

Reserve Power SPA Batteries

Stand-By Applications



Reserve Power

As a member of a strong and developing business ecosystem, SUNLIGHT relies on its modern infrastructure, continuous innovation and its passion for excellence, to develop and supply reliable battery solutions.

At the core of the company's growth lies its state-of-the-art manufacturing plant in Northern Greece, covering an area of 142.000 m².

The company has consistently invested in developing one of the most advanced industrial plants in Europe, running highly specialized production and assembly lines. The plant is fully compliant with the strictest international standards and is certified for Quality, Occu-

pational Health & Safety and Environmental management systems.

The products are developed by SUNLIGHT's R&D team which constantly designs and evaluates new innovative solutions to better meet market needs based on the latest technological trends, industry developments and market feedback.

SUNLIGHT's products and services have gained international recognition by ensuring uninterrupted and reliable operations in a wide range of critical applications for a broad spectrum of industries, such as Telecom and Power networks.

The complete Reserve Power portfolio consists of:

OPzS OPzV	RES OPzS RES OPzV	RES SOPzS RES SOPzV	RES SLT RES SLT GEL	SP SERIES ACCUFORCE SVT/ SVT GEL FRONT ACCESS	OGI
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SPA I Valve Regulated AGM Batteries

The SPA range of SUNLIGHT Valve Regulated Lead Acid batteries has been developed as general purpose batteries, designed to provide reliable performance in a wide field of applications. The SUNLIGHT SPA batteries respond to the needs of security and signalling systems market, low power UPS, telecommunications, information technology and emergency power supply.

The Valve Regulated Lead Acid (VRLA) battery is a rechargeable battery type with a safety valve, which allows the internal pressure to be released in case of overcharge. This battery type is maintenance free as there is no need for topping-up during the entire battery service life.

The SUNLIGHT SPA range of VRLA batteries features models with capacity up to 28Ah, offering a dense range of performances and dimensions also available with different types of terminals and flame retardant cases.



Security and fire alarm



UPS



Emergency lighting



Transportation signalling

Security and fire alarm systems

Low power UPS systems

Emergency Lighting systems

Signalling systems

Communications and electric equipment

Broadcasting systems

Robots and factory automation control equipment

Automation boards for elevators

Electronic cash registers

SPA 6 - 4.5



SPA 6 - 8



SPA 12 - 7



SPA 12 - 9



SPA 12 - 18



SPA 12 - 26



The ideal energy solution for stand-by applications

High Performance

With low internal resistance and efficient discharge characteristics, the SUNLIGHT SPA batteries can be applied to many fields in stand-by applications.

Maintenance Free

During the battery service life, there is no need to check the level of the electrolyte or to add water. The gases produced during electrolysis are almost completely recombined to water (up to 99%) through an effective reaction between hydrogen and oxygen.

Safety Valve Design

Excessive gas produced by overcharge or an incorrect charging method is released through the safety valve, which detects rising internal pressure and allows gas to exit; then automatically reseals.

Separator Technology

The Absorbent Glass Mat (AGM) separator, used in the SUNLIGHT batteries, is a highly porous material, which achieves maximization of oxygen diffusion and facilitates the reaction of active materials in the plates. The separator also maintains a constant distance between the positive and the negative plates and immobilizes the electrolyte, so that the possibility of acid leakage is minimized.

Wide Temperature Range Performance

The SUNLIGHT SPA batteries operate within a wide range of temperature while the optimum temperature for the operation of the battery is 20°C - 25°C.

Low Self-discharge Rate

Using a lead / calcium grid alloy, the self-discharge is the minimum. The battery can be stored for 6 months under normal conditions (20°C - 25°C) with no permanent effect on the capacity or the expected service life.

Leak and Spill Proof Container

The construction of the SUNLIGHT battery guarantees that no electrolyte leakage can occur from the terminals or case. A highly resistant plastic material is used, available in either standard ABS (UL94 HB) or flame retardant type (UL94 V-0).

Float Service Life

The nominal service life is 10 years in float / stand-by applications (20°C).

Multi-position Placement

The sealed construction of the battery allows perfect operation in any position (vertical or horizontal but not in completely inverted position).



Features of SPA Range

- Capacity Range: 0,7Ah to 28Ah
- Design Life: 10 years at 20°C

- Classified as "Long Life", according to EUROBAT guide 2015
- Configurations: 4V, 6V, 8V and 12V blocks available



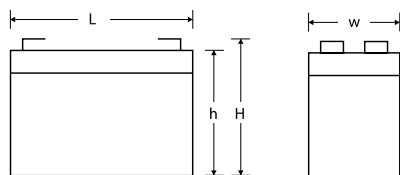
- The SUNLIGHT SPA batteries are recognized by **UL (File No MH18852)**.
- The SUNLIGHT Manufacturing Plant is certified according to **ISO 9001, ISO 14001** and **BS OHSAS 18001**
- As a member of **EUROBAT** organization SYSTEMS SUNLIGHT S.A. closely monitors the latest developments in the battery industry.
- Products are 100% tested and checked prior to shipment.
- The SUNLIGHT SPA batteries are completely recyclable.

Battery Type	Nominal Voltage (V)	Nominal Capacity (Ah) at 1.75 Vpc (25°C)		Length (mm)	Width (mm)	Height (h) (mm)	Total Height (H) (mm)	Typical Weight (kg)	Terminal Position	Terminal Type	Maximum Current (25°C)		Internal Resistance (mOhm)	Short Circuit Current (A)
		20 h	10 h								Charging (A)	Discharging (A)		
SPA 4 - 9.5	4	9.6	8.8	102	44	95	101	1.05	A	F1	3.00	150.0	8	400
SPA 6 - 1.3	6	1.3	1.2	97	24	52	58	0.28	A	F1	0.39	19.5	52	120
SPA 6 - 2.8	6	2.8	2.6	66	33	97	104	0.49	C	F1	0.84	42.0	32	190
SPA 6 - 3.2	6	3.2	3.0	134	35	61	67	0.62	A	F1	0.96	48.0	28	200
SPA 6 - 4.5	6	4.0	3.6	70	47	101	107	0.65	C	F1	1.20	60.0	30	210
SPA 6 - 7	6	7.0	6.4	151	34	94	100	0.98	A	F1	2.10	105.0	16	380
SPA 6 - 8	6	8.0	7.4	98	56	117	119	1.20	E	F1	2.40	120.0	10	450
SPA 6 - 10	6	10.0	9.3	151	50	94	100	1.60	A	F1	3.00	150.0	14	460
SPA 6 - 12	6	12.0	11.2	151	50	94	100	1.70	A	F1	3.60	180.0	10	500
SPA 8 - 3.2	8	3.2	3.0	134	36	63	69	0.85	D	F1	0.96	48.0	28	270
SPA 12 - 0.7	12	0.8	0.7	96	25	62	62	0.33	-	F6	0.24	5.0	200	60
SPA 12 - 1.3	12	1.2	1.1	97	43	52	58	0.52	D	F1	0.36	18.0	90	130
SPA 12 - 1.9	12	2.0	1.9	178	35	61	67	0.65	A	F1	0.60	30.0	65	180
SPA 12 - 2C	12	2.0	1.9	144	24	65	65	0.65	G	F5	0.60	10.0	70	80
SPA 12 - 2.3	12	2.3	2.1	178	35	61	67	0.80	A	F1	0.69	34.5	60	200
SPA 12 - 3.3	12	3.3	3.0	134	67	61	67	1.22	D	F1	0.96	48.0	52	240
SPA 12 - 5	12	5.0	4.7	90	70	101	107	1.45	A	F1	1.58	75.0	26	450
SPA 12 - 6	12	6.0	5.5	151	52	94	99	1.83	F	F1	1.80	97.5	26	500
SPA 12 - 7	12	7.0	6.2	151	65	94	100	1.95	F	F1	2.10	105.0	26	400
SPA 12 - 7.2	12	7.2	6.7	151	65	94	100	2.20	F	F1	2.16	108.0	26	430
SPA 12 - 9	12	9.0	8.4	151	65	94	100	2.35	F	F1	2.70	135.0	19	640
SPA 12 - 10	12	10.0	9.3	151	98	95	101	3.00	F	F1	3.00	150.0	32	380
SPA 12 - 12	12	12.0	11.3	151	98	95	101	3.40	F	F1	3.60	180.0	19	640
SPA 12 - 18	12	18.0	15.8	181	77	167	167	5.00	B	F3	5.40	270.0	15	750
SPA 12 - 26	12	26.0	24.4	165	176	127	127	7.60	B	F3	7.80	390.0	12	1020
SPA 12 - 28	12	28.0	26.0	165	125	175	182	8.60	B	F4	8.40	420.0	11	1200

