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# Introduction of New 40T

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SAMSUNG

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Energy Business Division

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## I . Product Concept

## II. Reliability Test

- Capacity, Impedance, Cycle Life

Low Temperature Performance, Storage Test

## III. Safety Test

Samsung will provide stable and well-balanced performance of new 40T through new design (e.g. electrode & tab design)

New 40T's Size : Same as 40T1	
Sample	Q2.'20
MP	Q3.20

Item			40T1	New 40T(40T3)
Design	Size (mm)	Diameter	Max 21.22	Max 21.22
		Height	Max 70.30	Max 70.30
	Chemistry	Cathode	NCA	NCA
		Anode	Graphite + SCN	Graphite + SCN
Tentative Spec.	Nominal Capacity*		4.0Ah	4.0Ah
	Nominal voltage		3.6V	3.6V
	Charge	Cut-off	4.2V	4.2V
		Max continuous	6A	6A
	Discharge	Cut-off	2.5V	2.5V
		Max continuous	45A(w/ 80°C cut)	50A(w/ 80°C cut) (under consideration)

\* 0.5C Charge to 4.2V / 0.2C discharge to 2.5V

### ▪ New 40T(40T3)

Cell	Capacity(Ah)	Energy(Wh)	Avg. volt(V)
1	4.109	15.1	3.67
2	4.108	15.1	3.67
3	4.111	15.1	3.67
<b>Avg.</b>	<b>4.109</b>	<b>15.1</b>	<b>3.67</b>

### ▪ 40T1

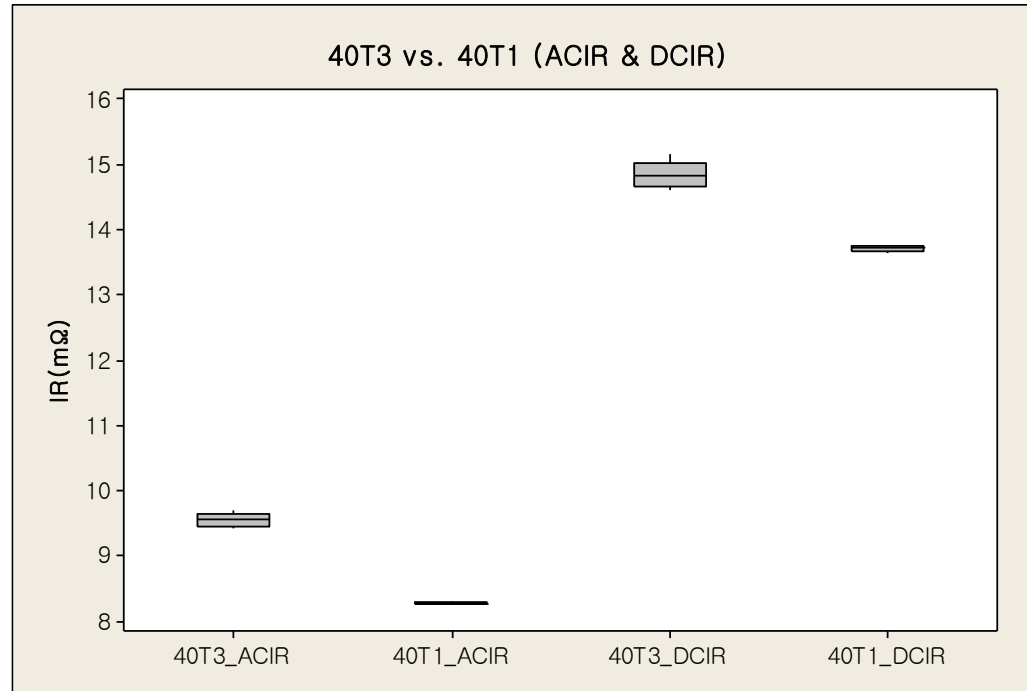
Cell	Capacity(Ah)	Energy(Wh)	Avg. volt(V)
1	4.084	14.8	3.63
2	4.089	14.8	3.63
3	4.084	14.8	3.63
<b>Avg.</b>	<b>4.086</b>	<b>14.8</b>	<b>3.63</b>

### ▪ New 40T(40T3)

Cell	Capacity(Ah)	Energy(Wh)	Avg. volt(V)
1	4.045	14.1	3.48
2	4.042	14.1	3.48
3	4.042	14.1	3.48
Avg.	<b>4.043</b>	<b>14.1</b>	<b>3.48</b>

