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Introduction of INR18650-25R

A Samsung SDI INR18650-25R lithium-ion rechargeable battery is shown in the background. It is a cylindrical cell with a silver-colored top and bottom and a white body. The text "SAMSUNG" and "Lion" are visible on the side, along with "LITHIUM-ION RECHARGEABLE BATTERY".

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Oct. 2013

Energy Business Division

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INR18650-25R

- **Specification**
- **Capacity (0.2C vs. 10A)**
- **AC/DC impedance**
- **Capacity & temperature vs. discharge capacity**
- **Energy & avg. voltage at different current**
- **Cycle life**
- **Pulse cycle life**
- **Low temperature voltage profile at 10A**
- **Storage characteristics**
- **Safety test**

Type		Spec.	Typical INR18650-25R
Chemistry		NCA	NCA
Dimension (mm)	Diameter	18.33 ± 0.07	18.33 ± 0.07
	Height	64.85 ± 0.15	64.85 ± 0.15
Weight (g)		Max. 45.0	43.8
Initial IR (mΩ AC 1kHz)		≤ 18	13.20 ± 2
Initial IR (mΩ DC (10A-1A))		≤ 30	22.15 ± 2
Nominal Voltage (V)		3.6	3.64
Charge Method (100mA cut-off)		CC-CV (4.2±0.05V)	CC-CV (4.2±0.05V)
Charge Time	Standard (min), 0.5C	180min	134min
	Rapid (min), 4A	60min	55min
Charge Current	Standard current (A)	1.25	1.25
	Max. current (A)	4.0	4.0
Discharge	End voltage (V)	2.5	2.5
	Max. cont. current (A)	20	20
	Max. momentary pulse (A, <1sec)	100	100
Rated discharge Capacity	Standard (mAh) (0.2C)	2,500	2,560
	rated (mAh) (10A)	2,450	2,539

Capacity _ 0.2C vs. 10A

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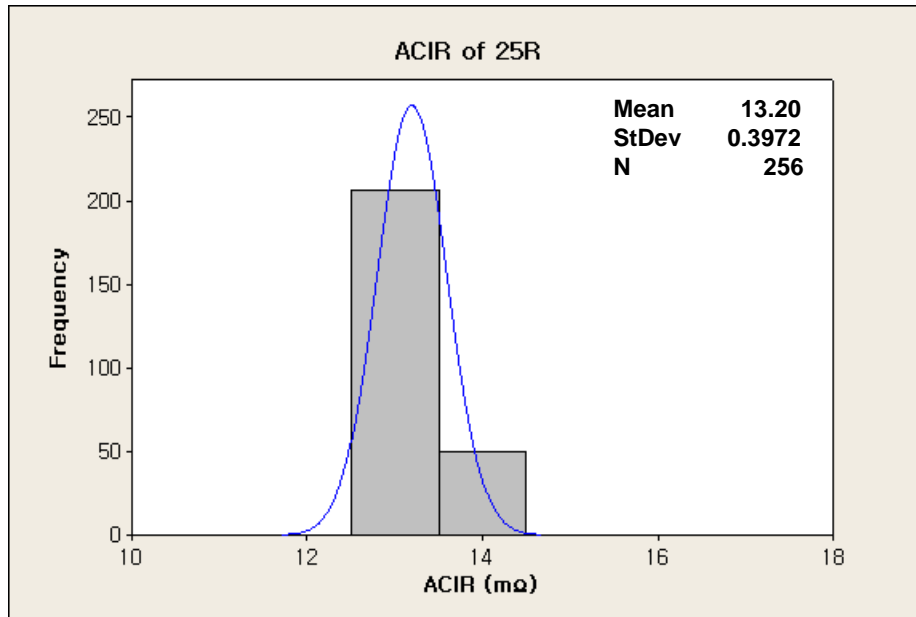
▪ 0.2C capacity

Cell	Capacity(Ah)	Energy(Wh)	Avg. volt(V)
1	2.555	9.36	3.66
2	2.557	9.37	3.66
3	2.557	9.37	3.67
4	2.564	9.39	3.66
5	2.565	9.40	3.66
Avg.	2.560	9.38	3.66

▪ 10A capacity

Cell	Capacity(Ah)	Energy(Wh)	Avg. volt(V)
1	2.533	8.71	3.44
2	2.531	8.70	3.43
3	2.539	8.74	3.44
4	2.544	8.77	3.45
5	2.548	8.76	3.44
Avg.	2.539	8.74	3.44