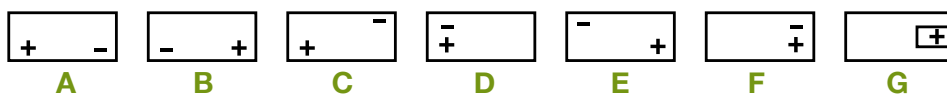
All dimensions and weights shown are subject to manufacturing tolerances

Drawings

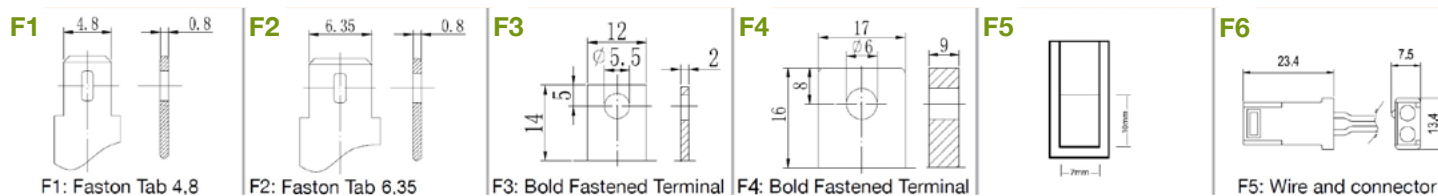
Case Dimensions



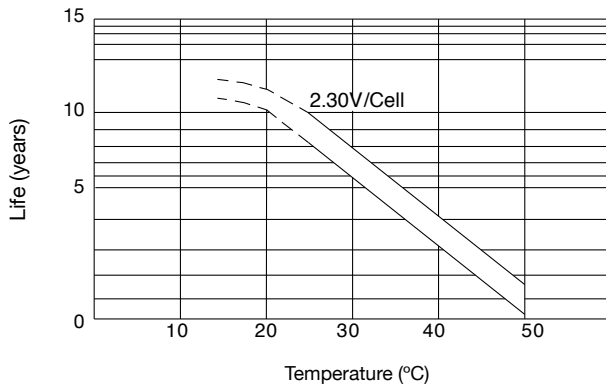
Terminal Positions



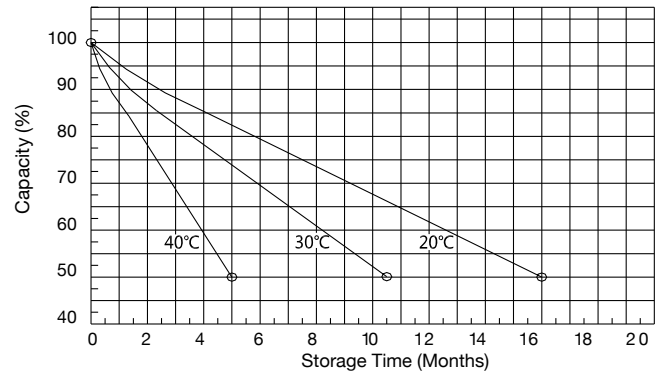
Terminals



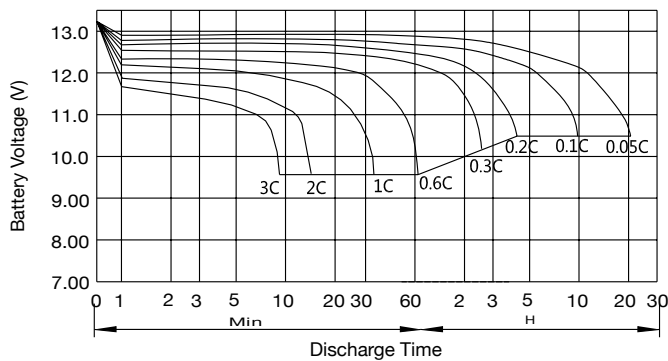
Temperature Effects on Float Life



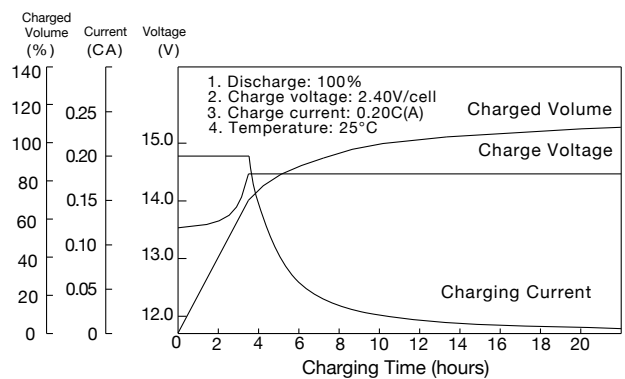
Self Discharge Characteristics



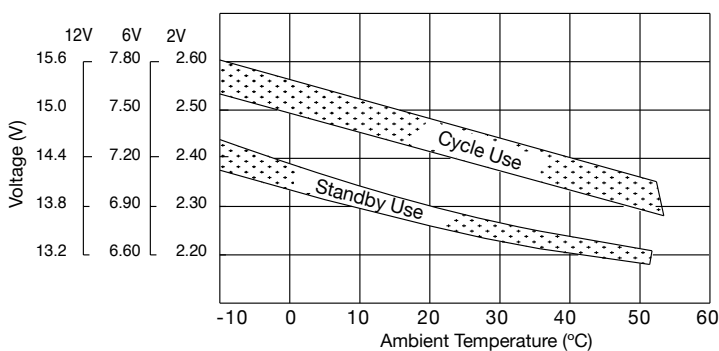
Discharge Characteristics (25°C)