### ▪ 40T1

Cell	Capacity(Ah)	Energy(Wh)	Avg. volt(V)
1	4.009	14.0	3.49
2	4.016	14.0	3.49
3	4.023	14.1	3.49
Avg.	<b>4.016</b>	<b>14.0</b>	<b>3.49</b>



AC-IR	
New 40T(40T3)	9.56 ± 2mΩ
40T1	8.30 ± 2mΩ

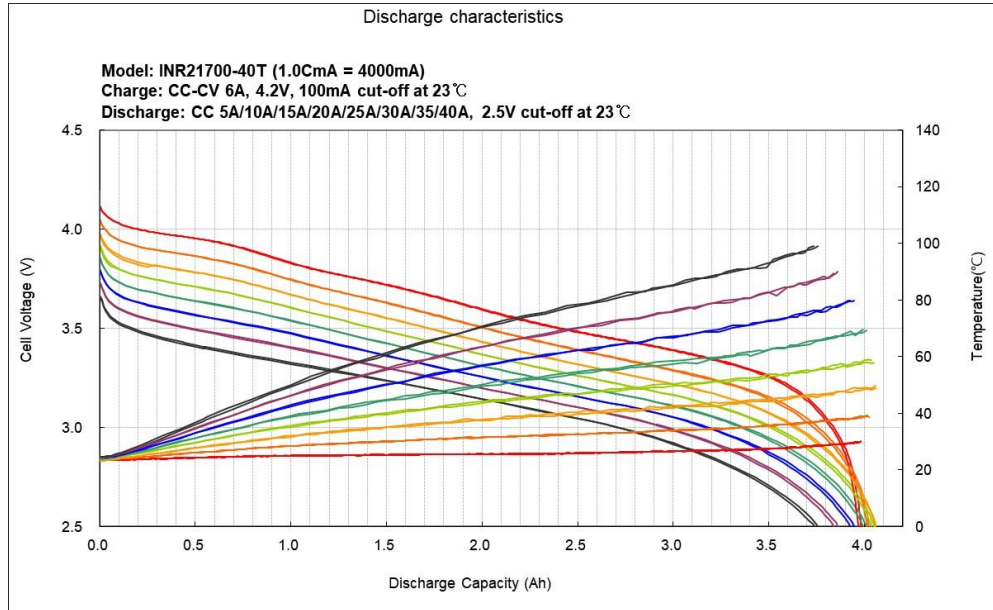
DC-IR	
New 40T(40T3)	14.85 ± 2mΩ
40T1	13.73 ± 2mΩ

# Capacity & Temperature vs. discharge capacity

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## II. Reliability Test

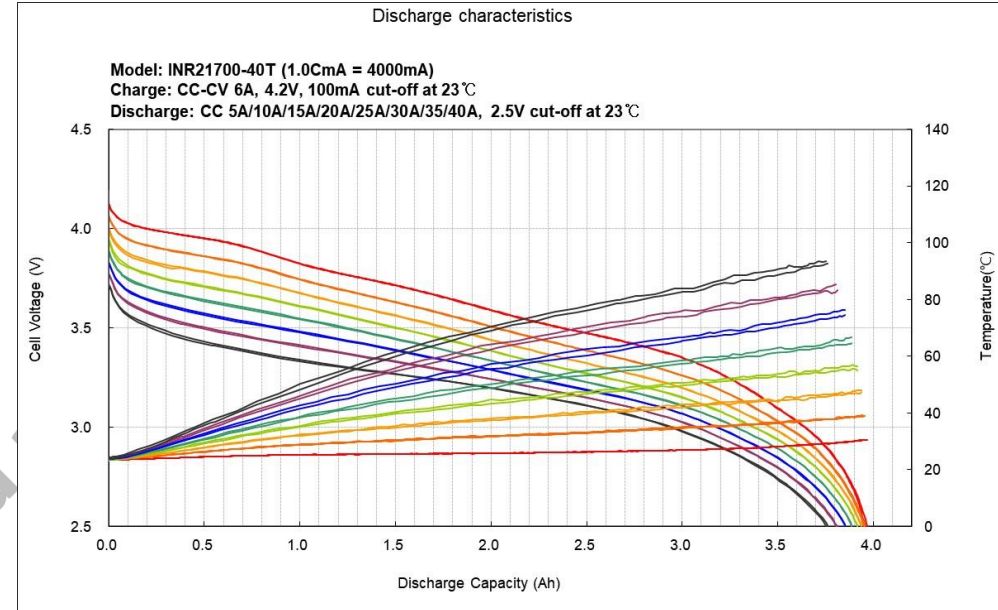
### ▪ New 40T(40T3)



