Maxwell TECHNOLOGIES
Enabling Energy's Future™

DATASHEET

2.7V 310 & 350F ULTRACAPACITOR CELLS

FEATURES AND BENEFITS

- Up to 500,000 duty cycles or 10 year life*
- Low internal resistance
- High power performance
- 310F and 350F capacitance values
- Radial terminals for PCB mounting

TYPICAL APPLICATIONS

- Wind turbine pitch control
- Automotive subsystems
- Small UPS systems
- Consumer and industrial electronics
- Medical equipment
- Portable tools

PRODUCT SPECIFICATIONS

ELECTRICAL	BCAP0310	BCAP0350
Rated Capacitance[1]	310 F	350 F
Minimum Capacitance, initial[1]	310 F	350 F
Maximum $ESR_{DC,}$ initial[1]	2.2 mΩ	3.2 mΩ
Test Current for Capacitance and ESR_{DC}[1]	31 A	35 A
Rated Voltage	2.70 V	2.70 V / 2.50 V
POWER & ENERGY		
Usable Specific Power, P_d[4]	6,600 W/kg	4,600 W/kg
Impedance Match Specific Power[5]	14,000 W/kg	9,500 W/kg
Specific Energy, E_{max}[6]	5.2 Wh/kg	5.9 Wh/kg
Stored Energy[7,11]	0.31 Wh	0.35 Wh
SHOCK & VIBRATION		
Vibration Specification	IEC 60068.2.6, SAE J2380	IEC 60068.2.6, SAE J2380
Shock Specification	IEC 60068.2.27, SAE J2464	IEC 60068.2.27, SAE J2464
SAFETY		
Short Circuit Current, typical (Current possible with short circuit from rated voltage. Do not use as an operating current.)	1,200 A	840 A
Certifications	UL810a, RoHS	UL810a, RoHS
THERMAL		
Thermal Resistance ($R_{ca,}$ Case to Ambient), typical[8]	10.9°C/W	10.9°C/W
Thermal Capacitance (C_{th}), typical[8]	60 J/°C	60 J/°C
Maximum Continuous Current ($\Delta T = 15°C$)[8]	25 A_{RMS}	21 A_{RMS}
Maximum Continuous Current ($\Delta T = 40°C$)[8]	41 A_{RMS}	34 A_{RMS}

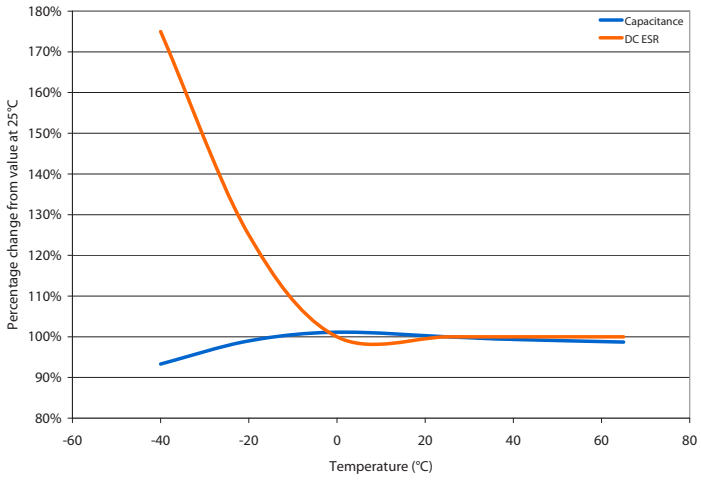
*Results may vary. Additional terms and conditions, including the limited warranty, apply at the time of purchase. See the warranty details for applicable operating and use requirements.