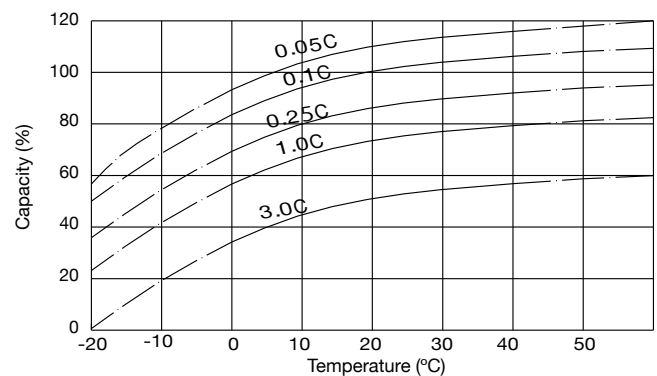
Charging Characteristics (25°C)



Relationship Between Charging Voltage and Temperature



Temperature Effects on Capacity



Discharge Constant Current at 25°C (Amperes)

End Voltage 1.80 V/cell												
	5 min	10 min	15 min	30 min	1 h	2 h	3 h	4 h	5 h	8 h	10 h	20 h
SPA 4 - 9.5	30.14	19.20	15.50	9.00	5.63	3.19	2.31	1.84	1.57	1.02	0.86	0.47
SPA 6 - 1.3	3.93	2.48	2.01	1.16	0.73	0.41	0.30	0.24	0.20	0.13	0.12	0.06
SPA 6 - 2.8	8.94	5.64	4.58	2.65	1.66	0.94	0.68	0.54	0.46	0.29	0.26	0.14
SPA 6 - 3.2	10.20	6.45	5.23	3.03	1.90	1.08	0.78	0.62	0.53	0.34	0.29	0.15
SPA 6 - 4.5	12.10	7.66	6.21	3.60	2.25	1.28	0.92	0.74	0.63	0.40	0.35	0.19
SPA 6 - 7	21.10	13.30	10.80	6.25	3.91	2.22	1.60	1.28	1.09	0.69	0.62	0.34
SPA 6 - 8	25.70	16.20	13.10	7.62	4.78	2.71	1.95	1.57	1.33	0.85	0.73	0.40
SPA 6 - 10	31.71	20.20	16.30	9.47	5.93	3.36	2.43	1.94	1.65	1.07	0.91	0.49
SPA 6 - 12	37.99	24.20	19.60	11.40	7.11	4.03	2.91	2.33	1.98	1.28	1.09	0.59
SPA 8 - 3.2	10.20	6.45	5.23	3.03	1.90	1.08	0.78	0.62	0.53	0.34	0.29	0.15
SPA 12 - 0.7	2.54	1.61	1.31	0.76	0.47	0.27	0.19	0.16	0.13	0.09	0.07	0.04
SPA 12 - 1.3	3.60	2.30	1.84	1.07	0.67	0.38	0.28	0.22	0.19	0.12	0.10	0.06
SPA 12 - 1.9	6.38	4.03	3.27	1.89	1.19	0.67	0.49	0.39	0.33	0.21	0.18	0.10
SPA 12 - 2C	6.34	4.04	3.26	1.89	1.19	0.68	0.49	0.39	0.33	0.21	0.18	0.10
SPA 12 - 2.3	7.34	4.64	3.76	2.18	1.36	0.77	0.56	0.45	0.38	0.24	0.21	0.11
SPA 12 - 3.3	10.20	6.45	5.23	3.03	1.94	1.08	0.78	0.62	0.53	0.34	0.29	0.17
SPA 12 - 5	15.70	9.80	8.13	4.69	2.92	1.68	1.21	0.97	0.82	0.52	0.46	0.25
SPA 12 - 6	19.10	12.10	9.78	5.68	3.55	2.01	1.46	1.16	0.99	0.63	0.55	0.30
SPA 12 - 7	21.10	13.30	10.80	6.25	3.91	2.22	1.60	1.28	1.09	0.70	0.61	0.34
SPA 12 - 7.2	23.00	14.50	11.80	6.82	4.27	2.42	1.75	1.40	1.19	0.76	0.66	0.35
SPA 12 - 9	28.70	18.10	14.70	8.52	5.34	3.02	2.18	1.75	1.48	0.95	0.82	0.44
SPA 12 - 10	31.71	20.20	16.30	9.47	5.93	3.36	2.43	1.94	1.65	1.07	0.91	0.49
SPA 12 - 12	35.64	22.70	18.40	10.70	6.71	3.84	2.76	2.15	1.86	1.22	1.11	0.56
SPA 12 - 18	53.54	34.10	27.60	16.07	10.06	5.75	4.14	3.23	2.79	1.83	1.55	0.85
SPA 12 - 26	76.77	48.90	39.80	23.10	14.40	8.31	5.98	4.67	4.04	2.65	2.40	1.22
SPA 12 - 28	85.41	54.40	44.10	25.60	16.00	9.41	6.79	5.43	4.62	2.99	2.55	1.37