#### Discharge current

	5A	10A	15A	20A	25A	30A	35A	40A
Capa. (Ah)	3.975	4.020	4.060	4.045	4.002	3.935	3.850	3.747
Temp. (°C)	30.02	39.11	49.30	58.47	69.43	79.88	89.60	99.00

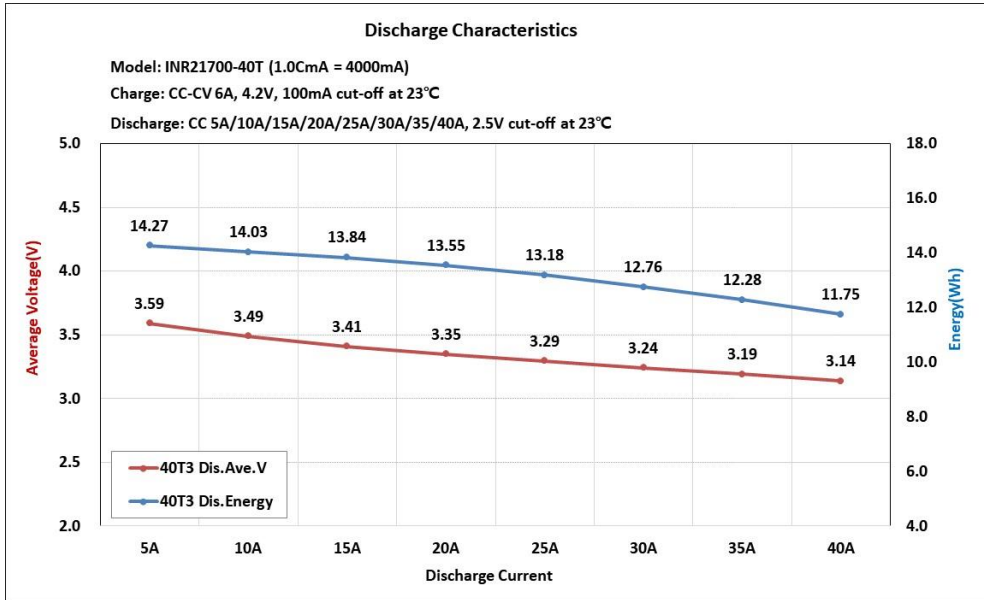
### ▪ 40T1



#### Discharge current

	5A	10A	15A	20A	25A	30A	35A	40A
Capa. (Ah)	3.961	3.954	3.938	3.916	3.887	3.852	3.809	3.758
Temp. (°C)	30.59	39.01	47.68	56.21	65.68	75.47	84.28	93.13

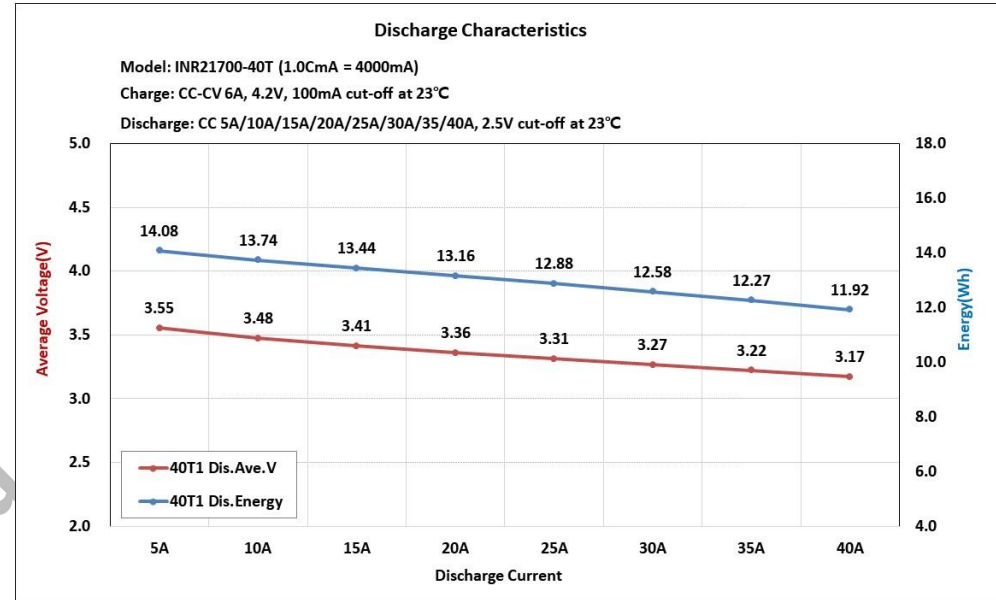
### ▪ New 40T(40T3)