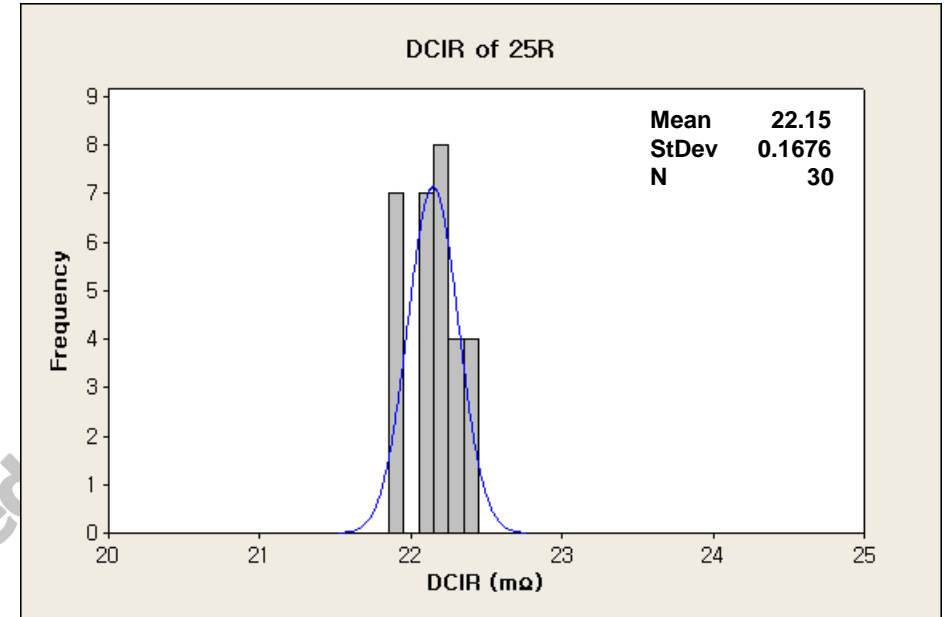
■ AC-IR



AC-IR

$13.20 \pm 2\text{m}\Omega$

■ DC-IR

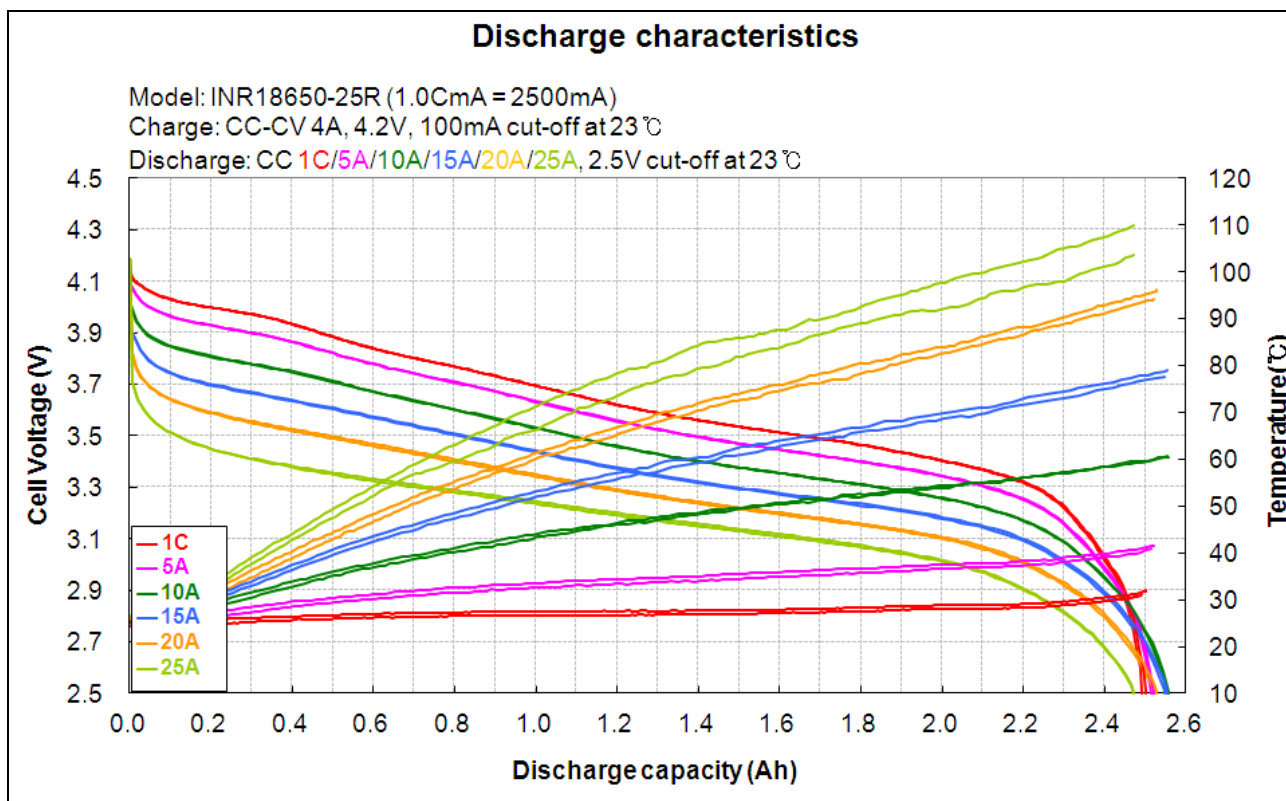


DC-IR

$22.15 \pm 2\text{m}\Omega$

Capacity & Temperature vs. discharge capacity

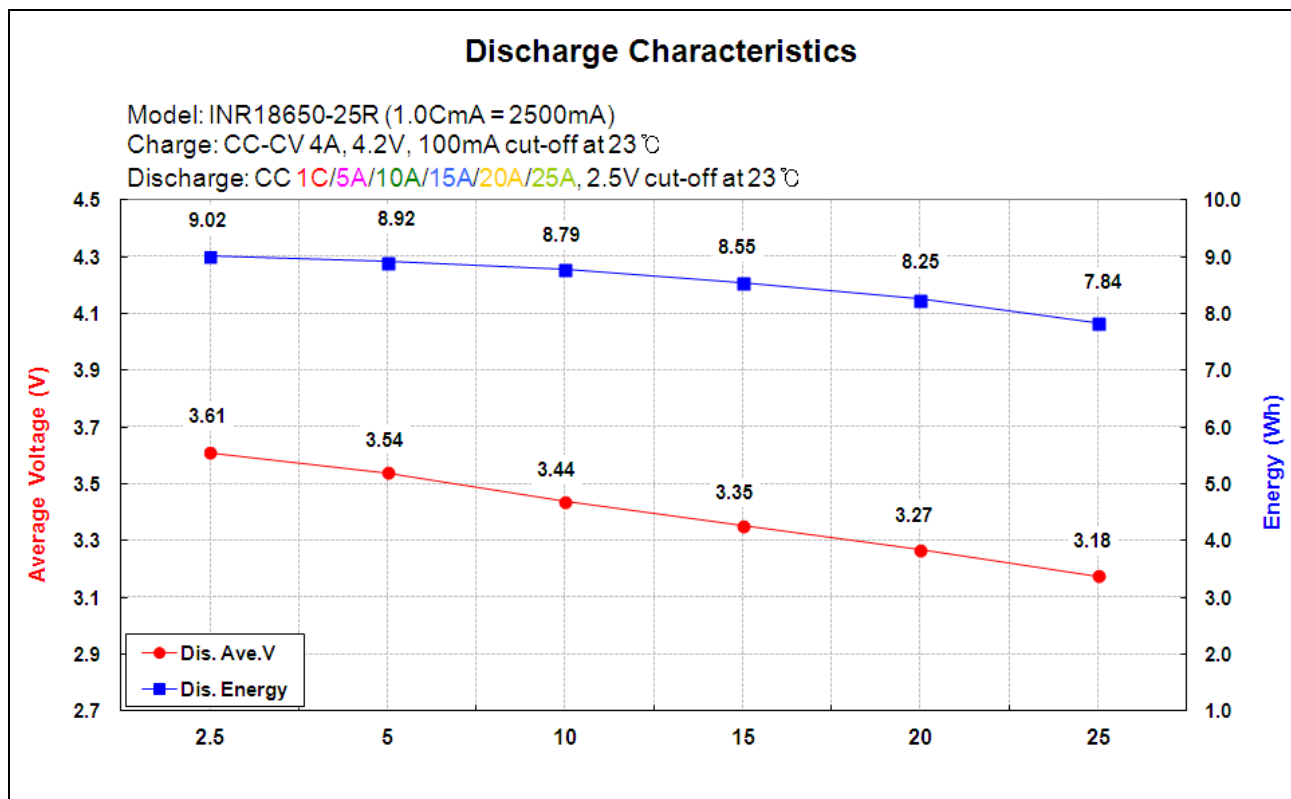