End Voltage 1.75 V/cell												
	5 min	10 min	15 min	30 min	1 h	2 h	3 h	4 h	5 h	8 h	10 h	20 h
SPA 4 - 9.5	31.87	20.30	16.40	9.34	5.81	3.28	2.38	1.90	1.62	1.05	0.88	0.48
SPA 6 - 1.3	4.16	2.63	2.12	1.21	0.75	0.42	0.31	0.25	0.21	0.13	0.12	0.07
SPA 6 - 2.8	9.47	5.98	4.83	2.75	1.71	0.97	0.70	0.56	0.47	0.30	0.26	0.14
SPA 6 - 3.2	10.80	6.84	5.52	3.14	1.96	1.10	0.80	0.64	0.54	0.35	0.30	0.16
SPA 6 - 4.5	12.90	8.12	6.56	3.73	2.32	1.31	0.95	0.76	0.65	0.41	0.36	0.20
SPA 6 - 7	22.30	14.10	11.40	6.49	4.04	2.28	1.65	1.32	1.12	0.71	0.64	0.35
SPA 6 - 8	27.20	17.30	13.90	7.92	4.93	2.78	2.01	1.61	1.37	0.87	0.74	0.40
SPA 6 - 10	33.60	21.40	17.30	9.83	6.12	3.45	2.50	2.00	1.70	1.10	0.93	0.50
SPA 6 - 12	40.19	25.60	20.70	11.80	7.34	4.14	3.00	2.40	2.04	1.32	1.12	0.60
SPA 8 - 3.2	10.80	6.80	5.52	3.14	1.96	1.10	0.80	0.64	0.54	0.35	0.30	0.16
SPA 12 - 0.7	2.70	1.71	1.38	0.79	0.49	0.28	0.20	0.16	0.14	0.09	0.07	0.04
SPA 12 - 1.3	3.80	2.40	1.94	1.11	0.69	0.39	0.28	0.22	0.19	0.12	0.11	0.06
SPA 12 - 1.9	6.76	4.27	3.45	1.97	1.22	0.69	0.50	0.40	0.34	0.22	0.19	0.10
SPA 12 - 2C	6.72	4.28	3.45	1.96	1.23	0.69	0.50	0.40	0.34	0.22	0.19	0.10
SPA 12 - 2.3	7.78	4.91	3.97	2.26	1.41	0.79	0.58	0.46	0.39	0.25	0.21	0.12
SPA 12 - 3.3	10.80	6.84	5.52	3.14	2.00	1.10	0.80	0.64	0.54	0.35	0.30	0.17
SPA 12 - 5	16.20	10.40	8.60	4.88	3.01	1.72	1.25	1.00	0.85	0.54	0.47	0.25
SPA 12 - 6	20.30	12.80	10.30	5.90	3.67	2.07	1.50	1.20	1.02	0.65	0.55	0.30
SPA 12 - 7	22.30	14.10	11.40	6.49	4.04	2.28	1.65	1.32	1.12	0.72	0.62	0.35
SPA 12 - 7.2	24.40	15.40	12.40	7.07	4.40	2.48	1.80	1.44	1.22	0.78	0.67	0.36
SPA 12 - 9	30.40	19.20	15.50	8.84	5.50	3.10	2.25	1.80	1.53	0.98	0.84	0.45
SPA 12 - 10	33.60	21.40	17.30	9.83	6.12	3.45	2.50	2.00	1.70	1.10	0.93	0.50
SPA 12 - 12	37.84	24.10	19.40	11.10	6.92	3.94	2.84	2.22	1.92	1.26	1.13	0.60
SPA 12 - 18	56.68	36.10	29.14	16.69	10.38	5.90	4.27	3.33	2.88	1.89	1.58	0.90
SPA 12 - 26	81.48	51.90	42.00	24.00	14.90	8.53	6.16	4.81	4.16	2.73	2.44	1.30
SPA 12 - 28	90.59	57.70	46.60	26.50	16.50	9.65	7.00	5.60	4.76	3.08	2.60	1.40

The above characteristics data can be obtained within three charge/discharge cycles.

Discharge Constant Current at 25°C (Amperes)

End Voltage 1.70 V/cell												
	5 min	10 min	15 min	30 min	1 h	2 h	3 h	4 h	5 h	8 h	10 h	20 h
SPA 4 - 9.5	33.28	21.20	17.00	9.60	5.93	3.33	2.39	1.91	1.62	1.05	0.89	0.48
SPA 6 - 1.3	4.35	2.75	2.20	1.24	0.77	0.43	0.31	0.25	0.21	0.13	0.12	0.07
SPA 6 - 2.8	9.90	6.25	5.00	2.82	1.75	0.98	0.70	0.56	0.48	0.31	0.26	0.14
SPA 6 - 3.2	11.30	7.14	5.72	3.22	2.00	1.12	0.81	0.64	0.55	0.35	0.30	0.16
SPA 6 - 4.5	13.40	8.48	6.79	3.83	2.37	1.33	0.96	0.77	0.65	0.41	0.36	0.20
SPA 6 - 7	23.30	14.70	11.80	6.65	4.12	2.31	1.66	1.33	1.13	0.72	0.64	0.35
SPA 6 - 8	28.50	17.90	14.40	8.11	5.03	2.82	2.02	1.62	1.38	0.88	0.75	0.40
SPA 6 - 10	35.01	22.30	17.90	10.10	6.24	3.50	2.52	2.01	1.71	1.11	0.94	0.50
SPA 6 - 12	42.08	26.80	21.40	12.10	7.49	4.20	3.02	2.42	2.05	1.33	1.12	0.60
SPA 8 - 3.2	11.30	7.14	5.72	3.22	2.00	1.12	0.81	0.64	0.55	0.35	0.30	0.16
SPA 12 - 0.7	2.83	1.79	1.43	0.81	0.50	0.28	0.20	0.16	0.14	0.09	0.08	0.04
SPA 12 - 1.3	4.00	2.50	2.01	1.14	0.71	0.40	0.29	0.22	0.19	0.12	0.11	0.06
SPA 12 - 1.9	7.07	4.46	3.57	2.01	1.25	0.70	0.50	0.40	0.34	0.22	0.19	0.10
SPA 12 - 2C	7.00	4.46	3.58	2.01	1.25	0.70	0.50	0.40	0.34	0.22	0.19	0.10
SPA 12 - 2.3	8.13	5.13	4.11	2.32	1.44	0.81	0.58	0.46	0.39	0.25	0.22	0.12
SPA 12 - 3.3	11.30	7.14	5.72	3.22	2.05	1.12	0.81	0.64	0.55	0.35	0.30	0.17
SPA 12 - 5	17.10	11.00	8.91	5.00	3.10	1.75	1.26	1.01	0.86	0.55	0.47	0.25
SPA 12 - 6	21.20	13.40	10.70	6.05	3.75	2.10	1.51	1.21	1.02	0.65	0.56	0.30
SPA 12 - 7	23.30	14.70	11.80	6.65	4.12	2.31	1.66	1.33	1.13	0.72	0.63	0.35
SPA 12 - 7.2	25.40	16.10	12.90	7.25	4.49	2.52	1.81	1.45	1.23	0.79	0.67	0.36
SPA 12 - 9	31.80	20.10	16.10	9.06	5.62	3.15	2.27	1.81	1.54	0.99	0.84	0.45
SPA 12 - 10	35.01	22.30	17.90	10.10	6.24	3.50	2.52	2.01	1.71	1.11	0.94	0.50
SPA 12 - 12	39.41	25.10	20.10	11.40	7.06	4.00	2.86	2.24	1.93	1.27	1.13	0.60
SPA 12 - 18	59.19	37.70	30.17	17.10	10.59	5.99	4.30	3.35	2.90	1.90	1.59	0.90
SPA 12 - 26	85.25	54.30	43.50	24.60	15.20	8.66	6.21	4.84	4.19	2.75	2.46	1.30
SPA 12 - 28	94.67	60.30	48.20	27.20	16.80	9.80	7.05	5.64	4.79	3.10	2.62	1.41

