

# ABF SHR(Super high rate) Sintered NiCd Battery Cells



## Performance Curves

- main applications:
1. Aviation battery.
  2. Locomotive battery.
  3. Ship and boat battery.
  4. High end energy storage

Figure 2. Discharge Curve of SHR Series at  $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$

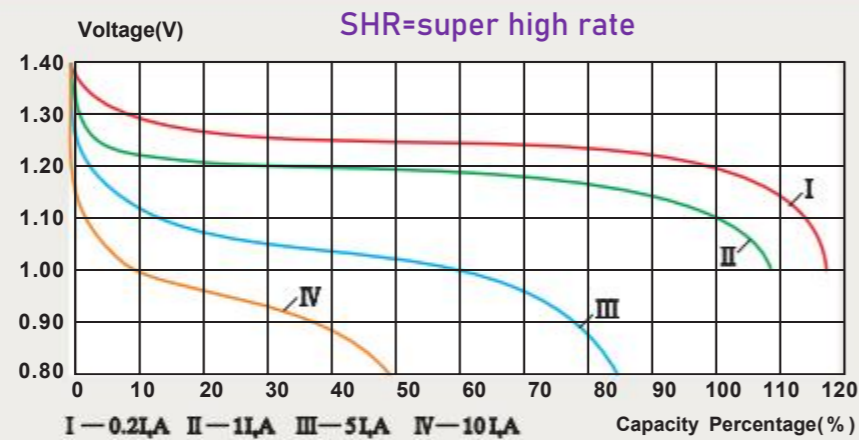


Figure 3. Capacity Comparison Curves Between ABF SHR Series Cell and VRLA Cell Under Different Temperature

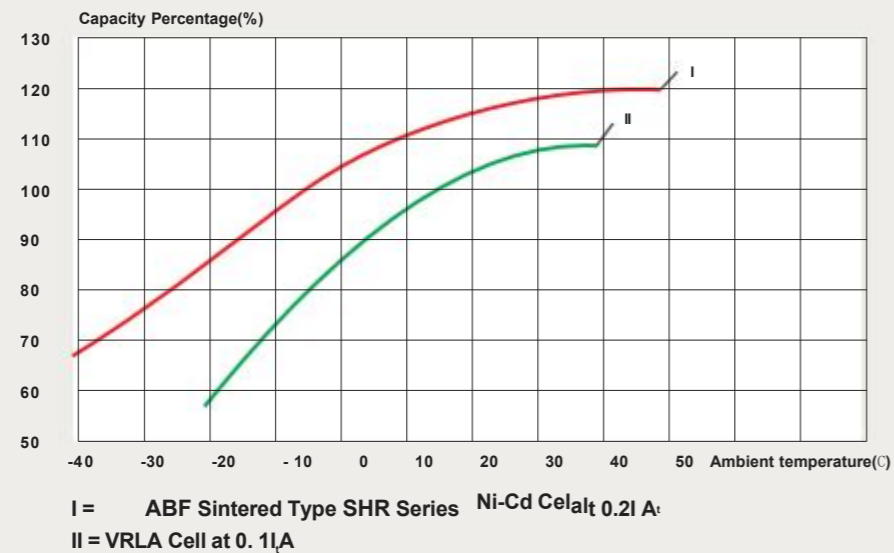


Figure 4. Cycle Life Comparison Curves Between ABF SHR Series Cell and VRLA Cell Under Different Temperature