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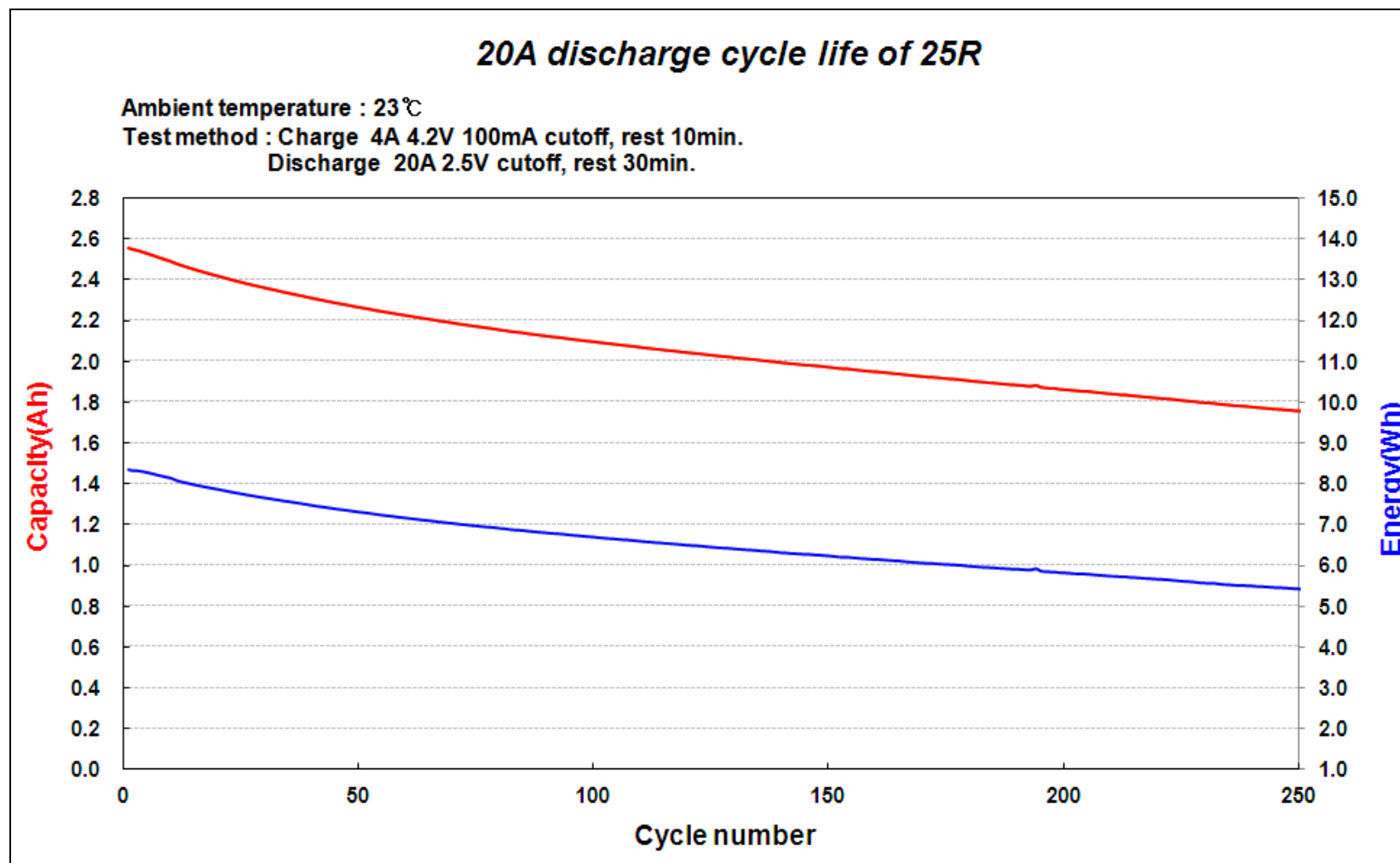
Discharge current						
	1C	5A	10A	15A	20A	25A
Capa.(Ah)	2.496	2.518	2.556	2.550	2.525	2.472
Temp.(°C)	31.6	41.2	60.6	78.4	95.2	106.8
Time(min.)	59.9	30.2	15.3	10.2	7.6	5.9