End Voltage 1.65 V/cell												
	5 min	10 min	15 min	30 min	1 h	2 h	3 h	4 h	5 h	8 h	10 h	20 h
SPA 4 - 9.5	34.70	22.10	17.60	9.88	6.08	3.35	2.41	1.93	1.63	1.06	0.89	0.48
SPA 6 - 1.3	4.53	2.86	2.28	1.28	0.79	0.43	0.31	0.25	0.21	0.13	0.12	0.07
SPA 6 - 2.8	10.30	6.52	5.19	2.91	1.79	0.99	0.71	0.57	0.48	0.31	0.26	0.14
SPA 6 - 3.2	11.80	7.45	5.93	3.32	2.05	1.13	0.81	0.65	0.55	0.35	0.30	0.16
SPA 6 - 4.5	14.00	8.85	7.05	3.95	2.43	1.34	0.96	0.77	0.66	0.42	0.36	0.20
SPA 6 - 7	24.30	15.40	12.20	6.86	4.23	2.33	1.67	1.34	1.14	0.73	0.64	0.35
SPA 6 - 8	29.70	18.70	15.00	8.37	5.15	2.85	2.05	1.63	1.39	0.89	0.75	0.41
SPA 6 - 10	36.58	23.30	18.50	10.40	6.40	3.53	2.54	2.03	1.72	1.12	0.94	0.51
SPA 6 - 12	43.80	27.90	22.30	12.50	7.68	4.24	3.04	2.43	2.07	1.34	1.13	0.61
SPA 8 - 3.2	11.80	7.45	5.93	3.32	2.05	1.13	0.81	0.65	0.55	0.35	0.30	0.16
SPA 12 - 0.7	2.94	1.86	1.48	0.83	0.51	0.28	0.20	0.16	0.14	0.09	0.08	0.04
SPA 12 - 1.3	4.20	2.60	2.09	1.18	0.73	0.40	0.29	0.23	0.20	0.12	0.11	0.06
SPA 12 - 1.9	7.37	4.66	3.71	2.08	1.28	0.71	0.51	0.41	0.34	0.22	0.19	0.10
SPA 12 - 2C	7.30	4.65	3.71	2.08	1.28	0.71	0.51	0.40	0.35	0.23	0.20	0.10
SPA 12 - 2.3	8.48	5.35	4.27	2.39	1.47	0.81	0.58	0.47	0.40	0.26	0.22	0.12
SPA 12 - 3.3	11.80	7.45	5.93	3.32	2.08	1.13	0.81	0.65	0.55	0.35	0.30	0.17
SPA 12 - 5	18.10	11.10	9.22	5.12	3.18	1.77	1.27	1.01	0.86	0.55	0.47	0.25
SPA 12 - 6	22.20	13.90	11.20	6.23	3.84	2.12	1.52	1.22	1.03	0.66	0.56	0.31
SPA 12 - 7	24.30	15.40	12.20	6.86	4.23	2.33	1.67	1.34	1.14	0.73	0.63	0.35
SPA 12 - 7.2	26.50	16.80	13.40	7.48	4.61	2.54	1.83	1.46	1.24	0.79	0.68	0.36
SPA 12 - 9	33.20	21.00	16.70	9.35	5.76	3.18	2.28	1.83	1.55	0.99	0.85	0.45
SPA 12 - 10	36.58	23.30	18.50	10.40	6.40	3.53	2.54	2.03	1.72	1.12	0.94	0.51
SPA 12 - 12	41.13	26.20	20.90	11.80	7.25	4.03	2.88	2.25	1.95	1.28	1.14	0.60
SPA 12 - 18	61.86	39.40	31.29	17.64	10.87	6.05	4.33	3.38	2.92	1.92	1.60	0.91
SPA 12 - 26	88.23	56.20	45.10	25.40	15.60	8.74	6.25	4.88	4.22	2.77	2.47	1.31
SPA 12 - 28	98.75	62.90	50.10	28.00	17.30	9.89	7.10	5.68	4.83	3.12	2.63	1.42

The above characteristics data can be obtained within three charge/discharge cycles.

Discharge Constant Current at 25°C (Amperes)

End Voltage 1.60 V/cell												
	5 min	10 min	15 min	30 min	1 h	2 h	3 h	4 h	5 h	8 h	10 h	20 h
SPA 4 - 9.5	35.80	22.80	18.10	10.10	6.18	3.37	2.42	1.94	1.64	1.06	0.89	0.48
SPA 6 - 1.3	4.67	2.95	2.34	1.30	0.80	0.44	0.31	0.25	0.21	0.13	0.12	0.07
SPA 6 - 2.8	10.60	6.72	5.32	2.97	1.82	0.99	0.71	0.57	0.49	0.31	0.26	0.14
SPA 6 - 3.2	12.20	7.68	6.08	3.39	2.08	1.14	0.82	0.65	0.55	0.35	0.30	0.16
SPA 6 - 4.5	14.40	9.12	7.22	4.03	2.47	1.35	0.97	0.78	0.66	0.42	0.36	0.20
SPA 6 - 7	25.10	15.80	12.50	7.05	4.29	2.34	1.68	1.35	1.14	0.73	0.64	0.35
SPA 6 - 8	30.60	19.30	15.30	8.54	5.23	2.86	2.06	1.65	1.39	0.89	0.76	0.41
SPA 6 - 10	37.68	24.00	19.00	10.60	6.50	3.55	2.55	2.04	1.73	1.12	0.94	0.51
SPA 6 - 12	45.22	28.80	22.80	12.70	7.80	4.26	3.06	2.45	2.08	1.35	1.13	0.61
SPA 8 - 3.2	12.20	7.68	6.08	3.39	2.08	1.14	0.82	0.65	0.55	0.35	0.30	0.16
SPA 12 - 0.7	3.03	1.92	1.52	0.85	0.52	0.28	0.20	0.16	0.14	0.09	0.08	0.04
SPA 12 - 1.3	4.30	2.70	2.14	1.20	0.74	0.41	0.29	0.23	0.20	0.13	0.11	0.06
SPA 12 - 1.9	7.60	4.80	3.80	2.12	1.30	0.71	0.51	0.41	0.35	0.22	0.19	0.10
SPA 12 - 2C	7.53	4.80	3.80	2.13	1.30	0.71	0.51	0.41	0.35	0.23	0.20	0.10
SPA 12 - 2.3	8.74	5.52	4.37	2.44	1.50	0.82	0.59	0.47	0.40	0.26	0.22	0.12
SPA 12 - 3.3	12.20	7.68	6.08	3.39	2.10	1.14	0.82	0.65	0.55	0.35	0.30	0.17
SPA 12 - 5	18.50	11.90	9.45	5.24	3.21	1.78	1.28	1.02	0.87	0.56	0.47	0.25
SPA 12 - 6	22.80	14.40	11.40	6.36	3.90	2.13	1.53	1.23	1.04	0.67	0.56	0.31
SPA 12 - 7	25.10	15.80	12.50	7.00	4.29	2.34	1.68	1.35	1.14	0.73	0.63	0.35
SPA 12 - 7.2	27.40	17.30	13.70	7.63	4.68	2.56	1.84	1.47	1.25	0.80	0.68	0.37
SPA 12 - 9	34.20	21.60	17.10	9.54	5.85	3.20	2.30	1.84	1.56	1.00	0.85	0.46
SPA 12 - 10	37.68	24.00	19.00	10.60	6.50	3.55	2.55	2.04	1.73	1.12	0.94	0.51
SPA 12 - 12	42.55	27.10	21.40	12.00	7.36	4.06	2.90	2.26	1.96	1.29	1.14	0.61
SPA 12 - 18	63.74	40.60	32.13	18.00	11.03	6.08	4.35	3.40	2.94	1.93	1.61	0.91
SPA 12 - 26	91.85	58.50	46.30	25.90	15.80	8.79	6.29	4.91	4.24	2.78	2.48	1.32
SPA 12 - 28	101.74	64.80	51.30	28.60	17.60	9.95	7.14	5.71	4.86	3.14	2.64	1.42