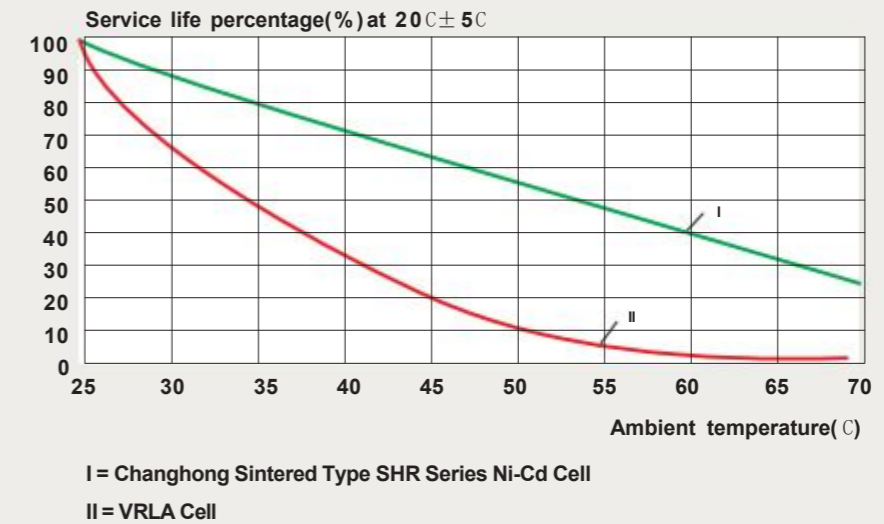
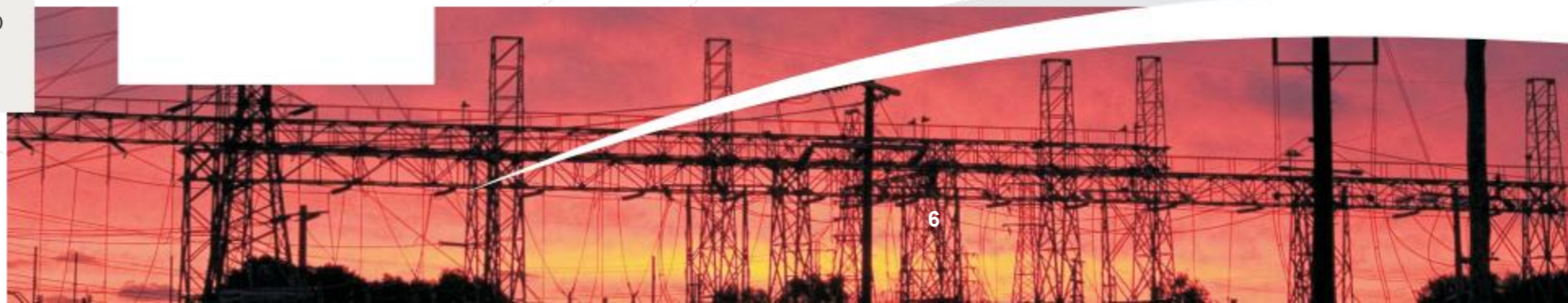
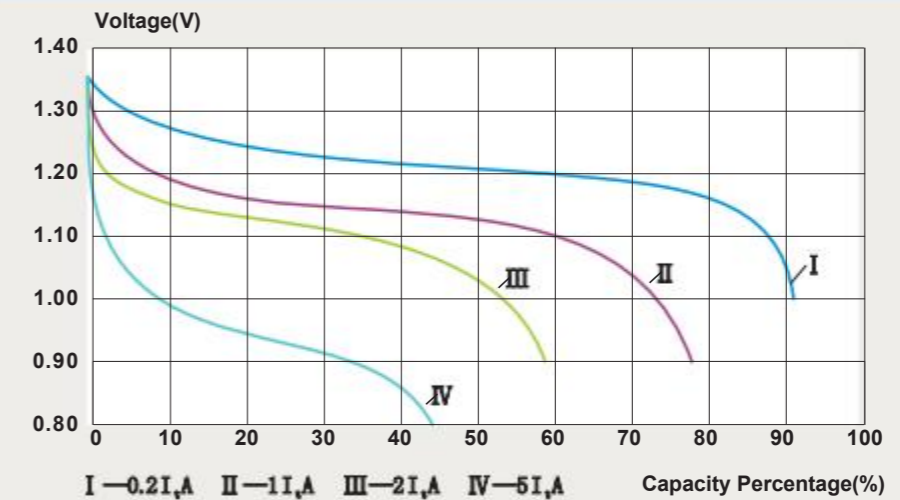


Figure 5. Discharge Curve of SHR Series at  $-18^{\circ}\text{C} \pm 2^{\circ}\text{C}$