Energy & Avg. voltage at different current

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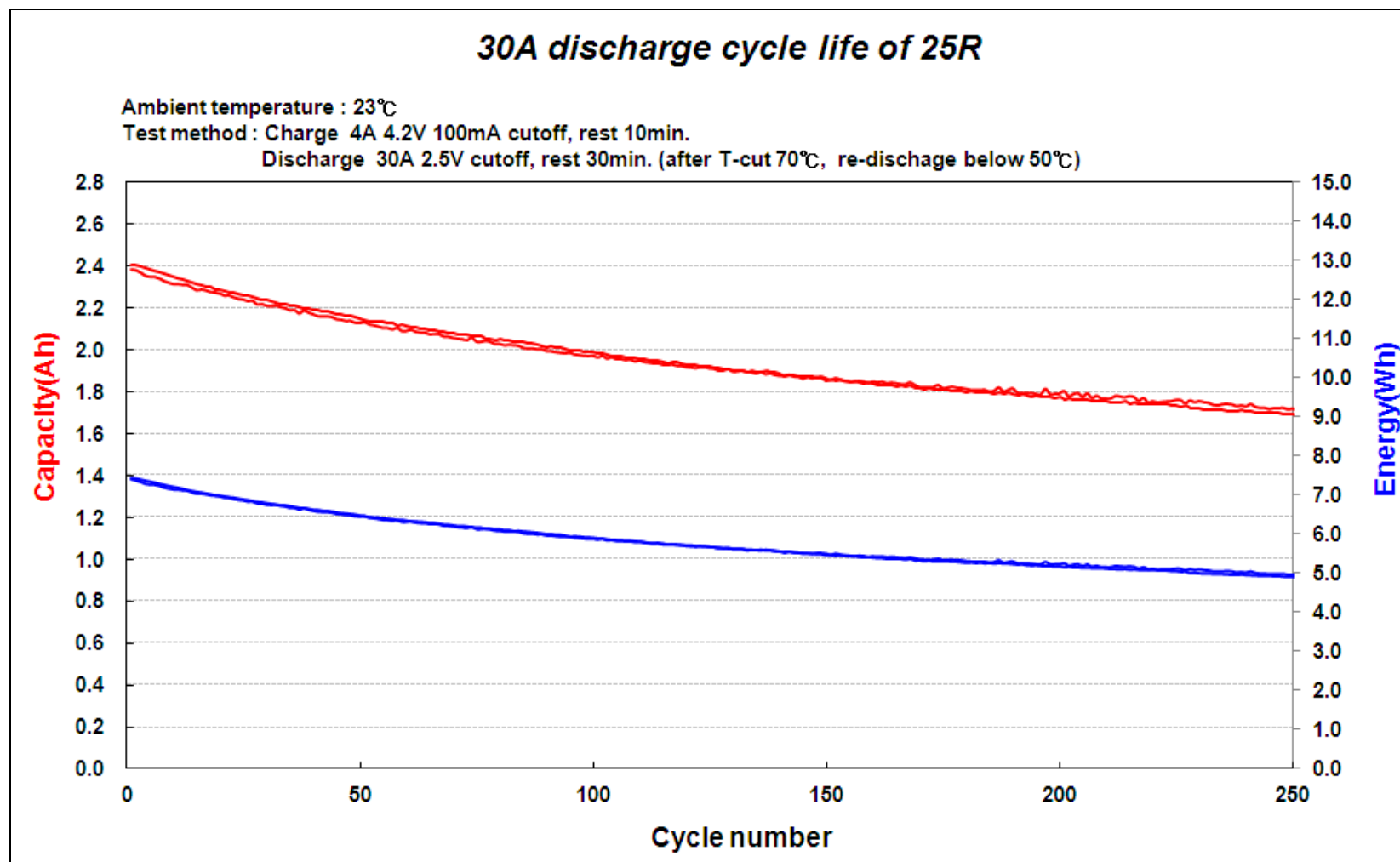


