



PRC TECH LLC
HIGH ENERGY SUPERCAPACITORS
FOR
BACKUP POWER AND TRANSPORTATION

PRODUCT CATALOG

SUPERCAPACITOR TECHNOLOGY

Hybrid, High-Energy Supercapacitors/Ultracapacitors

Supercapacitor is an electrochemical energy storage device between traditional capacitors and batteries; it stores energy by the electrochemical double layers formed on the electrode / electrolyte interface by rapid internal charge separation.

Hybrid Supercapacitors sold by PRC Tech LLC store more energy, with lower peak power than traditional supercapacitors, and are particularly useful for transportation applications where weight and volume are critical.



SUPERCAPACITOR CELLS AND MODULES

Main Characteristics

- Prismatic thin form factor design
- Up to 65C long term operation
- 5-7X higher energy density than 1st gen supercaps
- Fast recharge
- Low self discharge < 3% per month
- UL® Certified
- 4V cells
- Modules from 48V to 740V and 1 kWhr and larger



APPLICATIONS

From Back up power to Transportation

- Heavy industrial vehicles, ferries
- Electric buses for fast recharge and always running
- Trams for conduit wire free cityscapes
- Subway lines for regen energy and acceleration
- EV charge station power bank no utility upgrade needed
- Electric bicycles
- Regenerative energy savings in elevators
- Backup power in servers, datacenters
- Hand-held or portable medical diagnostic equipment



OUR PROGRESS

Highest energy density supercaps



SC Bus Development

SC E buses have accumulated over **10 million km in China.**



2014, 2015.....2021

2014 BG and Israel bus pilot



2012 High energy SC bus line



2010 SC bus fleet operated in multiple lines



2006 SC bus line 11 starts commercial operation

2004 First SC bus off production line

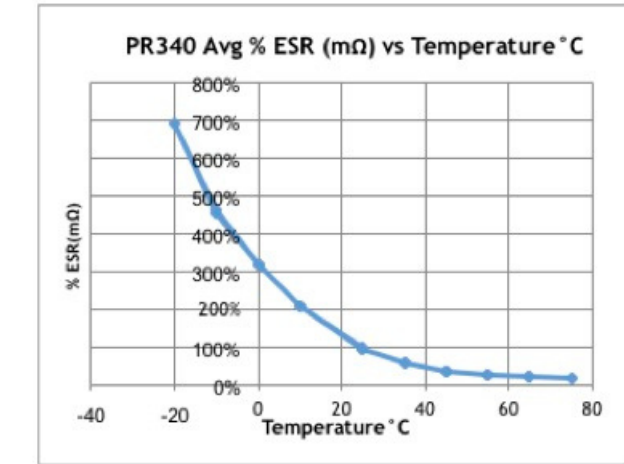
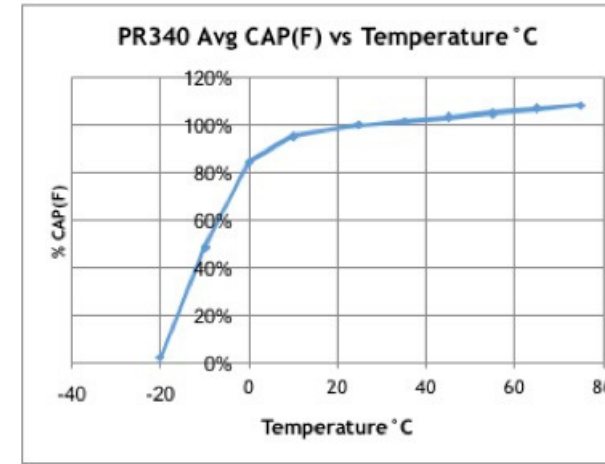


Product Part Numbers And Characteristics:

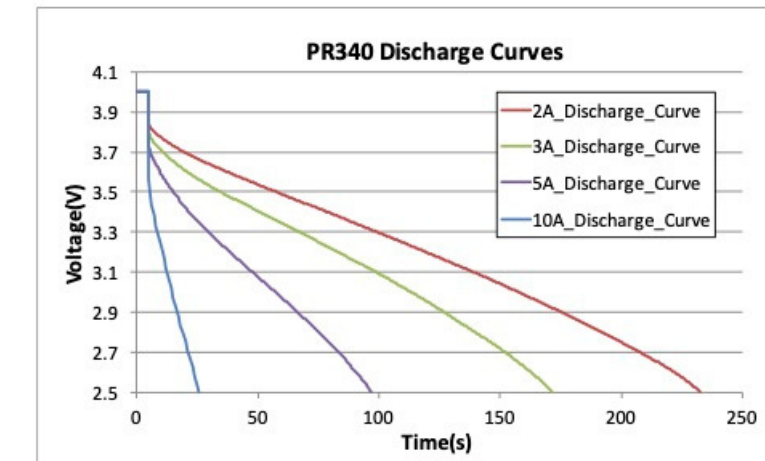
Specification	Units	PR0160F04R3 24.5W044L-S^^	PR0200F02R1- 045W050L-S	PR0340F03R0- 045W050L-S	PR0500F08R5- 025W064L-S^^	PR0800F05R7 045W050L-S	PR1100F08R0 045W050L-S	PR3000F02R3 - 111W245L-T	PR9000F05R3- 111W245L-T	PR13500F08R0 -109W245L-T
Rated Capacitance 0%,+30%	Farads	160	200	340	500	800	1100	3000	9000	13500
Max DC ESR (Equivalent Series Resistance)	mOhms	150	140	85	50	45	25	12	6	6
Max AC ESR (@ 1 kHz)	mOhms	65	50	40	25	20	11	6	3	3
Nominal Charge Discharge Current	Amperes	1	2	3	5	5	10	15	30	35
Max Pulse Current (<1 sec pulse)	Amperes	4	5	10	10	15	20	30	90	100
Energy	Whr	0.18	0.25	0.39	0.68	0.9	1.25	3.2	11.0	16.5
Dimensions	mm	24.5X44X4.3	50X45X2.1	50X45X3	25x64x8.5	50X45X5.7	50X45X8	111X245X2.3	111X245X5.3	109X245X8
Mass nominal	Grams	6	8	11	15	21	28.5	100	225	325
Specific Energy	Whr/Kg	30	31.2	35.4	45.3	42.8	43.8	32	48.8	50.7
Energy density	Whr/L	38.3	52.9	57.7	52.8	70.0	69.4	54.4	77.7	77.2
Connector Tabs**	S	S	S	S	S	S	S	T	T	T

** Tab Configuration: T – standard, S –solderable, W – wire and C - connector
 ^^ PR0160 and PR0500 are in development, with engineering samples for evaluation available now

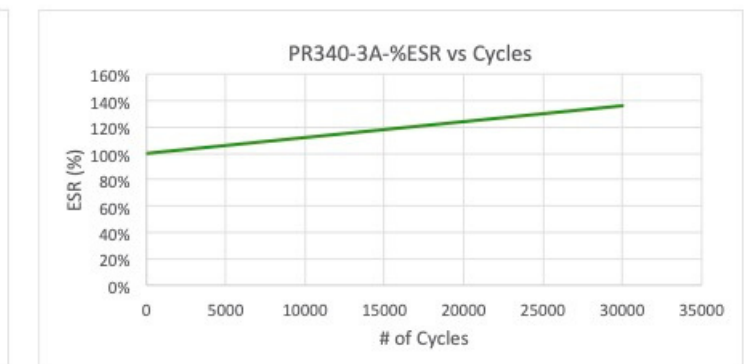
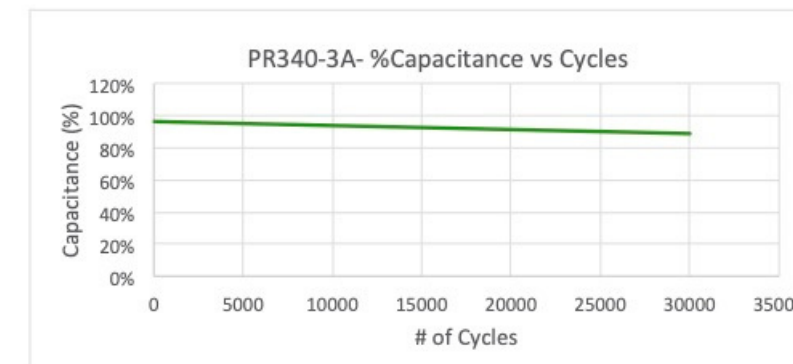
Product Performance :



