CDA-CAP
No. 4, Jifeng Road, Wufeng District, Taichung City, Taiwan
Tel: +00852-51245060 E-mail: zfw@cda-cap.com
www.cda-cap.com

LIB Series High and low Temperature Charge and Discharge Test Report

Basic Parameters

Lithium-ion Capacitor Screening:

- Select products with similar capacitance and ESR.
- Charge at 1C constant current to 4.2V.
- Maintain voltage at 4.2V for 30 minutes.
- Perform DCIR testing with a time of 10ms.
- Discharge at 1C constant current to 2.5V.

LIB1840Q4R0118 Cell Screening Data (1C=650mA)

Charging Current	Capacity (mAh)	DCIR (mΩ)	Capacity Difference (mAh)	DCIR Difference (mΩ)
1C	618.6	38.1	≤26.5	≤5.7
3C	621.7	33.4		
5C	642.1	37.8		
8C	615.6	39.1		
10C	616.7	34.3		

LIB1620Q4R0407 Cell Screening Data (1C=200mA)

Charging Current	Capacity (mAh)	DCIR (mΩ)	Capacity Difference (mAh)	DCIR Difference (mΩ)
1C	203.59	74.0	≤2.6	≤6.9
3C	203.85	74.7		
5C	201.18	77.6		
8C	203.37	71.3		
10C	201.74	78.2		

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LIB Series High and low Temperature Charge and Discharge Test Report

LIB1840Q4R0118 Test Data(1C)

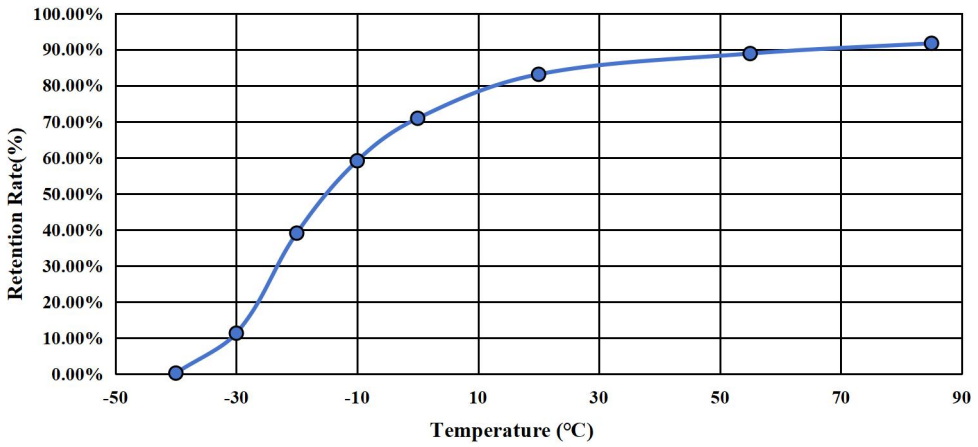
Test Conditions:

- Place the capacitor in environments of +85°C, +55°C, +20°C, 0°C, -10°C, -20°C, -30°C, and -40°C.
- Allow to stand for 120 minutes.
- The current 1C charges the capacitor to 4.0V at a constant current;
- Maintain constant voltage charging for 20 minutes.
- Discharge at 1C constant current.

Test Data

Test Temperature (℃)	Charging Time (min)	Discharge Time (min)	Total Charge Capacity (mAh)	Discharge Capacity (mAh)	Retention Rate
+85	48.18	52.23	557.93	567.12	91.68%
+55	46.66	50.64	538.92	549.59	88.84%
+20	43.25	47.23	518.53	513.97	83.09%
0	36.36	40.32	469.97	438.46	70.88%
-10	33.77	33.64	461.83	365.57	59.10%
-20	6.84	22.21	192.91	241.36	39.02%
-30	0.04	6.41	115.80	69.64	11.26%
-40	0.02	0.11	106.49	1.19	0.19%

Variation Curve Graph



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Doc. No: CDART-24513HMP	LIB Series High and low Temperature Charge and Discharge Test Report
Date: 2024/05/13 Revision: 1.1 Page: 13	
Grade: General	

LIB1840Q4R0118 Test Data(3C)

