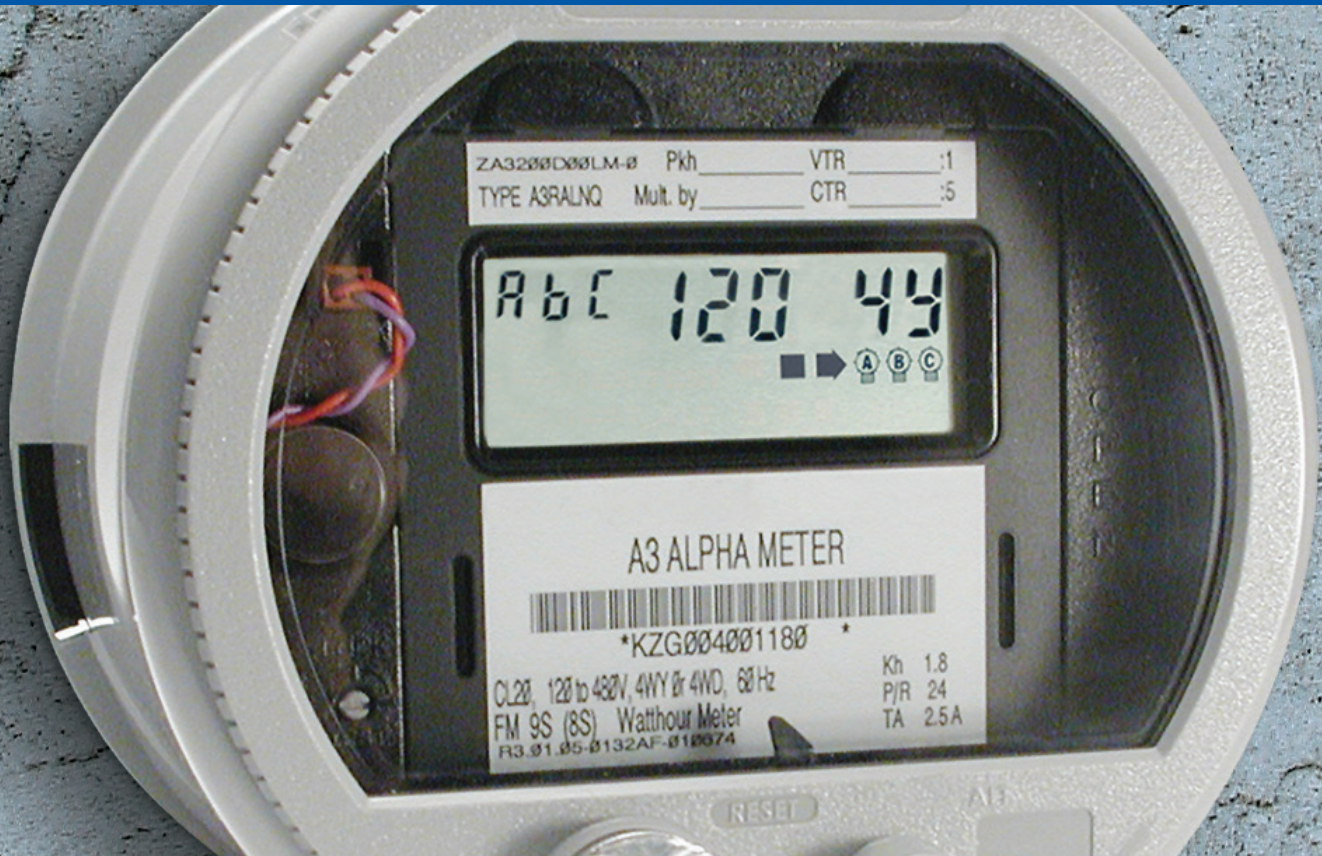


# SMART METERS AND AMR APPLICATION BRIEF



**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 connectedness, dependability and security is rapidly driving the development of more powerful, outage-proof smart meter and 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:

- Keep critical information and functions accessible in the event of primary power loss
- Reduce or eliminate battery maintenance and replacement costs
- Long lifetime and reliable operation in temperatures ranging from  $-40^{\circ}$  to  $+85^{\circ}\text{C}$  with derated voltage down from 2.7V to 2.3V\*
- XP: 3X lifetime improvement under biased humidity testing (at 2.7V,  $60^{\circ}\text{C}$ , 90% RH) versus standard Maxwell ultracapacitors
- Compliant with UL, RoHS, and REACH requirements

\*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.

## Ultracapacitors

Ultracapacitors are energy storage devices that provide burst power for applications requiring high power functions. Unlike batteries, which store energy via chemical reaction, ultracapacitors store energy by electrostatically (physically) separating positive and negative charges. The ultracapacitor's electrostatic energy storage permits the device to be rapidly charged and discharged for hundreds of thousands of cycles,\* as compared to batteries, which typically perform only hundreds or thousands of charge/discharge cycles. Ultracapacitors are a reliable, energy-efficient and cost-effective solution for storing energy.

## Background

Maxwell Technologies is the global leader in ultracapacitor technology and is changing the way energy is used and stored, with over 50 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 P270 X01	BCAP0005 P270 X01	BCAP0010 P270 X01	BCAP0025 P270 X01	BCAP0050 P270 X01
Part Number	133513	133515	133517	133519	133521
Min Cap. Initial (F)	2.7	4.5	9	22.5	45
Maximum ESR <sub>DC</sub> , Initial (mΩ)	142.9	98.2	33.2	25.6	16.5
Leakage Current at 25°C, Max. (mA)	0.0071	0.0125	0.0249	0.0549	0.0963
Impedance Match Specific Power, P <sub>max</sub> (W/kg)	9,100	8,800	17,000	10,000	8,900
Specific Energy, E <sub>max</sub> (Wh/kg)	2.2	2.4	3.2	3.7	4.1

\*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. All products featured on this datasheet are covered by the following U.S. patents and their respective foreign counterparts: 6525924, 6643119, 7295423, 7342770, 7352558, 7384433, 7492571, 7508651, 7791860, 7791861, 7883553, 7935155, 8072734, 8279580, and patents pending.

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