Discharge current

	5A	10A	15A	20A	25A	30A	35A	40A
Energy (Wh)	14.27	14.03	13.84	13.55	13.18	12.76	12.28	11.75
Avg. voltage (V)	3.59	3.49	3.41	3.35	3.29	3.24	3.19	3.14

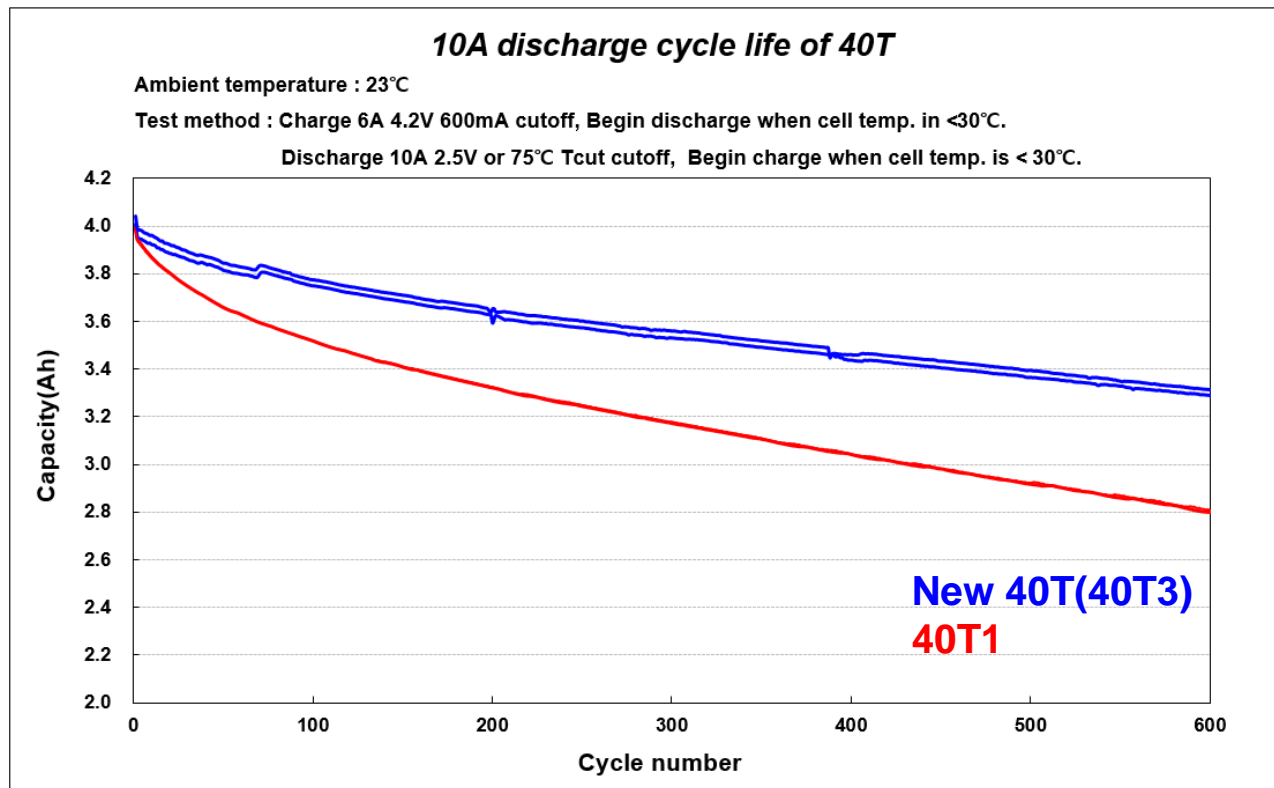