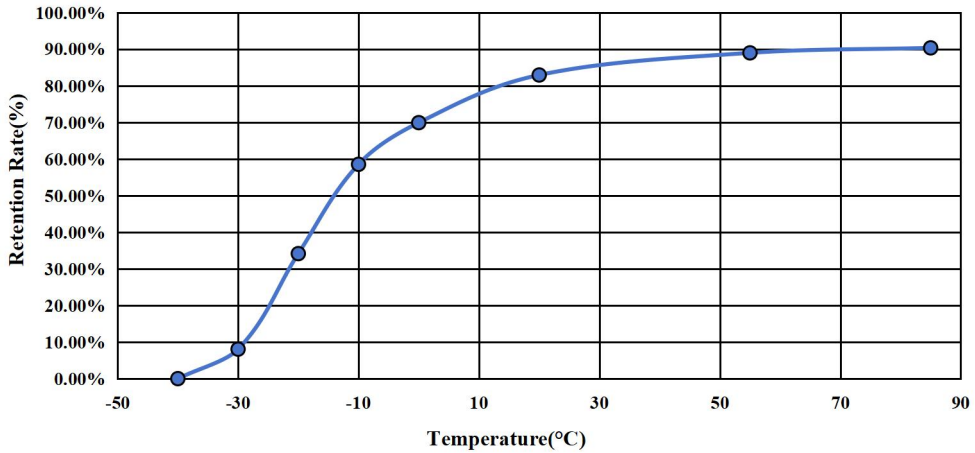
Test Conditions:

- Place the capacitor in environments of +85°C, +55°C, +20°C, 0°C, -10°C, -20°C, -30°C, and -40°C.
- Allow to stand for 120 minutes.
- The current 3C charges the capacitor to 4.0V at a constant current;
- Maintain constant voltage charging for 20 minutes.
- Discharge at 3C constant current.

Test Data

Test Temperature (°C)	Charging Time (min)	Discharge Time (min)	Total Charge Capacity (mAh)	Discharge Capacity (mAh)	Retention Rate
+85	14.47	51.71	571.92	561.55	90.32%
+55	13.48	50.93	539.3	553.09	88.96%
+20	11.50	47.46	506.18	515.52	82.92%
0	9.47	40.01	476.91	434.70	69.92%
-10	8.00	33.50	450.26	364.01	58.55%
-20	0.00	19.55	167.63	212.47	34.18%
-30	0.00	4.64	106.98	50.41	8.11%
-40	0.00	0.04	84.96	0.44	0.07%

Variation Curve Graph



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Date: 2024/05/13 Revision: 1.1 Page: 13	
Grade: General	

LIB1840Q4R0118 Test Data(5C)

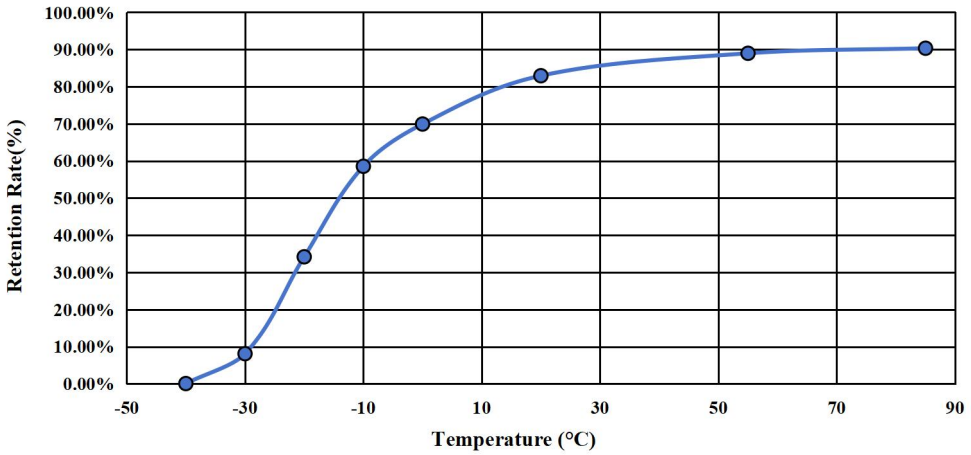
Test Conditions:

- Place the capacitor in environments of +85°C, +55°C, +20°C, 0°C, -10°C, -20°C, -30°C, and -40°C.
- Allow to stand for 120 minutes.
- The current 5C charges the capacitor to 4.0V at a constant current;
- Maintain constant voltage charging for 20 minutes.
- Discharge at 5C constant current.