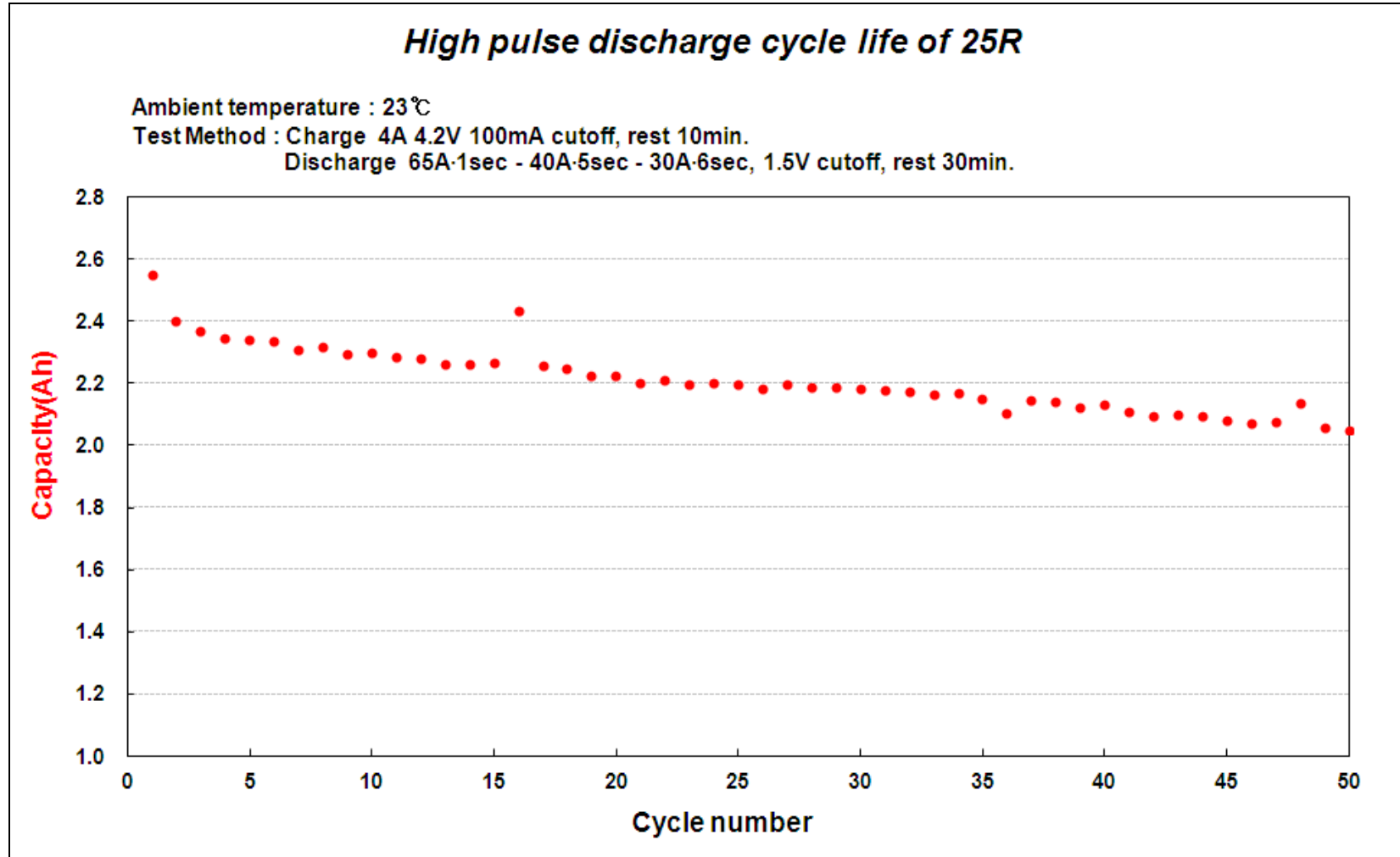
Discharge current						
	1C	5A	10A	15A	20A	25A
Energy(Wh)	9.02	8.95	8.79	8.55	8.25	7.84
Avg. voltage(V)	3.61	3.54	3.44	3.35	3.27	3.18



Cycle life _ 30A cycle(70°C T-cut)