### ▪ 40T1



Discharge current

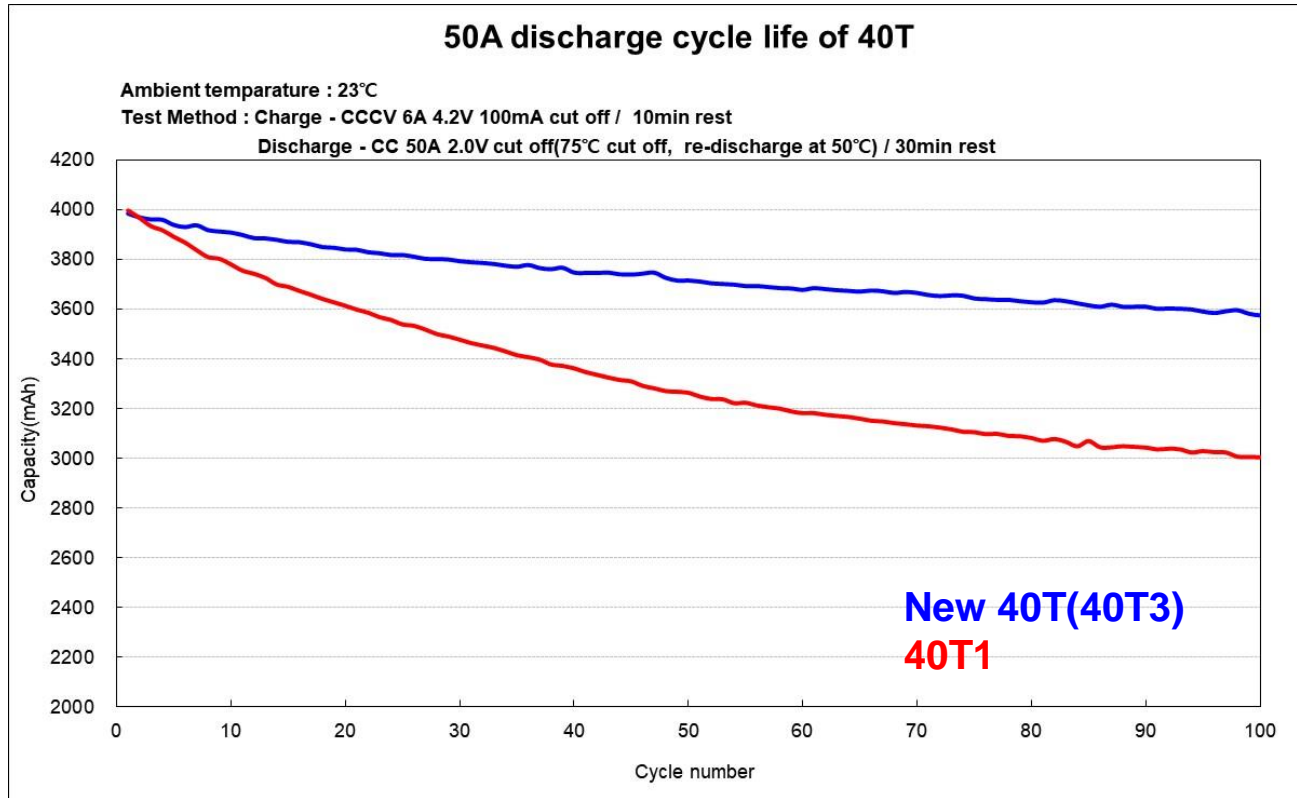
	5A	10A	15A	20A	25A	30A	35A	40A
Energy (Wh)	14.08	13.74	13.44	13.16	12.88	12.58	12.27	11.92
Avg. voltage (V)	3.55	3.48	3.41	3.36	3.31	3.27	3.22	3.17