Discharge Constant Power at 25°C (Watts/cell)

End Voltage 1.80 V/cell												
	5 min	10 min	15 min	30 min	1 h	2 h	3 h	4 h	5 h	8 h	10 h	20 h
SPA 4 - 9.5	56.00	36.00	29.50	17.20	10.40	6.20	4.56	3.66	3.12	2.03	1.74	0.93
SPA 6 - 1.3	7.30	4.67	3.83	2.23	1.41	0.81	0.59	0.47	0.40	0.26	0.24	0.13
SPA 6 - 2.8	16.63	10.60	8.70	5.07	3.20	1.83	1.34	1.08	0.92	0.60	0.51	0.27
SPA 6 - 3.2	19.00	12.13	9.93	5.80	3.67	2.10	1.54	1.23	1.05	0.68	0.58	0.31
SPA 6 - 4.5	22.57	14.40	11.80	6.87	4.33	2.49	1.82	1.46	1.25	0.81	0.69	0.37
SPA 6 - 7	39.17	25.00	20.50	11.93	7.55	4.32	3.17	2.53	2.17	1.41	1.22	0.68
SPA 6 - 8	47.83	30.50	25.00	14.57	9.22	5.28	3.87	3.10	2.65	1.72	1.47	0.79
SPA 6 - 10	59.33	38.00	31.03	18.07	11.43	6.57	4.80	3.87	3.28	2.13	1.82	0.98
SPA 6 - 12	71.00	45.33	37.33	21.70	13.73	7.87	5.77	4.63	3.93	2.56	2.19	1.18
SPA 8 - 3.2	19.00	12.13	9.93	5.78	3.65	2.10	1.54	1.23	1.05	0.68	0.58	0.31
SPA 12 - 0.7	4.75	3.03	2.48	1.45	0.92	0.52	0.38	0.31	0.26	0.17	0.15	0.08
SPA 12 - 1.3	6.62	4.27	3.50	2.05	1.30	0.75	0.55	0.43	0.37	0.24	0.21	0.11
SPA 12 - 1.9	11.87	7.58	6.22	3.62	2.28	1.31	0.96	0.77	0.66	0.43	0.37	0.20
SPA 12 - 2C	11.87	7.58	6.22	3.63	2.30	1.31	0.96	0.77	0.66	0.43	0.37	0.20
SPA 12 - 2.3	13.65	8.72	7.13	4.15	2.63	1.51	1.11	0.89	0.76	0.49	0.42	0.23
SPA 12 - 3.3	19.00	12.13	9.93	5.78	3.70	2.10	1.54	1.23	1.05	0.68	0.58	0.32
SPA 12 - 5	28.33	18.17	15.25	8.92	5.52	3.28	2.40	1.93	1.64	1.07	0.91	0.49
SPA 12 - 6	35.67	22.83	18.67	10.85	6.87	3.93	2.88	2.30	1.97	1.28	1.09	0.59
SPA 12 - 7	39.17	25.00	20.50	11.93	7.55	4.32	3.17	2.53	2.17	1.41	1.22	0.68
SPA 12 - 7.2	42.67	27.33	22.33	13.02	8.23	4.72	3.45	2.77	2.37	1.54	1.31	0.71
SPA 12 - 9	53.50	34.17	28.00	16.27	10.30	5.90	4.32	3.47	2.95	1.92	1.64	0.88
SPA 12 - 10	59.17	37.83	31.00	18.00	11.43	6.55	4.80	3.85	3.28	2.13	1.82	0.98
SPA 12 - 12	66.67	42.67	35.00	20.50	12.95	7.48	5.47	4.27	3.70	2.45	2.22	1.13
SPA 12 - 18	100.17	64.00	52.43	30.70	19.42	11.22	8.20	6.42	5.57	3.67	3.11	1.69
SPA 12 - 26	143.67	91.83	75.50	44.17	27.83	16.20	11.83	9.27	8.03	5.30	4.78	2.45
SPA 12 - 28	160.17	102.33	83.83	48.83	30.83	18.33	13.45	10.78	9.18	5.98	5.10	2.75

The above characteristics data can be obtained within three charge/discharge cycles.

Discharge Constant Power at 25°C (Watts/cell)

End Voltage 1.75 V/cell												
	5 min	10 min	15 min	30 min	1 h	2 h	3 h	4 h	5 h	8 h	10 h	20 h
SPA 4 - 9.5	59.50	38.15	31.15	17.80	11.20	6.35	4.71	3.77	3.22	2.09	1.77	0.95
SPA 6 - 1.3	7.73	4.93	4.03	2.30	1.45	0.83	0.61	0.49	0.42	0.27	0.24	0.13
SPA 6 - 2.8	17.60	11.23	9.17	5.27	3.31	1.88	1.39	1.11	0.95	0.62	0.52	0.28
SPA 6 - 3.2	20.13	12.87	10.50	6.00	3.77	2.15	1.58	1.27	1.08	0.70	0.60	0.32
SPA 6 - 4.5	23.90	15.27	12.47	7.13	4.50	2.55	1.88	1.51	1.29	0.84	0.71	0.38
SPA 6 - 7	41.50	26.50	21.67	12.38	7.78	4.43	3.27	2.62	2.23	1.45	1.25	0.69
SPA 6 - 8	50.67	32.33	26.50	15.12	9.50	5.42	3.98	3.20	2.72	1.77	1.50	0.81
SPA 6 - 10	62.67	40.00	32.77	18.77	11.80	6.73	4.97	3.97	3.37	2.20	1.86	1.00
SPA 6 - 12	75.67	48.33	39.33	22.53	14.17	8.07	5.93	4.77	4.07	2.64	2.23	1.20
SPA 8 - 3.2	20.13	12.85	10.50	6.00	3.78	2.15	1.59	1.27	1.08	0.70	0.60	0.32
SPA 12 - 0.7	5.03	3.22	2.62	1.50	0.95	0.54	0.40	0.32	0.27	0.18	0.15	0.08
SPA 12 - 1.3	7.10	4.53	3.68	2.12	1.34	0.77	0.56	0.44	0.38	0.25	0.21	0.12
SPA 12 - 1.9	12.58	8.03	6.55	3.75	2.37	1.35	0.99	0.79	0.68	0.44	0.37	0.20
SPA 12 - 2C	12.60	8.05	6.57	3.75	2.35	1.34	0.99	0.79	0.68	0.44	0.37	0.20
SPA 12 - 2.3	14.47	9.23	7.53	4.32	2.72	1.55	1.14	0.91	0.78	0.51	0.43	0.23
SPA 12 - 3.3	20.17	12.85	10.48	6.00	3.82	2.15	1.58	1.27	1.08	0.70	0.60	0.33
SPA 12 - 5	30.33	19.17	16.02	9.32	5.80	3.37	2.48	1.98	1.68	1.09	0.93	0.50
SPA 12 - 6	37.67	24.17	19.67	11.27	7.08	4.03	2.97	2.38	2.03	1.32	1.12	0.60
SPA 12 - 7	41.50	26.50	21.67	12.38	7.78	4.43	3.27	2.62	2.23	1.45	1.25	0.69
SPA 12 - 7.2	45.33	28.83	23.67	13.52	8.50	4.83	3.57	2.87	2.43	1.58	1.34	0.72
SPA 12 - 9	56.67	36.17	29.50	16.83	10.62	6.05	4.45	3.57	3.05	1.98	1.67	0.90
SPA 12 - 10	62.83	40.17	32.83	18.83	11.80	6.72	4.95	3.97	3.38	2.20	1.87	1.00
SPA 12 - 12	70.67	45.17	36.83	21.17	13.37	7.68	5.63	4.40	3.82	2.52	2.25	1.20
SPA 12 - 18	106.00	67.83	55.33	31.87	20.03	11.52	8.45	6.62	5.73	3.78	3.17	1.80
SPA 12 - 26	152.83	97.67	79.83	45.83	28.83	16.63	12.20	9.55	8.28	5.47	4.88	2.60
SPA 12 - 28	169.83	108.50	88.50	50.67	31.83	18.83	13.87	11.12	9.47	6.17	5.20	2.80