ESR and Capacitance over temperature range at nominal current discharge



Discharge curves at 2A, 3A, 5A, and 10A discharge currents PR0340F



Cycle Life data: charge discharge at 3Amp current over 25,000 cycles at room temperature

General Product Characteristics:

Rated Voltage maximum	4.0V	(Volts)
Rated Voltage minimum	2.5V	(Volts)
Operating Temperature	0°C to 65°C	(degrees centigrade)
Surge Absolute Max Voltage	4.2V	(volts) Not to exceed 1 second pulse.
Capacity Range*	160 F – 13,500 F	(Farads)
Max Leakage Current*	0.03 mA - 0.1 mA	(mAmps) After 72 hours at rated voltage and 25°C.

Temperature Characteristics

Storage Temperature	-25°C to 65°C	Up to 5 years at room temperature; test and recharge annually; less than 18 months at 65°C
Temperature Characteristics	0°C to 65°C	Cap change: less than 50% of the initial ESR change: less than 200% of the initial

Reliability

Cycle Life	>25,000 cycles	Less than 20% decrease in capacitance and < 150% rise in ESR See Note 1
High Temperature Load Life	1,000 hours at 65°C	Less than 15% decrease in capacitance and <150% rise in ESR
Shelf Life	8 years	At 25°C and 3.75V (recharge annually)
Vibration Tolerance		As per IEC 60068.2.6
Shock Tolerance		As per IEC 60068.2.27

* Varies with product size

Note 1: Cycle using nominal current at 25°C for a given part per following cycle:

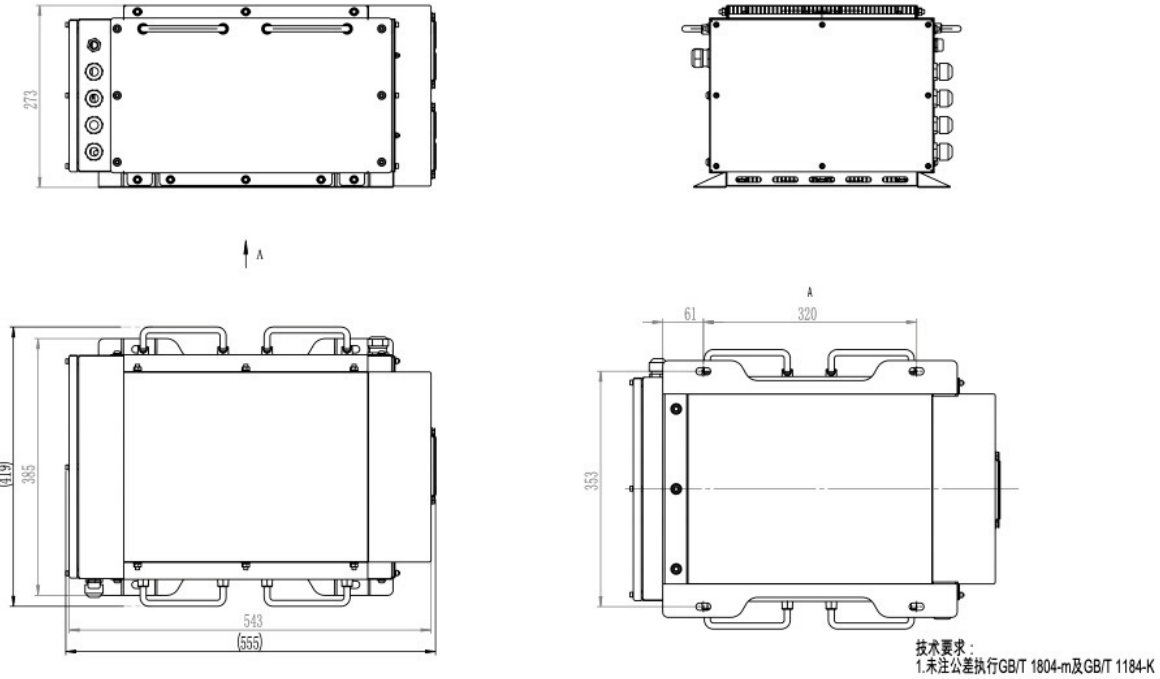
- Constant Current Charge with Nominal Current to 4V.
- Constant Voltage at 4V for 5 min.
- Constant Current Discharge with Nominal Current to 2.5V; Repeat.