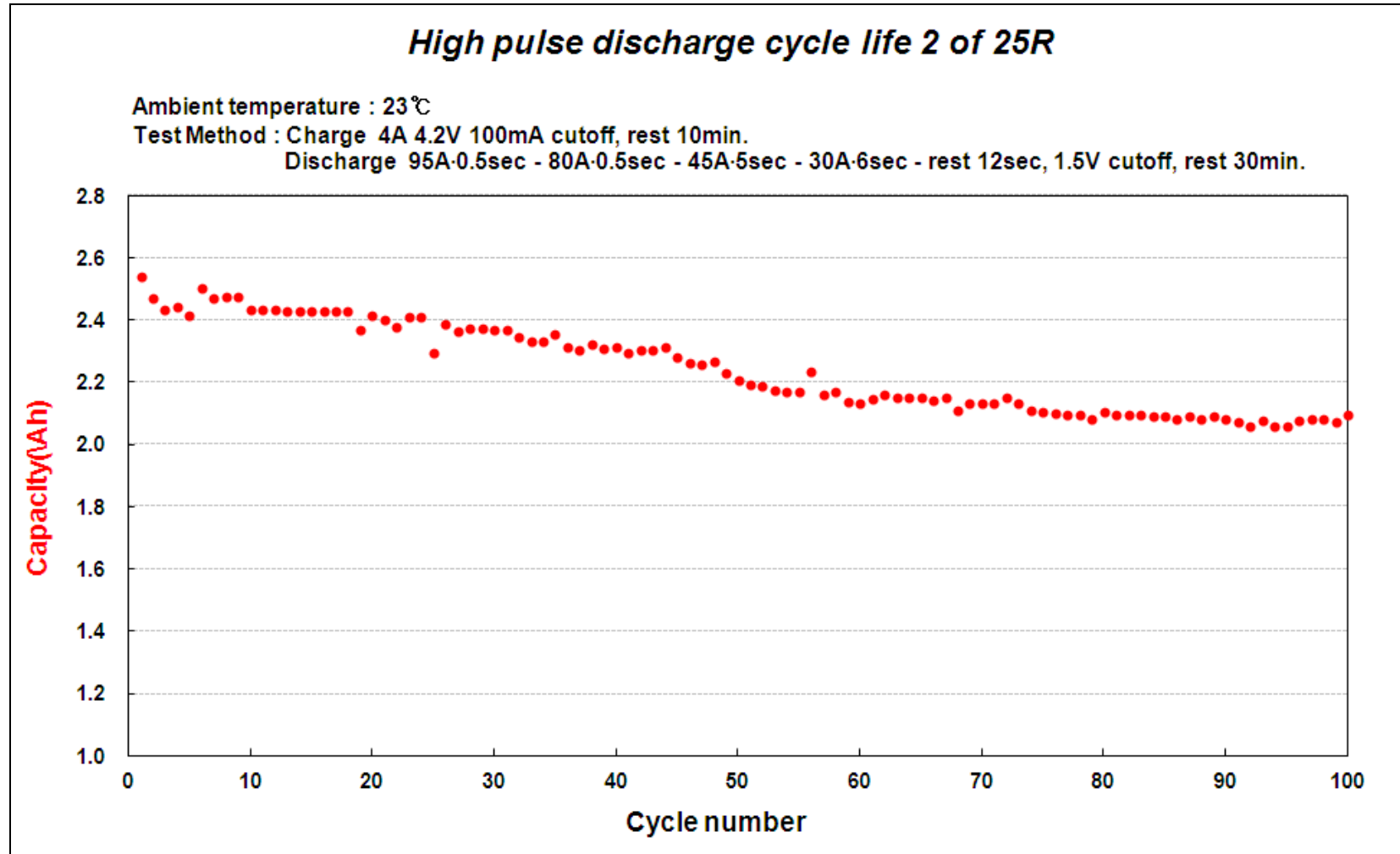
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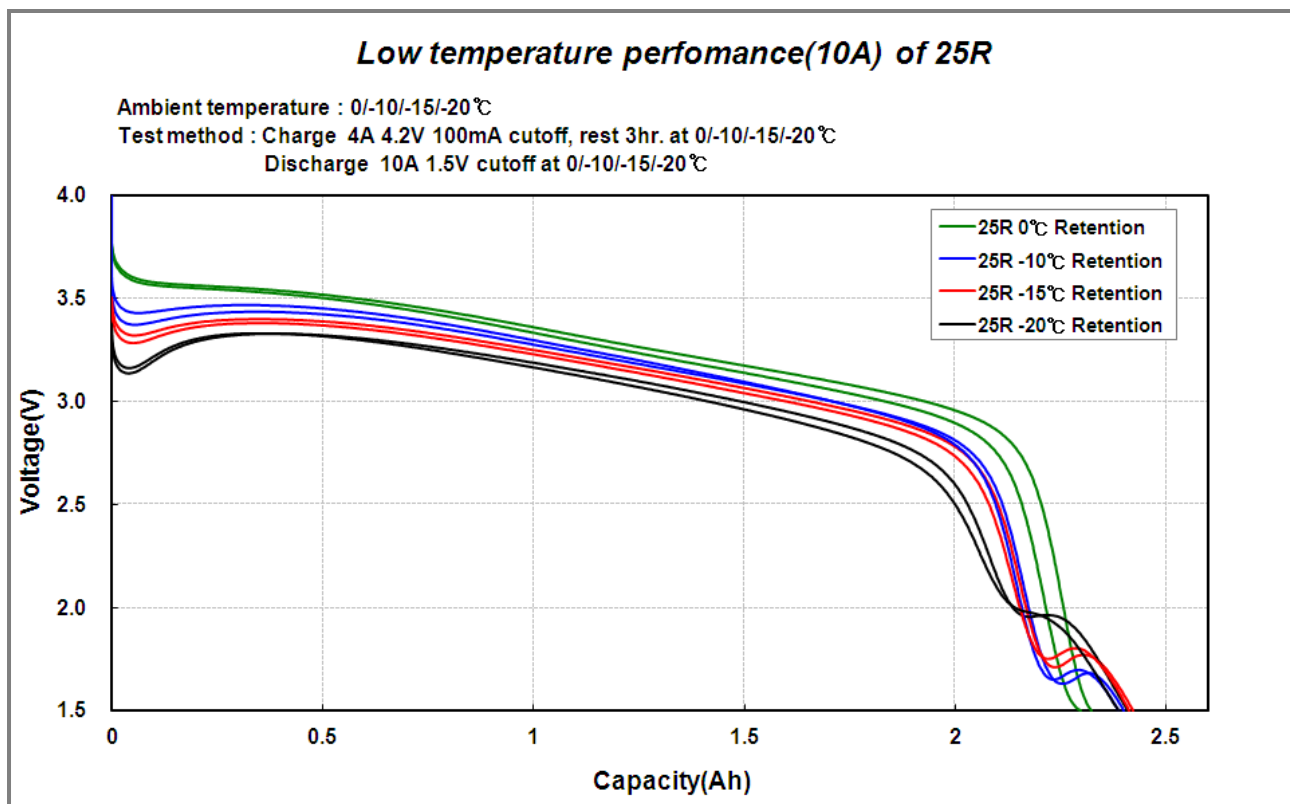
High pulse cycle life 2