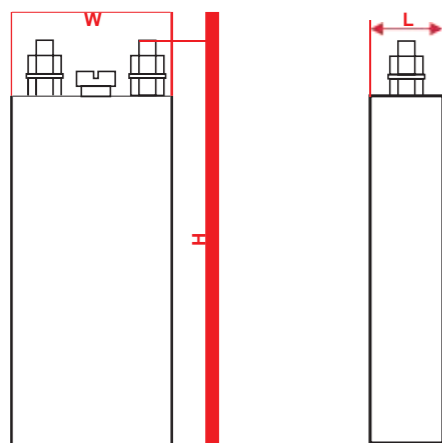
Common Trouble and Trouble Shootings

Troubles	Possible Cause	Trouble Shootings
There is no voltage of the battery packs	The linking parts are loosened	Tighten or replace the linking part
	The battery is fully discharged	Recharge the battery pack in strict accordance with manufacturer's instructions and check the insulating
There is no voltage of the single cell	Short-circuit,open circuit or no electrolyte inside the cell	Check the reasons after cleaning the cell, replace with the qualified electrolyte or cell.
	The cell is fully and over-discharged	Recharge the cell in strict accordance with manufacturer's instructions
Electrolyte leakage	The electrolyte level is too high	Clean the cell surface and carry out the charge - discharge cycle,then adjust the electrolyte level between the Max. and Min. Level allowed
	The vent plug is loosened or damaged	Tighten or replace the vent plug
	The cell are overcharged under high temperature The charging voltage is too high or the charging current is too large	Disassemble and clean the cell,and ensure the installation room is well ventilated Stop charging immediately,when the temperature of cell is very high Check the circuit and adjust the charging voltage accordingly
	Terminal pole and vent plug is not well sealed	Tighten the nut or replace the defective sealing spare parts
Excessive water consumption	There is electrolyte leakage because of the broken container or defective vent plug	Check and replace the defective cell or vent plug
	Excessive overcharged or charged under high temperature	Check the charging voltage and the charge system
The initial charging voltage is abnormally high	Electrolyte quantity is too less	Refill the distilled water,then adjust the electrolyte level before the end of charge
Capacity loss	The electrolyte level is too low to cover the cell plate	Refill the distilled water,then adjust the electrolyte level accordingly
	The cell is charged or discharged improperly	Charge or discharge the cell in strict accordance with manufacturer's instructions
	Short circuit or slight short circuit occurs in the interior of the cell	Replace the defective cell.
	Carbonate content in the electrolyte is too high	Replace it with the qualified electrolyte
	The cell is charged under too high or too low temperature	Keep the charging temperature within the range of 15 C ~ 30 C
	Memory effect	Do the charge-discharge cycle to recover the cell capacity in accordance with manufacturer's instructions

Troubles	Possible Cause	Trouble Shootings
	Normal capacity loss after a long time service (capacity lower than 70% of nominal capacity)	Replace the defective cell with the qualified new one
	The calibration of instruments is inaccuracy	Check and adjust the ampere meter and voltmeter
The charge voltage is lower than 1.56V/cell before the end of charge	The separator is damaged,because the cell is overcharged exclusively or work under high temperature	Replace the defensive cell with qualified new one
Cell container swells	The vent plug is blocked up	Clean the vents to make it smooth or replace it with new vent plug
	Plates bulge because of improper use	As principle, ignore it when there is no influences on operation,otherwise,replace it with qualified new cell
Connectors heat abnormally,or nut strike fire	The tightened nuts are loosened	check if the wave washer (or spring washer ) are intact or not,change the defensive washer with the qualified ones,then tighten the nuts properly in accordance with manufacturer's instructions
The open voltage of battery pack is lower than $n \times 1.27V$ (n means the numbers of cells series connected)	The cell capacity is lower than the nominal capacity	Carry out charge-discharge cycle and check the cell capacity
	There is short-circuit between the cells	Disassemble and clean the cell,then recharge it in accordance with manufacturer's instructions
	The electrolyte is too little	Refill the distilled water and recharge the cell,adjust the electrolyte level at the end of charge
	The joint parts is disconnected	Tighten the nut
There is corrosion on the metallic linking parts	Improper series connection	Check the wiring to shoot the troubles on series connection,then charge and discharge the cells in accordance with manufacturer's instructions
	Several cells is damaged	Replace the defective cells with qualified new ones
	Acidic atmosphere	Keep the cells away from the acidic source
	lack of lubricating oil	clean and lubricate the metallic linking parts of the cell properly
	The nickel plated coating of the metallic linking parts is damaged	Replace the damaged metallic linking parts
	There is green or black substance on the metallic linking parts	Soak the metallic linking parts with 3%~5% boracic acid liquor,then clear it