Test Data

Test Temperature (°C)	Charging Time (min)	Discharge Time (min)	Total Charge Capacity (mAh)	Discharge Capacity (mAh)	Retention Rate
+85	8.38	54.84	585.13	595.46	92.74%
+55	8.13	53.25	563.04	578.25	90.06%
+20	7.32	49.72	544.11	540.04	84.11%
0	2.62	42.02	366.34	456.69	71.12%
-10	3.34	35.95	429.32	390.51	60.82%
-20	0.00	21.79	214.06	236.76	36.87%
-30	0.00	6.78	192.14	73.63	11.47%
-40	0.00	0.04	109.08	0.45	0.07%

Variation Curve Graph



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Doc. No: CDART-24513HMP	LIB Series High and low Temperature Charge and Discharge Test Report
Date: 2024/05/13 Revision: 1.1 Page: 13	
Grade: General	

LIB1840Q4R0118 Test Data(8C)

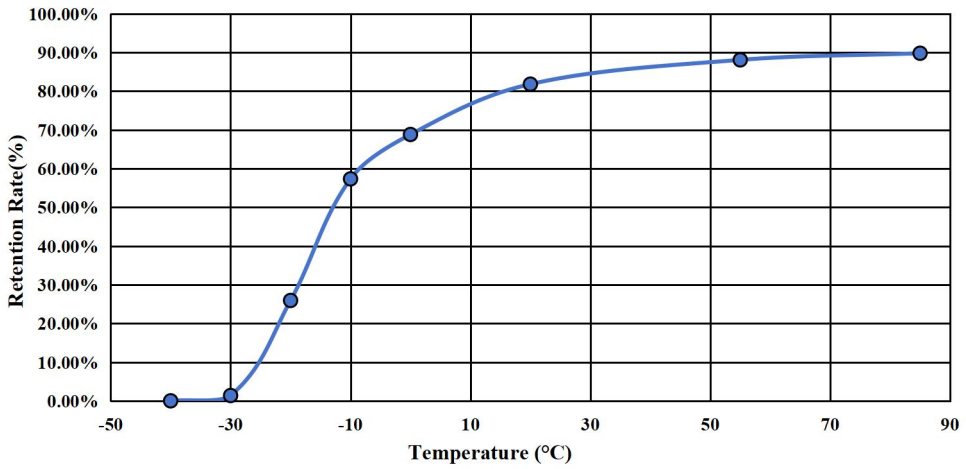
Test Conditions:

- Place the capacitor in environments of +85°C, +55°C, +20°C, 0°C, -10°C, -20°C, -30°C, and -40°C.
- Allow to stand for 120 minutes.
- The current 8C charges the capacitor to 4.0V at a constant current;
- Maintain constant voltage charging for 20 minutes.
- Discharge at 8C constant current.

Test Data

Test Temperature (°C)	Charging Time (min)	Discharge Time (min)	Total Charge Capacity (mAh)	Discharge Capacity (mAh)	Retention Rate
+85	4.45	50.72	582.03	552.73	89.79%
+55	4.29	49.75	541.33	542.21	88.08%
+20	3.16	46.19	511.04	503.63	81.81%
0	1.83	38.83	464.32	423.62	68.81%
-10	0.05	32.40	449.17	353.01	57.34%
-20	0.00	14.66	246.77	159.69	25.94%
-30	0.00	0.79	165.69	8.57	1.39%
-40	0.00	0.01	70.84	0.11	0.02%

Variation Curve Graph



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Doc. No: CDART-24513HMP	LIB Series High and low Temperature Charge and Discharge Test Report
Date: 2024/05/13 Revision: 1.1 Page: 13	
Grade: General	

LIB1840Q4R0118 Test Data(10C)