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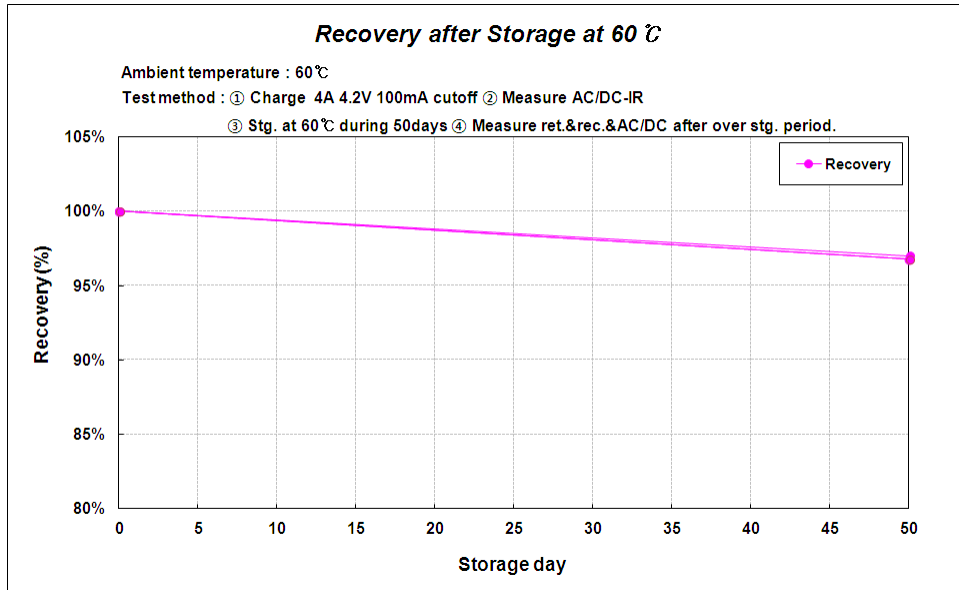
Low temperature discharge (10A)

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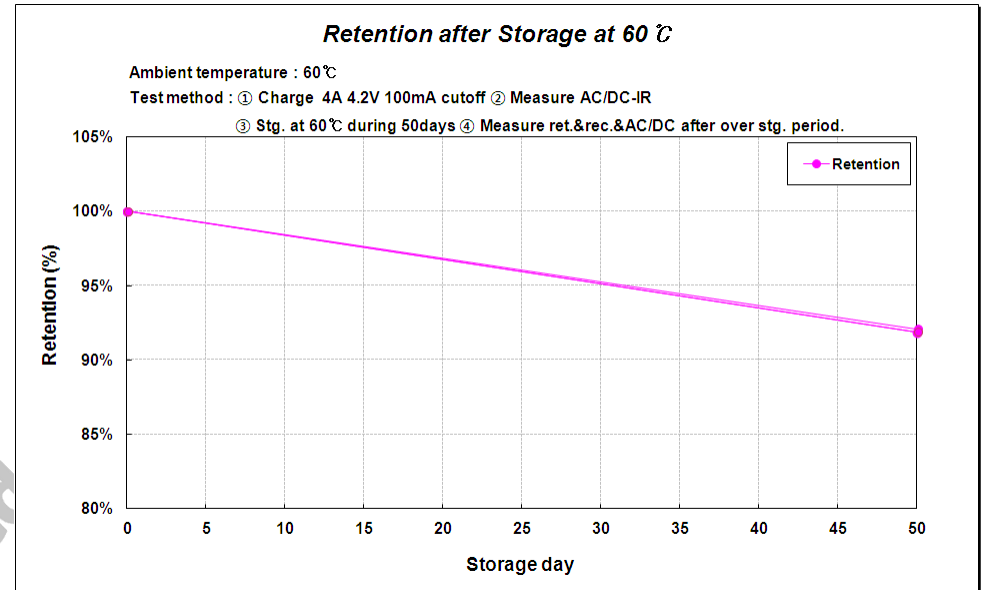


	0 °C		-10 °C		-15 °C		-20 °C	
10A	Capacity(Ah)	Capa.(%)	Capacity(Ah)	Capa.(%)	Capacity(Ah)	Capa.(%)	Capacity(Ah)	Capa.(%)
	2.323	92.9	2.398	95.9	2.413	96.5	2.407	96.3
	2.298	91.9	2.385	95.4	2.421	96.8	2.386	95.4
Avg.	2.310	92.4	2.392	95.7	2.417	96.7	2.397	95.9