TYPICAL CHARACTERISTICS

TEMPERATURE	BCAP0310	BCAP0350
Operating temperature (Cell case temperature)		
Minimum	-40°C	-40°C
Maximum	65°C	65°C / 70°C
Storage temperature range (Stored uncharged)		
Minimum	-40°C	-40°C
Maximum	70°C	70°C
ELECTRICAL		
Absolute Maximum Voltage[2]	2.85 V	2.85 V
Absolute Maximum Current	250 A	170 A
Leakage Current at 25°C, maximum[3]	0.45 mA	0.30 mA
LIFE*		
DC Life at High Temperature[1] (at Rated Voltage & Maximum Operating Temperature)	1,500 hours	1,500 hours
Capacitance Change (% decrease from minimum initial value)	20%	20%
ESR Change (% increase from maximum initial value)	100%	100%
Projected DC Life at 25°C[1] (held continuously at Rated Voltage)	10 years	10 years
Capacitance Change (% decrease from minimum initial value)	20%	20%
ESR Change (% increase from maximum initial value)	100%	100%
Projected Cycle Life at 25°C[1,9,10]	500,000 cycles	500,000 cycles
Capacitance Change (% decrease from minimum initial value)	20%	20%
ESR Change (% increase from maximum initial value)	100%	100%
Test Current	31 A	35 A
Shelf Life (Stored uncharged at 25°C)	4 years	4 years
PHYSICAL		
Mass, typical	60 g	60 g
Terminals	Radial Tab	Radial Tab

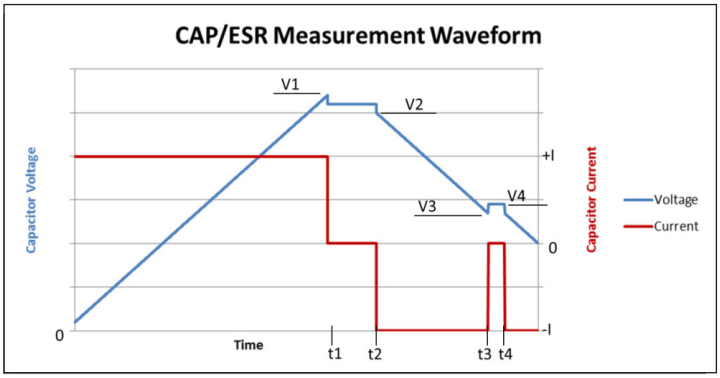
*Results may vary. Additional terms and conditions, including the limited warranty, apply at the time of purchase. See the warranty details for applicable operating and use requirements.

ESR AND CAPACITANCE VS TEMPERATURE

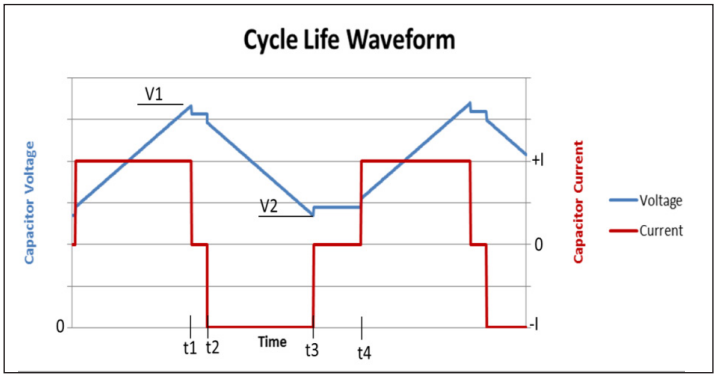


NOTES

1. Capacitance and ESR_{DC} measured at 25°C using specified test current per waveform below.
2. Absolute maximum voltage, non-repeated. Not to exceed 1 second.
3. After 72 hours at rated voltage. Initial leakage current can be higher.
4. Per IEC 62391-2, $P_d = \frac{0.12V^2}{ESR_{DC} \times mass}$
5. $P_{max} = \frac{V^2}{4 \times ESR_{DC} \times mass}$
6. $E_{max} = \frac{½\ CV^2}{3{,}600 \times mass}$
7. $E_{stored} = \frac{½\ CV^2}{3{,}600}$
8. $\Delta T = I_{RMS}^2 \times ESR \times R_{ca}$
9. Cycle using specified test current per waveform below.
10. Cycle life varies depending upon application-specific characteristics. Actual results will vary.
11. Per United Nations material classification UN3499, all Maxwell ultracapacitors have less than 10 Wh capacity to meet the requirements of Special Provisions 361. Both individual ultracapacitors and modules composed of those ultracapacitors shipped by Maxwell can be transported without being treated as dangerous goods (hazardous materials) under transportation regulations.