End Voltage 1.70 V/cell												
	5 min	10 min	15 min	30 min	1 h	2 h	3 h	4 h	5 h	8 h	10 h	20 h
SPA 4 - 9.5	62.00	39.85	32.25	18.30	11.45	6.50	4.74	3.80	3.24	2.11	1.78	0.96
SPA 6 - 1.3	8.10	5.17	4.17	2.37	1.48	0.84	0.61	0.49	0.42	0.27	0.24	0.13
SPA 6 - 2.8	18.40	11.73	9.50	5.40	3.37	1.91	1.40	1.12	0.95	0.62	0.52	0.28
SPA 6 - 3.2	21.03	13.43	10.87	6.17	3.87	2.18	1.60	1.28	1.09	0.71	0.60	0.32
SPA 6 - 4.5	24.97	15.93	12.90	7.30	4.57	2.59	1.89	1.52	1.29	0.84	0.71	0.38
SPA 6 - 7	43.33	27.67	22.33	12.70	7.95	4.50	3.28	2.63	2.25	1.46	1.25	0.69
SPA 6 - 8	53.00	33.67	27.50	15.50	9.70	5.50	4.02	3.22	2.75	1.79	1.51	0.81
SPA 6 - 10	65.67	42.00	34.00	19.23	12.03	6.83	5.00	4.00	3.40	2.22	1.87	1.01
SPA 6 - 12	78.67	50.33	40.67	23.07	14.47	8.20	5.97	4.80	4.10	2.66	2.25	1.21
SPA 8 - 3.2	21.03	13.43	10.85	6.15	3.85	2.19	1.60	1.28	1.09	0.71	0.60	0.32
SPA 12 - 0.7	5.23	3.35	2.72	1.53	0.97	0.55	0.40	0.32	0.27	0.18	0.15	0.08
SPA 12 - 1.3	7.42	4.73	3.82	2.18	1.36	0.78	0.57	0.44	0.39	0.25	0.21	0.12
SPA 12 - 1.9	13.15	8.40	6.78	3.85	2.42	1.37	1.00	0.80	0.68	0.44	0.38	0.20
SPA 12 - 2C	13.13	8.40	6.80	3.85	2.42	1.37	1.00	0.80	0.68	0.44	0.38	0.20
SPA 12 - 2.3	15.12	9.65	7.80	4.42	2.77	1.57	1.15	0.92	0.78	0.51	0.43	0.23
SPA 12 - 3.3	21.00	13.43	10.87	6.15	3.95	2.18	1.60	1.28	1.09	0.71	0.60	0.33
SPA 12 - 5	31.83	20.17	16.58	9.53	5.90	3.42	2.50	2.00	1.70	1.11	0.94	0.50
SPA 12 - 6	39.33	25.17	20.33	11.53	7.23	4.10	2.98	2.40	2.05	1.33	1.12	0.60
SPA 12 - 7	43.33	27.67	22.33	12.70	7.95	4.50	3.28	2.63	2.25	1.46	1.25	0.69
SPA 12 - 7.2	47.33	30.17	24.50	13.85	8.67	4.92	3.58	2.88	2.45	1.59	1.35	0.73
SPA 12 - 9	59.17	37.83	30.50	17.33	10.83	6.15	4.48	3.60	3.07	1.99	1.68	0.91
SPA 12 - 10	65.67	42.00	34.00	19.17	12.05	6.83	4.98	4.00	3.40	2.22	1.87	1.01
SPA 12 - 12	74.00	47.33	38.17	21.83	13.63	7.80	5.67	4.43	3.85	2.53	2.27	1.20
SPA 12 - 18	111.00	71.00	57.33	32.67	20.45	11.68	8.50	6.65	5.77	3.81	3.19	1.80
SPA 12 - 26	159.67	102.00	82.67	47.00	29.33	16.83	12.28	9.62	8.33	5.50	4.92	2.60
SPA 12 - 28	177.33	113.33	91.67	52.00	32.50	19.17	13.95	11.20	9.53	6.20	5.23	2.82

The above characteristics data can be obtained within three charge/discharge cycles.

Discharge Constant Power at 25°C (Watts/cell)