Dimensions Table of SHR Series



Cell Type	Rated Voltage (V)	Rated Capacity (C5 Ah)	Max. External Dimension ( mm)			Max. Weight (kg)	Volume of Electrolyte (L)	Terminal Thread	Case Material
			Length	Width	Height				
SHR10	1.2	10	29	81	218	1.05	0.16	M10	PA
SHR20	1.2	20	61	138.5	258	3.3	1.06	M10	PP
SHR30	1.2	30	61	138.5	258	3.4	1	M10	PP
SHR35	1.2	35	36	81	237	1.6	0.19	M10	PA or PP
SHR40	1.2	40	61	138.5	258	3.5	0.94	M10	PP
SHR45	1.2	45	39	80.5	250	1.8	0.20	M10	PA
SHR50	1.2	50	61	138.5	258	3.8	0.92	M10	PP
SHR60	1.2	60	61	138.5	258	4.0	0.91	M10	PP
SHR60-(2)	1.2	60	50	80.5	250	2.4	0.25	M10	PA
SHR60-(3)	1.2	60	74.5	81	243	2.8	0.55	M12	PA or PP
SHR70	1.2	70	70	134	285	4.5	1.1	M16	ABS or PP
SHR80	1.2	80	70	134	285	4.7	1	M16	ABS or PP
SHR80-(4)	1.2	80	74.5	81	243	3.0	0.45	M12	PA or PP
SHR90	1.2	90	70	134	285	4.9	0.95	M16	ABS or PP
SHR90-(2)	1.2	90	74.5	81	243	3.1	0.4	M12	PA or PP
SHR100	1.2	100	70	134	285	5.0	0.9	M16	ABS or PP
SHR100-(2)	1.2	100	62	138.5	267	4.5	0.78	M16	ABS or PP
SHR110	1.2	110	70	134	285	5.5	0.85	M16	ABS or PP

Cell Type	Rated Voltage (V)	Rated Capacity (C5 Ah)	Max. External Dimension ( mm)			Max. Weight (kg)	Volume of Electrolyte (L)	Terminal Thread	Case Material
			Length	Width	Height				
SHR120	1.2	120	70	134	285	6.0	0.8	M16	ABS or PP
SHR120-(2)	1.2	120	62	138.5	267	4.8	0.7	M16	ABS or PP
SHR120-(3)	1.2	120	79	140.7	367	7.2	1.3	M16×1.5	PP
SHR130	1.2	130	79	140.7	367	7.5	1.25	M16×1.5	PP
SHR140	1.2	140	79	140.7	367	7.6	1.2	M16×1.5	PP
SHR140-(2)	1.2	140	107	165	348	8.8	2.5	M20	PP
SHR150	1.2	150	79	140.7	367	7.7	1.16	M16×1.5	PP
SHR160	1.2	160	79	140.7	367	7.8	1.1	M16×1.5	PP
SHR170	1.2	170	79	140.7	367	8.1	1.02	M16×1.5	PP
SHR170-(2)	1.2	170	107	165	342	9.7	2.3	M20	PP
SHR180	1.2	180	79	140.7	367	8.3	1	M16×1.5	PP
SHR190	1.2	190	79	140.7	367	8.5	1	M16×1.5	PP
SHR190-(2)	1.2	190	107	165	342	10.2	2.2	M20	PP
SHR200	1.2	200	107	165	342	10.3	2.1	M20	PP
SHR200-(2)	1.2	200	71	137	432	9.0	1	M20	PP
SHR210	1.2	210	107	165	342	10.4	2	M20	PP
SHR220	1.2	220	107	165	342	10.5	2	M20	PP
SHR230	1.2	230	107	165	342	11.0	1.9	M20	PP
SHR240	1.2	240	107	165	342	11.2	1.9	M20	PP
SHR250	1.2	250	107	165	342	11.4	1.9	M20	PP
SHR300	1.2	300	162	166	348	13.8	2.9	M20	PP

PA = Polyamides

PP = High impact polypropylene Co-polymer

ABS = Acrylonitrile butadiene styrene with high impact properties

**Remark:**

1. The above specifications may be modified without prior notice.
2. The above dimensions are only a part of ABF standard products' range, we could design and develop any other battery model and battery crate, according to specific end-user's requirements.