$V1 = V_{rated}$ t2 - t1 = 15 seconds Capacitance = I x (t3-t2)/(V2-V3)
$V3 = 0.5 \times V_{rated}$ t4 - t3 = 5 seconds ESR = (V4 - V3)/I



$V1 = V_{rated}$ t2 - t1 = 5 seconds (I=0)
$V2 = 0.5 \times V_{rated}$ t4 - t3 = 15 seconds (I=0)

MOUNTING RECOMMENDATIONS

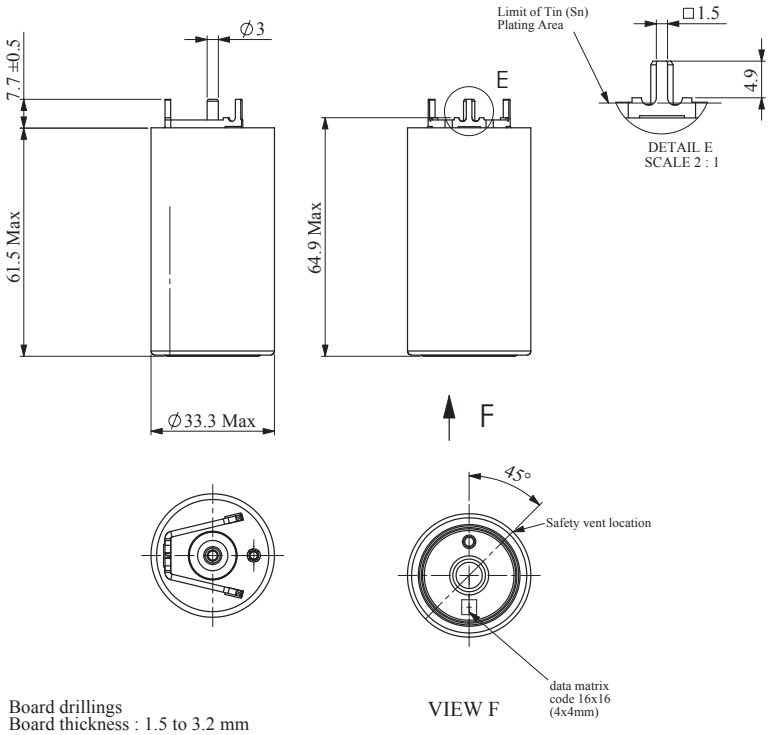
Do not reverse polarity. Please refer to document number 1008238, available at maxwell.com for soldering recommendations.

MARKINGS

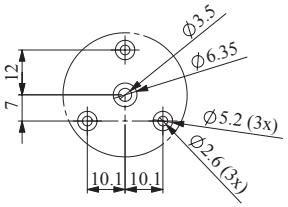
Products are marked with the following information: Rated capacitance, rated voltage, product number, name of manufacturer, positive terminal, warning marking, serial number.

NOTE: Center Pin is negative terminal.