■ Recovery



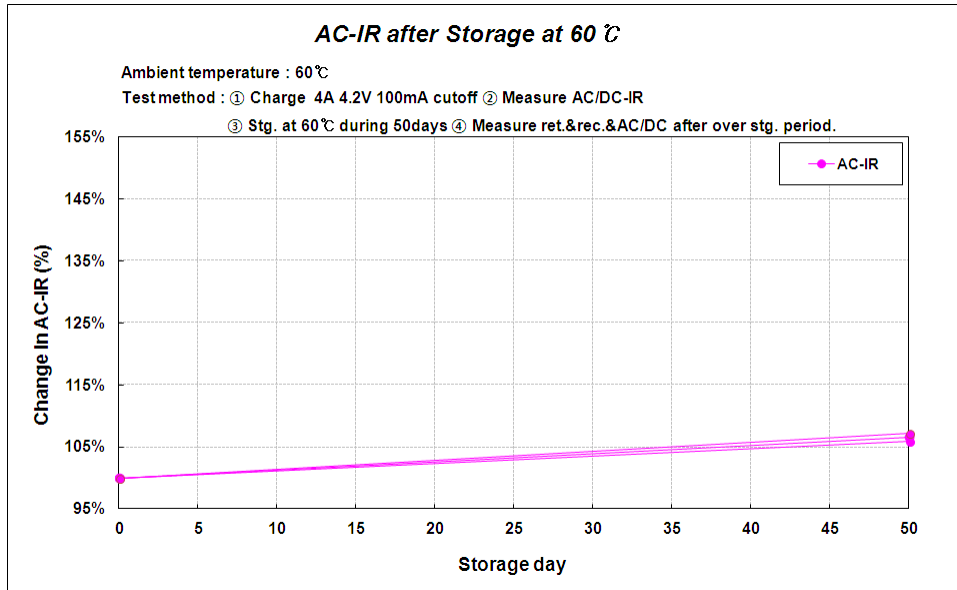
■ Retention



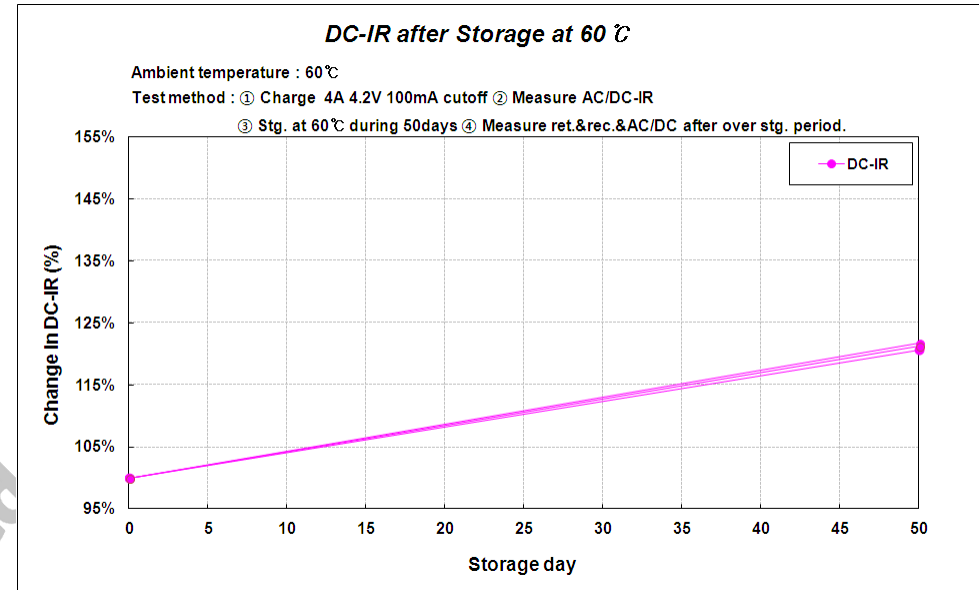
Storage at 60°C

storage day	initial			after storage				Ratio(%)			
	ACIR	DCIR	Capacity	ACIR	DCIR	Retention	Recovery	ACIR	DCIR	Retention	Recovery
50	13.2	20.2	2597	15.3	29.3	2122	2393	115.8	145.2	81.7	92.1

■ AC-IR



■ DC-IR



Storage at 60°C

storage day	initial			after storage				Ratio(%)			
	ACIR	DCIR	Capacity	ACIR	DCIR	Retention	Recovery	ACIR	DCIR	Retention	Recovery
50	13.2	20.2	2597	15.3	29.3	2122	2393	115.8	145.2	81.7	92.1

Safety test

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Test item			Spec.	Results		OK/NG	Remark
				Results	Max. temp.		
Electrical Abuse	Overcharge	20A 20V(UL)	L1	3L1	115.6	OK	
	Short circuit	10mΩ at 23℃	L1	3L1	55.0	OK	
Mechanical Abuse	Impact	UL	L1	5L0	22.6	OK	
	Crush	UL	L1	5L0	23.9	OK	
Thermal Abuse	Hot oven	140℃	L1	3L1	144.0	OK	

Level 0

•No change

Level 1

•Leak

Level 2

•Smoke, < 200℃

Level 3

•Smoke, > 200℃

Level 4

•Fire

Level 5

•Explosion