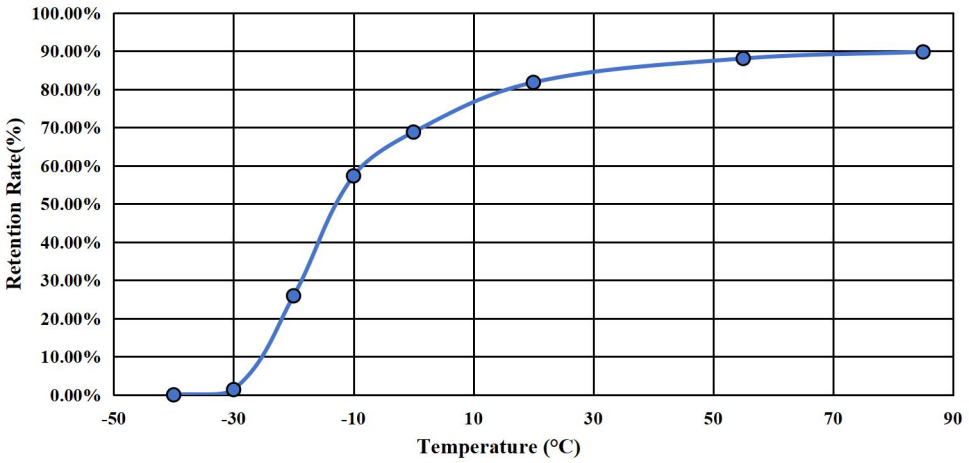
Test Conditions:

- Place the capacitor in environments of +85°C, +55°C, +20°C, 0°C, -10°C, -20°C, -30°C, and -40°C.
- Allow to stand for 120 minutes.
- The current 10C charges the capacitor to 4.0V at a constant current;
- Maintain constant voltage charging for 20 minutes.
- Discharge at 10C constant current.

Test Data

Test Temperature (°C)	Charging Time (min)	Discharge Time (min)	Total Charge Capacity (mAh)	Discharge Capacity (mAh)	Retention Rate
+85	2.72	50.24	554.35	546.58	88.63%
+55	2.39	49.48	528.80	538.42	87.31%
+20	2.04	46.57	511.14	507.05	82.22%
0	0.98	40.19	477.41	437.60	70.96%
-10	0.00	34.16	458.10	372.04	60.33%
-20	0.00	21.01	200.80	228.84	37.11%
-30	0.00	5.72	179.41	62.26	10.10%
-40	0.00	0.02	97.91	0.24	0.04%

Variation Curve Graph



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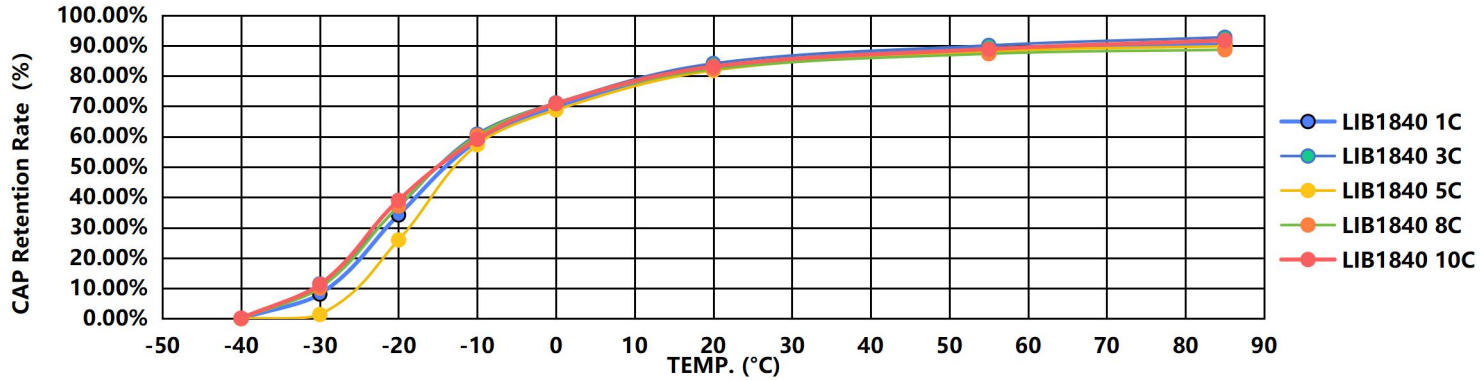
Date: 2024/05/13 Revision: 1.1 Page: 13	
Grade: General	