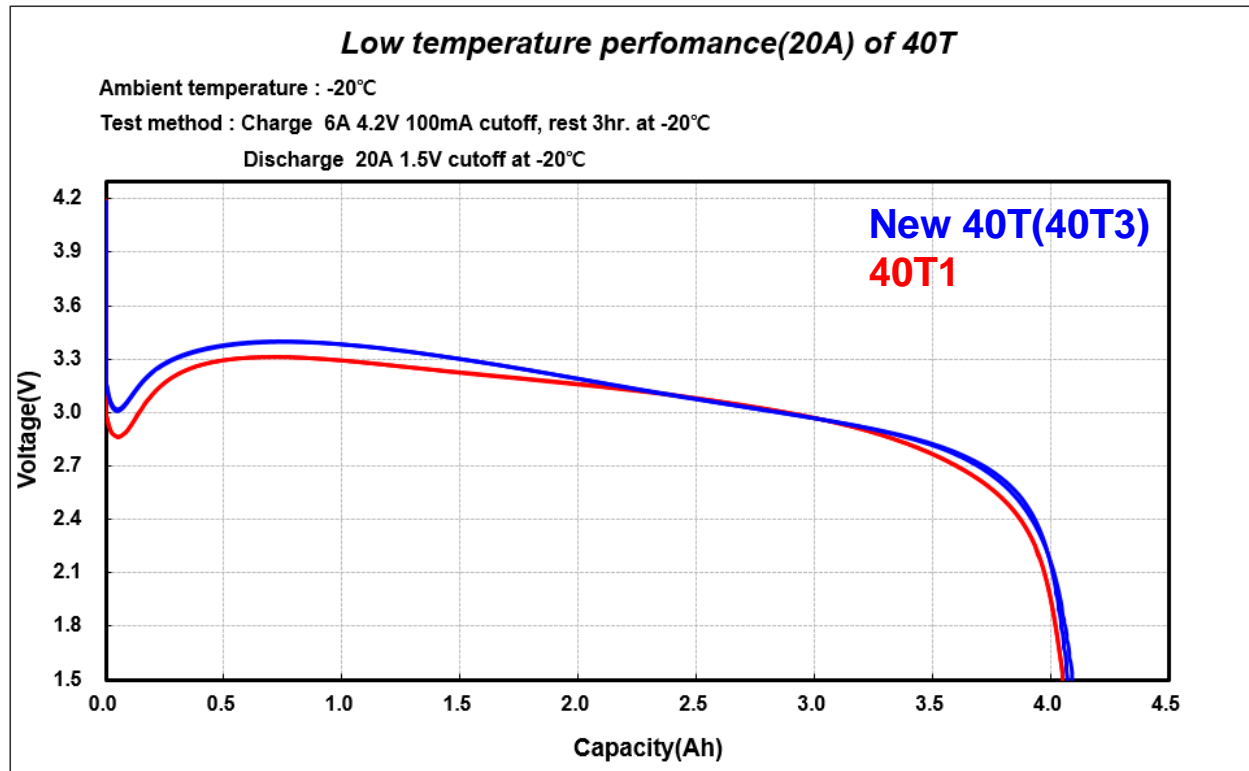
	New 40T(40T3)		40T1	
	Capacity (Ah)	Efficiency (%)	Capacity (Ah)	Efficiency (%)
<b>600cycle</b>	3.290	82.1	2.799	70.2
	3.314	82.0	2.808	70.3
<b>Ave.</b>	<b>3.302</b>	<b>82.1</b>	<b>2.804</b>	<b>70.2</b>

※ Efficiency : vs initial capacity



	New 40T(40T3)		40T1	
	Capacity (Ah)	Efficiency (%)	Capacity (Ah)	Efficiency (%)
<b>100cycle</b>	3.574	89.7	3.003	75.2