## Discharge Data Table

Discharge performance data after fully charged by constant current under  $20C \pm 5C$  according to IEC60623, Final Voltage 1. 14V/cell

Cell Type	Cell Capacity (C <sub>5</sub> Ah)	Hours			Minutes					Seconds	
		5	3	1	20	10	5	3	1	30	5
SHR10	10	1.80	2.90	8.60	15.5	19.0	26.0	34.0	44.5	50.0	64
SHR20	20	3.60	5.80	17.2	31.0	38.0	52.0	68.0	89.0	100	128
SHR30	30	5.40	8.70	25.8	46.5	57.0	78.0	102	134	150	192
SHR40	40	7.20	11.6	34.4	62.0	76.0	104	136	178	200	256
SHR50	50	9.00	14.5	43.0	77.5	95.0	130	170	223	250	320
SHR60	60	10.8	17.4	51.6	93.0	114	156	204	267	300	384
SHR70	70	12.6	20.3	60.2	109	133	182	238	312	350	448
SHR80	80	14.4	23.2	68.8	124	152	208	272	356	400	512
SHR90	90	16.2	26.1	77.4	140	171	234	306	401	450	576
SHR100	100	18.0	29.0	86.0	155	190	260	340	445	500	640
SHR110	110	19.8	31.9	94.6	171	209	286	374	490	550	704
SHR120	120	21.6	34.8	103	184	225	306	398	518	579	738
SHR130	130	23.4	37.7	111	198	240	325	420	545	606	768
SHR140	140	25.2	40.6	119	213	258	350	453	587	653	823
SHR150	150	27.0	43.5	128	228	277	375	485	629	699	878
SHR160	160	28.8	46.4	136	243	295	400	518	671	746	931
SHR170	170	30.6	49.3	145	258	313	425	550	713	793	985
SHR180	180	32.4	52.2	153	273	332	450	582	754	839	1037
SHR190	190	34.2	55.1	162	289	350	475	615	796	886	1090
SHR200	200	36.0	58.0	170	304	369	500	647	838	933	1145
SHR210	210	37.8	60.9	178	318	385	520	673	870	966	1183
SHR220S	220	39.6	63.8	187	333	403	545	705	911	1012	1239
SHR230	230	41.4	66.7	195	348	422	570	737	953	1058	1296
SHR240	240	43.2	69.6	204	363	440	595	769	994	1104	1352
SHR250	250	45.0	72.5	212	378	458	620	801	1035	1150	1408
SHR300	300	54.0	87.0	255	454	550	744	961	1242	1379	1690

Discharge specification data after fully charged by constant current under  $20C \pm 5C$  according to IEC60623, Final Voltage 1. 10V/cell

Cell Type	Cell Capacity (C <sub>5</sub> Ah)	Hours			Minutes					Seconds	
		5	3	1	20	10	5	3	1	30	5
SHR10	10	1.90	3.10	9.20	17.8	22.8	30.5	37.0	55.0	62.5	73.0
SHR20	20	3.80	6.20	18.4	35.6	45.6	61.0	74.0	110	125	145
SHR30	30	5.70	9.30	27.6	53.4	68.4	91.5	111	165	188	218
SHR40	40	7.60	12.4	36.8	71.2	91.2	122	148	220	250	290
SHR50	50	9.50	15.5	46.0	89.0	114	153	180	268	304	353
SHR60	60	11.4	18.6	55.2	106	136	182	215	310	352	409
SHR70	70	13.3	21.7	64.4	123	157	210	248	355	403	488
SHR80	80	15.2	24.8	73.6	139	177	237	279	395	449	543
SHR90	90	17.1	27.9	82.8	154	196	262	315	426	484	586
SHR100	100	19.0	31.0	92.0	169	215	287	345	495	563	681
SHR110	110	20.9	34.1	101	186	236	315	379	544	618	749
SHR120	120	22.8	37.2	110	202	256	342	411	590	670	812
SHR130	130	24.7	40.3	120	218	275	368	443	635	722	874
SHR140	140	26.6	43.4	129	235	297	396	477	683	777	941
SHR150	150	28.5	46.5	138	251	318	424	511	732	832	1008
SHR160	160	30.4	49.6	147	268	339	453	545	781	888	1070
SHR170	170	32.3	52.7	156	285	360	481	579	850	966	1164
SHR180	180	34.2	55.8	166	302	381	509	613	900	1023	1233
SHR190	190	36.1	58.9	175	318	403	537	647	950	1080	1301
SHR200	200	38.0	62.0	184	335	424	566	681	1000	1136	1370
SHR210	210	39.9	65.1	193	352	445	594	715	1050	1193	1438
SHR220	220	41.8	68.2	202	369	466	622	749	1100	1250	1507
SHR230	230	43.7	71.3	212	385	487	651	783	1150	1307	1575
SHR240	240	45.6	74.4	221	402	509	679	817	1200	1364	1644
SHR250	250	47.5	77.5	230	419	530	707	851	1250	1420	1712
SHR300	300	57.0	93.0	276	503	636	849	1021	1500	1705	2054