LIB1840Q4R0118 Comparison of Charge-Discharge Data at Different Temperatures

Charging Current	1C		3C		5C		8C		10C	
Test Temperature(℃)	Capacity (mAh)	Retention Rate(%)	Capacity (mAh)	Retention Rate(%)	Capacity (mAh)	Retention Rate(%)	Capacity (mAh)	Retention Rate(%)	Capacity (mAh)	Retention Rate(%)
+85	567.12	91.68	561.55	90.32	595.46	92.74	552.73	89.79	546.58	88.63
+55	549.59	88.84	553.09	88.96	578.25	90.06	542.21	88.08	538.42	87.31
+20	513.97	83.09	515.52	82.92	540.04	84.11	503.63	81.81	507.05	82.22
0	438.46	70.88	434.70	69.92	456.69	71.12	423.62	68.81	437.60	70.96
-10	365.57	59.10	364.01	58.55	390.51	60.82	353.01	57.34	372.04	60.33
-20	241.36	39.02	212.47	34.18	236.76	36.87	159.69	25.94	228.84	37.11
-30	69.64	11.26	50.41	8.11	73.63	11.47	8.57	1.39	62.26	10.10
-40	1.19	0.19	0.44	0.07	0.45	0.07	0.11	0.02	0.24	0.04

***1C=650mA**



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Date: 2024/05/13 Revision: 1.1 Page: 13	
Grade: General	

LIB1620Q4R0407 Test Data(1C)

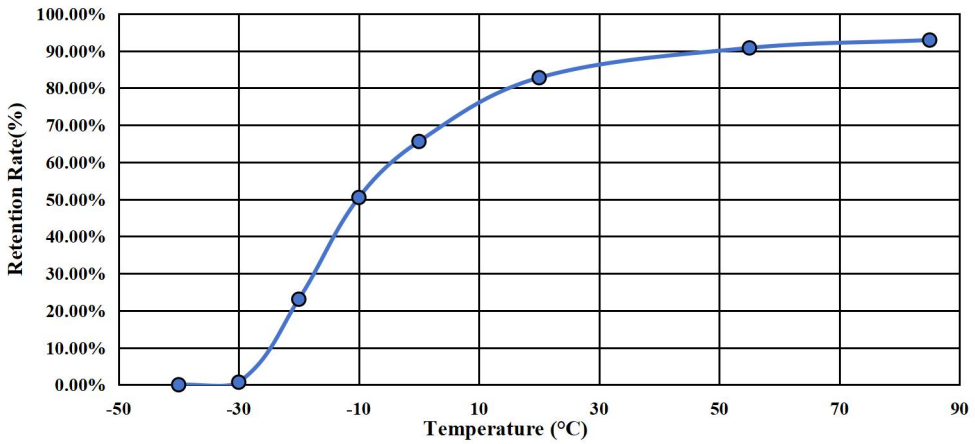
Test Conditions:

- Place the capacitor in environments of +85°C, +55°C, +20°C, 0°C, -10°C, -20°C, -30°C, and -40°C.
- Allow to stand for 120 minutes.
- The current 1C charges the capacitor to 4.0V at a constant current;
- Maintain constant voltage charging for 20 minutes.
- Discharge at 1C constant current.

Test Data

Test Temperature (°C)	Charging Time (min)	Discharge Time (min)	Total Charge Capacity (mAh)	Discharge Capacity (mAh)	Retention Rate
+85	53.40	56.38	187.67	189.13	92.90%
+55	49.95	55.06	176.67	184.81	90.78%
+20	46.48	50.21	172.16	168.49	82.76%
0	40.35	39.67	162.33	133.52	65.58%
-10	33.13	30.51	146.48	102.77	50.48%
-20	18.96	13.99	105.80	46.94	23.06%
-30	5.21	0.43	53.35	1.45	0.71%
-40	0.01	0.02	20.61	0.05	0.02%

Variation Curve Graph



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Date: 2024/05/13 Revision: 1.1 Page: 13	
Grade: General	

LIB1620Q4R0407 Test Data(3C)