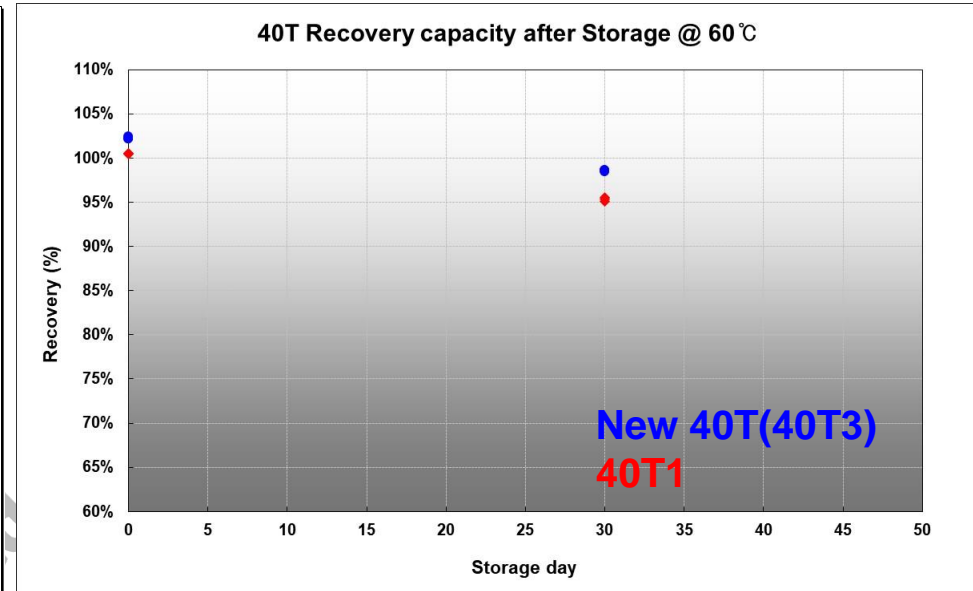
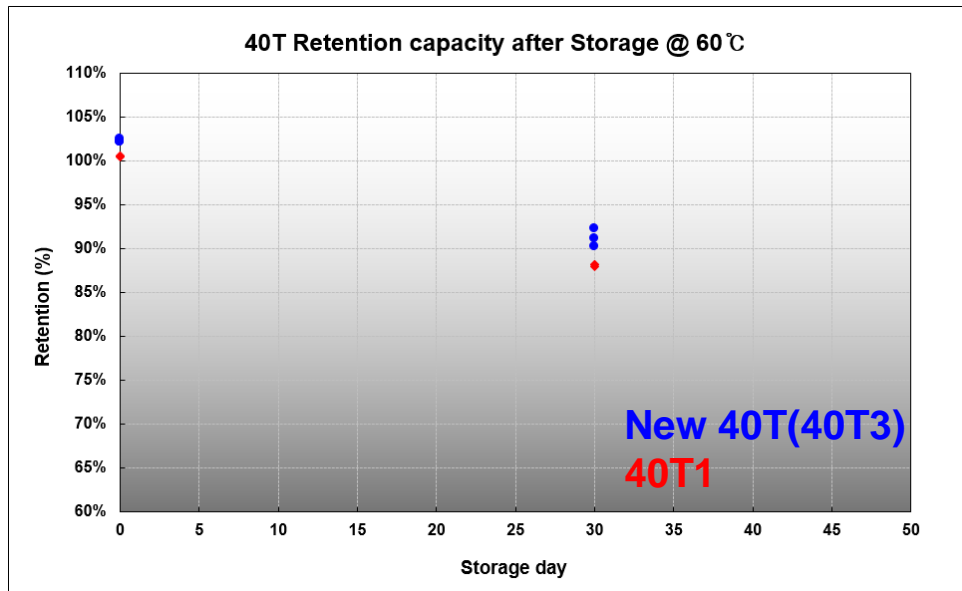
※ Efficiency : vs initial capacity