End Voltage 1.65 V/cell												
	5 min	10 min	15 min	30 min	1 h	2 h	3 h	4 h	5 h	8 h	10 h	20 h
SPA 4 - 9.5	65.00	41.55	33.50	18.85	11.75	6.55	4.75	3.83	3.26	2.12	1.79	0.96
SPA 6 - 1.3	8.43	5.37	4.33	2.43	1.52	0.85	0.62	0.50	0.42	0.28	0.24	0.13
SPA 6 - 2.8	19.20	12.27	9.87	5.57	3.47	1.93	1.41	1.13	0.96	0.62	0.53	0.28
SPA 6 - 3.2	21.93	14.00	11.27	6.33	3.97	2.20	1.61	1.29	1.10	0.71	0.60	0.32
SPA 6 - 4.5	26.07	16.63	13.40	7.53	4.70	2.62	1.91	1.53	1.30	0.85	0.71	0.38
SPA 6 - 7	45.17	28.83	23.33	13.10	8.15	4.55	3.32	2.65	2.27	1.47	1.26	0.70
SPA 6 - 8	55.17	35.17	28.33	15.98	9.97	5.55	4.03	3.23	2.77	1.80	1.52	0.82
SPA 6 - 10	68.33	43.67	35.33	19.83	12.37	6.90	5.03	4.03	3.43	2.23	1.88	1.01
SPA 6 - 12	82.33	52.67	42.33	23.80	14.83	8.27	6.03	4.83	4.10	2.68	2.26	1.21
SPA 8 - 3.2	21.95	14.00	11.28	6.35	3.95	2.20	1.61	1.29	1.10	0.71	0.60	0.32
SPA 12 - 0.7	5.47	3.50	2.82	1.58	0.98	0.55	0.40	0.32	0.28	0.18	0.15	0.08
SPA 12 - 1.3	7.73	4.93	3.97	2.25	1.40	0.79	0.57	0.45	0.39	0.25	0.21	0.12
SPA 12 - 1.9	13.72	8.75	7.05	3.97	2.47	1.38	1.00	0.81	0.69	0.45	0.38	0.20
SPA 12 - 2C	13.70	8.75	7.05	3.97	2.48	1.38	1.01	0.81	0.69	0.45	0.38	0.20
SPA 12 - 2.3	15.77	10.07	8.10	4.57	2.85	1.58	1.16	0.93	0.79	0.51	0.43	0.23
SPA 12 - 3.3	22.00	14.00	11.27	6.35	4.02	2.20	1.61	1.29	1.10	0.71	0.60	0.33
SPA 12 - 5	33.33	21.33	16.67	9.83	6.03	3.45	2.52	2.02	1.72	1.12	0.94	0.51
SPA 12 - 6	41.00	26.33	21.00	11.90	7.42	4.13	3.02	2.42	2.07	1.34	1.13	0.61
SPA 12 - 7	45.17	28.83	23.33	13.10	8.15	4.55	3.32	2.65	2.27	1.47	1.26	0.70
SPA 12 - 7.2	49.33	31.50	25.33	14.28	8.90	4.95	3.62	2.90	2.47	1.60	1.35	0.73
SPA 12 - 9	61.67	39.33	31.67	17.83	11.12	6.20	4.52	3.62	3.08	2.00	1.70	0.91
SPA 12 - 10	68.50	43.83	35.17	19.83	12.35	6.88	5.02	4.03	3.43	2.23	1.88	1.01
SPA 12 - 12	77.17	49.33	39.67	22.50	13.98	7.87	5.72	4.47	3.87	2.55	2.28	1.21
SPA 12 - 18	116.00	74.17	59.50	33.70	20.98	11.80	8.57	6.70	5.82	3.83	3.20	1.82
SPA 12 - 26	165.33	105.67	85.67	48.50	30.17	17.00	12.37	9.68	8.40	5.53	4.95	2.62
SPA 12 - 28	184.83	118.17	95.17	53.50	33.33	19.33	14.05	11.27	9.60	6.25	5.27	2.83

End Voltage 1.60 V/cell												
	5 min	10 min	15 min	30 min	1 h	2 h	3 h	4 h	5 h	8 h	10 h	20 h
SPA 4 - 9.5	67.00	42.85	34.30	19.25	11.90	6.60	4.80	3.85	3.28	2.14	1.80	0.97
SPA 6 - 1.3	8.70	5.53	4.43	2.50	1.54	0.85	0.62	0.50	0.42	0.28	0.25	0.13
SPA 6 - 2.8	19.80	12.63	10.10	5.67	3.50	1.94	1.41	1.13	0.97	0.63	0.53	0.28
SPA 6 - 3.2	22.63	14.43	11.57	6.47	4.00	2.22	1.62	1.30	1.10	0.72	0.60	0.32
SPA 6 - 4.5	26.87	17.13	13.73	7.70	4.77	2.63	1.92	1.54	1.31	0.85	0.72	0.39
SPA 6 - 7	46.67	29.83	23.83	13.37	8.28	4.57	3.33	2.67	2.28	1.48	1.27	0.70
SPA 6 - 8	57.00	36.33	29.17	16.30	10.12	5.58	4.08	3.25	2.78	1.81	1.52	0.82
SPA 6 - 10	70.33	45.00	36.00	20.23	12.53	6.93	5.03	4.03	3.47	2.24	1.89	1.02
SPA 6 - 12	84.33	54.00	43.33	24.30	15.07	8.30	6.07	4.87	4.13	2.69	2.27	1.22
SPA 8 - 3.2	22.63	14.45	11.55	6.48	4.03	2.22	1.62	1.30	1.11	0.72	0.61	0.33
SPA 12 - 0.7	5.67	3.62	2.88	1.62	1.00	0.56	0.40	0.32	0.28	0.18	0.15	0.08
SPA 12 - 1.3	8.00	5.10	4.07	2.30	1.42	0.79	0.58	0.45	0.39	0.25	0.22	0.12
SPA 12 - 1.9	14.13	9.02	7.22	4.05	2.52	1.39	1.01	0.81	0.69	0.45	0.38	0.20
SPA 12 - 2C	14.10	9.02	7.23	4.05	2.50	1.39	1.01	0.81	0.69	0.45	0.38	0.20
SPA 12 - 2.3	16.25	10.38	8.30	4.65	2.88	1.59	1.16	0.93	0.79	0.52	0.44	0.23
SPA 12 - 3.3	22.67	14.43	11.55	6.48	4.08	2.22	1.62	1.30	1.11	0.72	0.60	0.33
SPA 12 - 5	35.00	21.83	16.83	10.02	6.18	3.47	2.52	2.02	1.73	1.13	0.94	0.51
SPA 12 - 6	42.50	27.00	21.67	12.15	7.52	4.15	3.03	2.43	2.08	1.35	1.13	0.61
SPA 12 - 7	46.67	29.83	23.83	13.37	8.28	4.57	3.33	2.67	2.28	1.48	1.27	0.70
SPA 12 - 7.2	50.83	32.50	26.00	14.58	9.03	4.98	3.63	2.92	2.48	1.61	1.36	0.73
SPA 12 - 9	63.67	40.67	32.50	18.17	11.28	6.23	4.55	3.65	3.10	2.02	1.70	0.91
SPA 12 - 10	70.67	45.17	36.17	20.17	12.55	6.93	5.05	4.05	3.45	2.25	1.88	1.02
SPA 12 - 12	79.50	50.83	40.67	23.00	14.20	7.92	5.75	4.50	3.90	2.57	2.28	1.22
SPA 12 - 18	119.33	76.33	61.00	34.38	21.30	11.87	8.62	6.75	5.85	3.86	3.22	1.82
SPA 12 - 26	172.17	110.00	88.00	49.50	30.50	17.17	12.45	9.73	8.45	5.57	4.97	2.63
SPA 12 - 28	190.67	121.83	97.50	54.67	33.83	19.33	14.13	11.33	9.67	6.28	5.28	2.85

The above characteristics data can be obtained within three charge/discharge cycles.