Discharge performance data after fully charged by constant current under 20°C±5°C according to IEC60623, Final Voltage 1.05V/cell

Cell Type	Cell Capacity (C <sub>5</sub> Ah)	Hours			Minutes					Seconds	
		5	3	1	20	10	5	3	1	30	5
SHR10	10	1.95	3.20	9.40	18.3	25.0	38.0	46.5	67.5	76.0	81.0
SHR20	20	3.90	6.40	18.8	36.5	50.0	76.0	93.0	135	152	162
SHR30	30	5.80	9.60	28.2	54.8	75.0	114	140	203	228	243
SHR40	40	7.80	12.8	37.6	73.0	100	152	186	270	304	324
SHR50	50	9.70	16.0	47	91.3	125	190	233	338	380	405
SHR60	60	11.7	19.0	55.9	108	145	219	265	381	425	469
SHR70	70	13.6	22.2	65.3	125	165	243	288	406	444	529
SHR80	80	15.6	25.4	74.6	143	186	275	326	460	503	596
SHR90	90	17.5	28.6	83.9	160	207	306	364	560	615	725
SHR100	100	19.5	31.7	93.2	178	231	340	400	622	683	805
SHR110	110	21.4	34.9	103	196	254	374	438	684	752	886
SHR120	120	23.4	38.1	112	214	277	408	473	739	820	966
SHR130	130	25.3	41.3	121	232	300	442	507	793	888	1047
SHR140	140	27.3	44.4	131	250	323	476	546	854	957	1127
SHR150	150	29.2	47.6	140	267	346	510	585	915	1025	1208
SHR160	160	31.2	50.8	149	285	369	544	624	976	1093	1288
SHR170	170	33.1	53.9	158	303	392	578	663	1037	1162	1369
SHR180	180	35.1	57.1	168	321	415	612	702	1098	1230	1449
SHR190	190	37.0	60.3	177	339	435	636	724	1159	1298	1518
SHR200	200	39.0	63.5	186	357	457	669	762	1220	1367	1598
SHR210	210	40.9	66.6	196	374	480	703	800	1281	1435	1678
SHR220	220	42.9	69.8	205	392	503	736	838	1342	1503	1758
SHR230	230	44.8	73.0	214	410	526	770	876	1403	1572	1837
SHR240	240	46.8	76.2	224	428	549	803	914	1464	1640	1917
SHR250	250	48.7	79.3	233	446	572	837	952	1525	1708	1997
SHR300	300	58.5	95.0	280	535	686	1004	1143	1830	2050	2397

Discharge performance data after fully charged by constant current under 20°C±5°C according to IEC60623, Final Voltage 1.00V/cell

Cell Type	Cell Capacity (C <sub>5</sub> Ah)	Hours			Minutes					Seconds	
		5	3	1	20	10	5	3	1	30	5
SHR10	10	2.00	3.30	9.80	18.8	27.5	44.0	55.0	79.0	87.5	100
SHR20	20	4.00	6.60	19.6	37.6	55.0	88.0	110	158	175	200
SHR30	30	6.00	9.90	29.4	56.4	82.5	132	165	237	263	300
SHR40	40	8.00	13.2	39.2	75.2	110	176	220	316	350	400
SHR50	50	10.0	16.5	49.0	94.0	138	220	274	392	434	494
SHR60	60	12.0	19.8	58.4	111	162	258	316	445	489	556
SHR70	70	14.0	23.1	67.4	127	182	286	343	473	520	592
SHR80	80	16.0	26.4	77.0	145	206	323	388	536	594	677
SHR90	90	18.0	29.7	86.6	163	232	363	421	620	669	761
SHR100S	100	20.0	33.0	96.3	181	258	404	462	678	743	846
HR110	110	22.0	36.3	106	200	284	444	506	740	817	930
SHR120	120	24.0	39.6	116	218	310	485	549	802	892	1015
SHR130	130	26.0	42.9	125	236	335	525	592	869	966	1100
SHR140	140	28.0	46.2	135	254	361	565	634	935	1040	1184
SHR150	150	30.0	49.5	144	272	387	606	676	1000	1115	1269
SHR160	160	32.0	52.8	154	290	413	646	721	1066	1189	1353
SHR170	170	34.0	56.1	164	308	439	687	766	1133	1263	1438
SHR180	180	36.0	59.4	173	326	464	727	811	1199	1338	1523
SHR190	190	38.0	62.7	183	345	490	767	856	1266	1412	1607
SHR200	200	40.0	66.0	193	363	516	808	901	1333	1486	1692
SHR210	210	42.0	69.3	202	381	542	848	946	1399	1561	1776
SHR220	220	44.0	72.6	212	399	568	888	991	1464	1635	1861
SHR230	230	46.0	75.9	221	417	593	929	1036	1529	1709	1946
SHR240	240	48.0	79.2	231	435	619	969	1081	1594	1783	2030
SHR250	250	50.0	82.5	241	453	645	1010	1127	1659	1858	2115
SHR300	300	60.0	99.0	289	544	774	1212	1352	1981	2229	2538