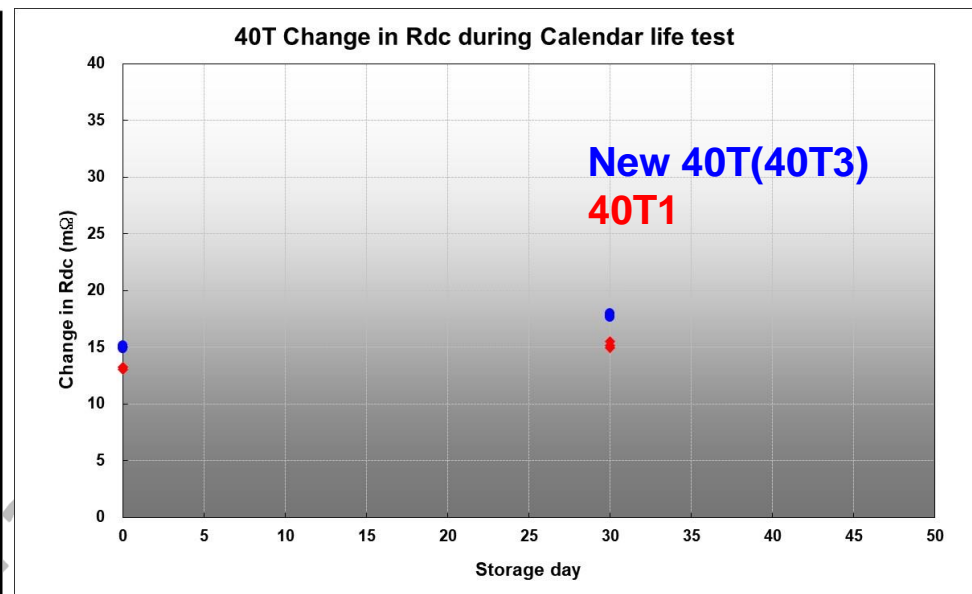
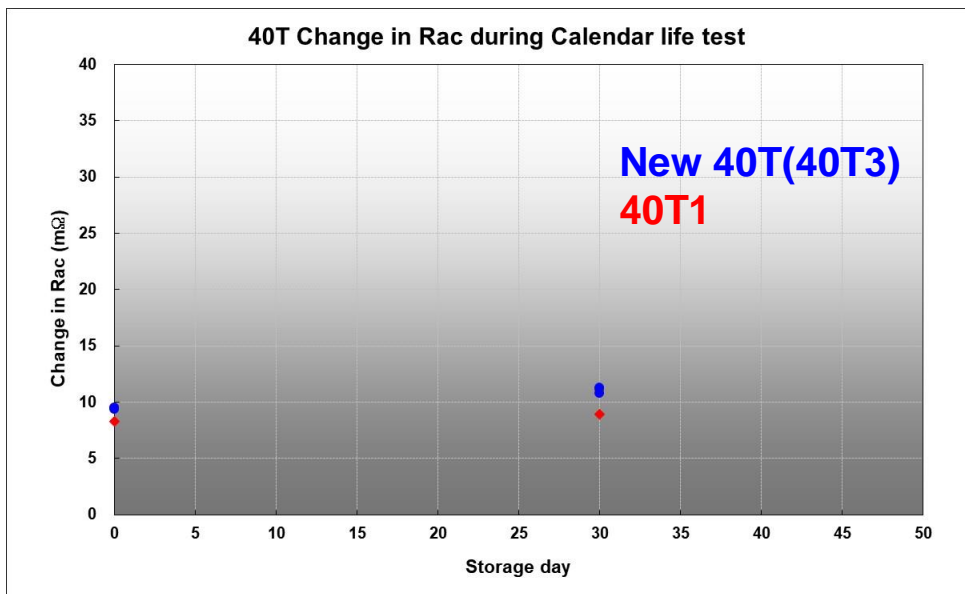
-20 °C	New 40T(40T3)		40T1	
	Capacity (Ah)	Efficiency (%)	Capacity (Ah)	Efficiency (%)
20A	4.071	101.8	4.050	101.3
	4.091	102.3	4.051	101.3
<b>Avg.</b>	<b>4.081</b>	<b>102.0</b>	<b>4.051</b>	<b>101.3</b>

# Storage at 60°C\_Retention / Recovery

## II. Reliability Test



Storage at 60°C _ 30days									
Model	initial			after storage			Ratio(%)		
	ACIR (mΩ)	DCIR (mΩ)	Capacity (Ah)	ACIR (mΩ)	DCIR (mΩ)	Capacity (Ah)	ACIR	DCIR	Recovery
New 40T (40T3)	9.5	15.0	4.091	11.1	17.8	3.942	116.8	118.6	96.4
40T1	8.3	13.2	4.020	8.9	15.2	3.814	107.8	115.6	94.9



### Storage at 60°C \_ 30days

Model	initial			after storage			Ratio(%)		
	ACIR (mΩ)	DCIR (mΩ)	Capacity (Ah)	ACIR (mΩ)	DCIR (mΩ)	Capacity (Ah)	ACIR	DCIR	Recovery
New 40T (40T3)	9.5	15.0	4.091	11.1	17.8	3.942	116.8	118.6	96.4
40T1	8.3	13.2	4.020	8.9	15.2	3.814	107.8	115.6	94.9

Safety Test			Spec.	Results		OK / NG
				Results	Max. temp.	
Electrical Abuse	Overcharge	18A 20V (UL)	L1	10L0	123	OK
	Short circuit	10mΩ at 23°C	L3	5L0	81	OK
		80mΩ at 23°C (UL)	L2	5L0	129	OK
Mechanical Abuse	Impact	UL	L1	10L0	-	OK
	Crush	UL	L1	10L0	-	OK
Thermal Abuse	Hot oven	130°C	-	10L1	138	OK

Level 0

•No change

Level 1

•Leak

Level 2

•Smoke, < 200°C

Level 3

•Smoke, > 200°C

Level 4

•Fire

Level 5

•Explosion

# **End of Document**