1kWhr, 2kWhr and 4 kWhr packs

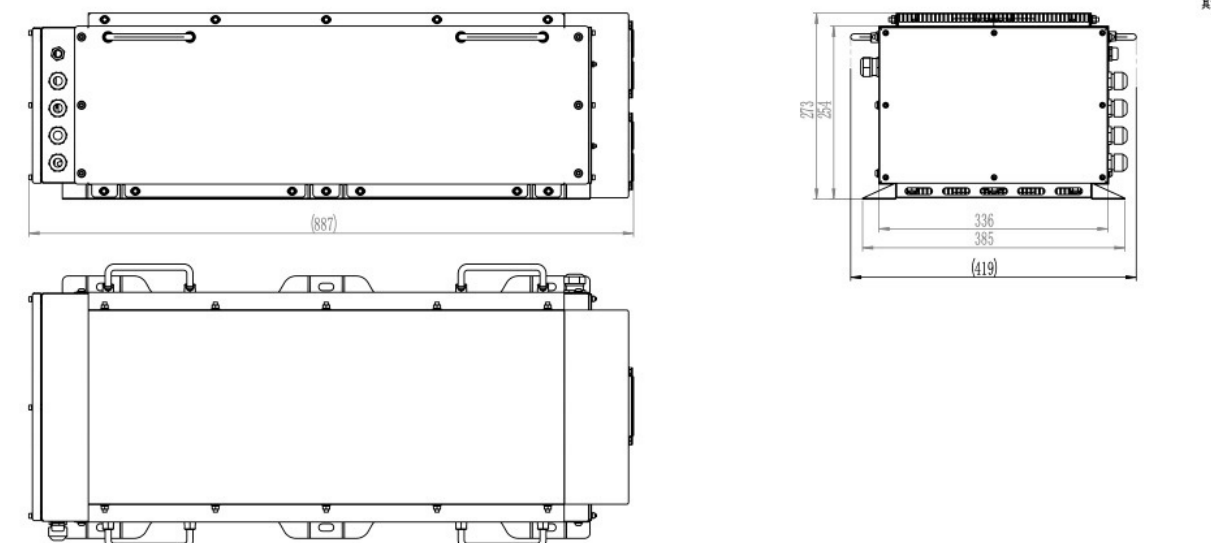
	S56V2-K11 1 kWhr pack	S56V3-K11 2 kWhr Pack	S56V4-K11 4 kWhr pack
Basic Cell	20000 Farad cell	20000 Farad cell	20000 Farad cell
Cell Connection Type	2P14S	4P14S	8P14S
Operating Voltage Window (V)	39.2~56	39.2~56	39.2~56
Surge Voltage, V	58.8	58.8	58.8
Nominal Capacity (F)	4500	9000	18000
Stored Energy (kWh)	1.0	2.0	4.0
Standard Charge Current (A)	100	150	280
Maximun Charge Current (A)	200 (20s)	280 (20s)	560 (20s)
Standard Discharge Current (A)	≤100	≤150	≤280
Maximun Discharge Current (A)	200 (20s)	280 (20s)	560 (20s)
Cycle Life (Cycles)	50000	50000	50000
Operating Temperature (°C)	-25 ~ +55	-25 ~ +55	-25 ~ +55
Storage Temperature (°C)	-30 ~ +65	-30 ~ +65	-30 ~ +65
Weight (kg)	35	60	105
Dimensions L*W*H (mm)	325×419×273	555×419×273	887×419×273
Electric Property	Overvoltage, Overcurrent, Overheat, Overload, Short circuit, DC leakage protection, etc		
Capacitor Management System	Automatic balance, Voltage monitor, Temperature monitor, DC leakage monitor, etc		
Cooling Mode	Air Cooling		
Communication Interface	CAN		
The fast charge time is mainly determined by the power of the charging post, and the charging can be completed within 6 minutes at the earliest.			

48V Module Offerings

2 kWhr



4 kWhr





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