Discharge performance data after fully charged by constant current under  $20C \pm 5C$  according to IEC60623, Final Voltage 0.85V/cell

Cell Type	Cell Capacity (Cs Ah)	Minutes				Seconds	
		20	10	5	1	30	5
SHR10	10	30.0	48.2	74.1	120	142	158
SHR20	20	60.0	96.4	148	240	283	316
SHR30	30	90.0	145	225	360	430	474
SHR40	40	120	191	297	473	562	623
SHR50	50	150	234	368	579	688	763
SHR60	60	180	271	426	660	769	869
SHR70	70	210	305	479	732	844	963
SHR80	80	240	348	548	836	964	1101
SHR90	90	270	392	616	935	1016	1231
SHR100	100	300	436	685	1039	1129	1368
SHR110	110	330	479	753	1143	1242	1505
SHR120	120	360	523	822	1247	1355	1641
SHR130	130	390	566	860	1305	1418	1718
SHR140	140	420	610	926	1405	1527	1851
SHR150	150	450	647	973	1464	1579	1928
SHR160	160	480	690	1038	1562	1684	2057
SHR170	170	510	745	1120	1690	1818	2221
SHR180	180	540	789	1186	1786	1925	2351
SHR190	190	570	833	1252	1885	2032	2482
SHR200	200	600	876	1318	1984	2139	2612
SHR210	210	630	920	1384	2083	2246	2743
SHR220	220	660	964	1450	2182	2353	2874
SHR230	230	690	1008	1516	2282	2460	3004
SHR240	240	720	1052	1581	2381	2567	3135
SHR250	250	750	1096	1647	2480	2674	3265
SHR300	300	900	1315	1977	2976	3208	3919

Discharge performance data after fully charged by constant current under  $20C \pm 5C$  according to IEC60623, Final Voltage 0.65V/cell

Cell Type	Cell Capacity (Cs Ah)	Minutes				Seconds	
		20	10	5	1	30	5
SHR10	10	32.0	60.0	90.0	200	230	300
SHR20	20	64.0	120	180	400	460	600
SHR30	30	96.0	180	270	600	690	900
SHR40	40	128	240	360	800	920	1200
SHR50	50	160	300	450	1000	1150	1500
SHR60	60	192	360	540	1200	1380	1800
SHR70	70	224	420	630	1400	1610	2100
SHR80	80	256	480	720	1600	1831	2388
SHR90	90	288	540	810	1800	2039	2660
SHR100	100	320	600	900	2000	2266	2955
SHR110	110	352	660	990	2178	2468	3219
SHR120	120	384	720	1080	2376	2665	3477
SHR130	130	416	780	1170	2561	2859	3729
SHR140	140	448	840	1260	2745	3048	3956
SHR150	150	480	900	1343	2912	3217	4155
SHR160	160	512	960	1426	3066	3371	4332
SHR170	170	544	1020	1507	3215	3528	4511
SHR180	180	576	1080	1588	3361	3681	4669
SHR190	190	608	1140	1663	3491	3805	4788
SHR200	200	640	1200	1737	3617	3922	4896
SHR210	210	672	1254	1800	3730	4025	4984
SHR220	220	704	1313	1871	3858	4141	5088
SHR230	230	736	1373	1940	3993	4278	5215
SHR240	240	768	1424	1995	4098	4382	5299
SHR250	250	787	1468	2042	4173	4453	5342
SHR300	300	939	1751	2436	4855	5129	6002

**Remark:** The discharge data listed are for battery sizing reference only, and not regarded as the battery acceptance standards.