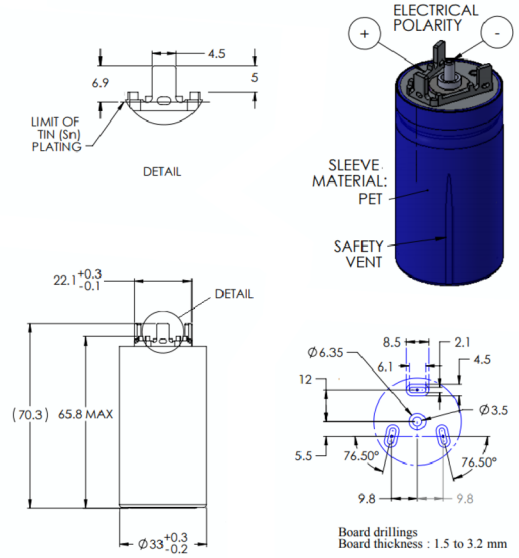
BCAP0350 E270 T11



Board drillings
Board thickness : 1.5 to 3.2 mm



BCAP0350 E270 T13



Board drillings
Board thickness : 1.5 to 3.2 mm

Part Description	Dimensions (mm)		Package Quantity
	L (max)	D (max)	
BCAP0350 E270 T11/13	61.5	33.3	250

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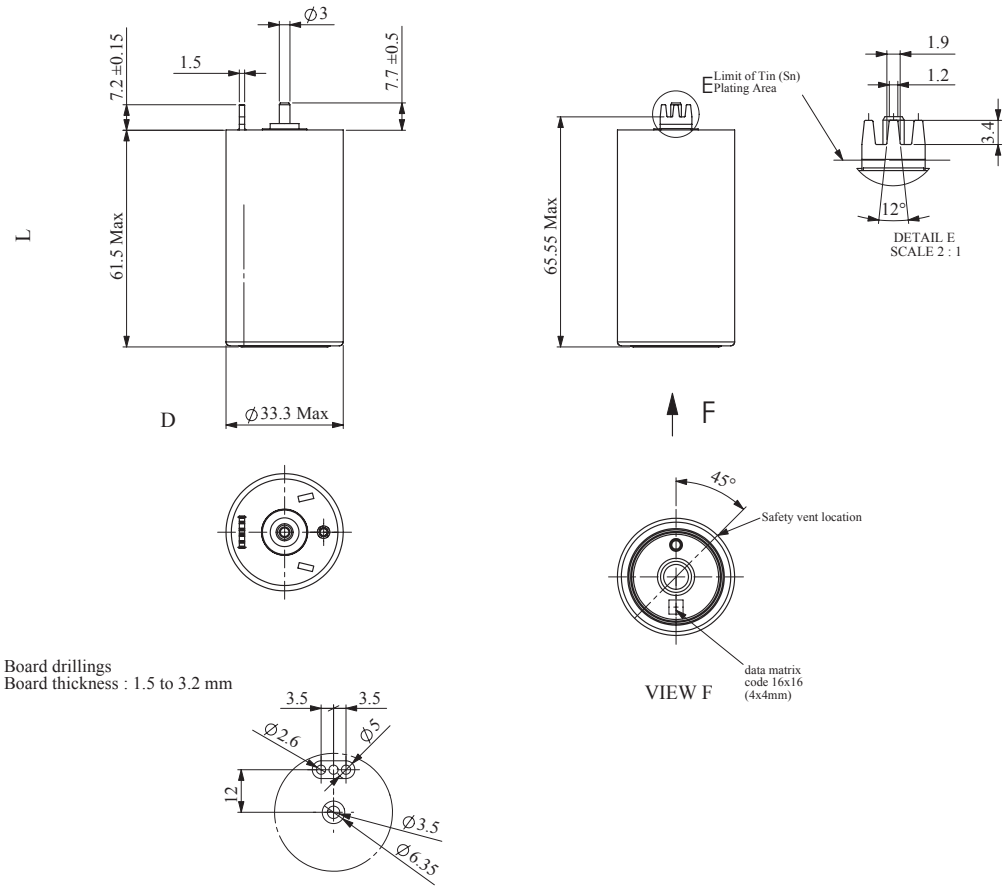
BCAP0310 P270 T10



Part Description	Dimensions (mm)		Package Quantity
	L (max)	D (max)	
BCAP0310 P270 T10	61.5	33.3	250

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