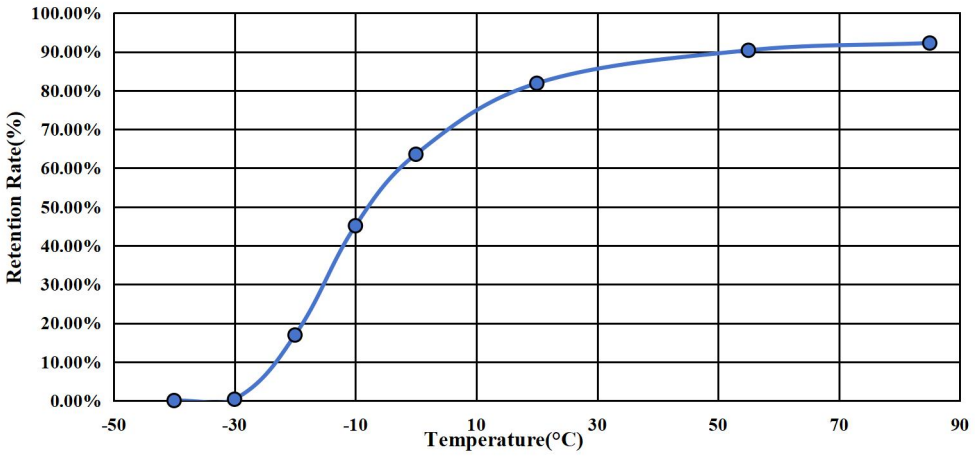
Test Conditions:

- Place the capacitor in environments of +85°C, +55°C, +20°C, 0°C, -10°C, -20°C, -30°C, and -40°C.
- Allow to stand for 120 minutes.
- The current 3C charges the capacitor to 4.0V at a constant current;
- Maintain constant voltage charging for 20 minutes.
- Discharge at 3C constant current.

Test Data

Test Temperature (°C)	Charging Time (min)	Discharge Time (min)	Total Charge Capacity (mAh)	Discharge Capacity (mAh)	Retention Rate
+85	16.82	56.35	186.10	188.04	92.24%
+55	15.64	55.13	175.47	184.21	90.37%
+20	13.61	49.98	169.87	166.87	81.86%
0	9.76	38.70	157.16	129.55	63.55%
-10	6.88	27.48	141.84	91.95	45.11%
-20	1.41	10.21	87.92	34.49	16.92%
-30	0.00	0.22	44.34	0.74	0.36%
-40	0.00	0.01	19.45	0.04	0.02%

Variation Curve Graph



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Date: 2024/05/13 Revision: 1 .1 Page: 13	
Grade: General	

LIB1620Q4R0407 Test Data(5C)

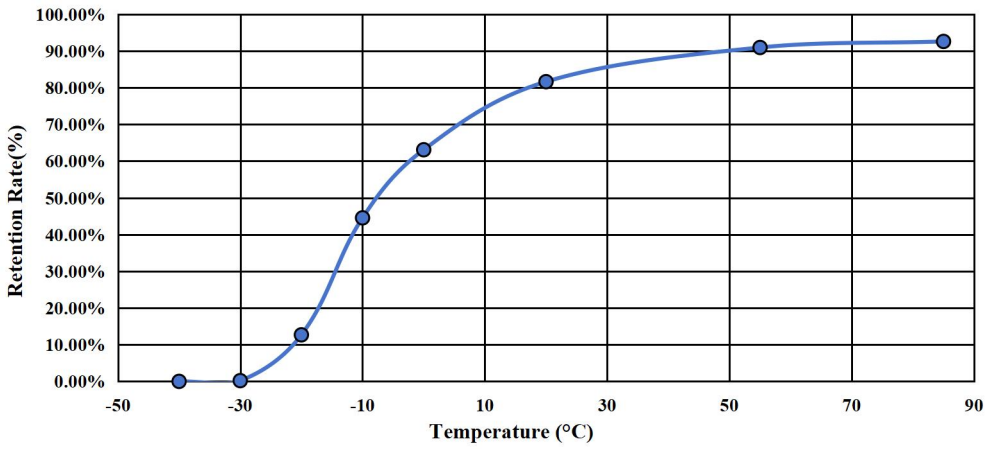
Test Conditions:

- Place the capacitor in environments of +85°C, +55°C, +20°C, 0°C, -10°C, -20°C, -30°C, and -40°C.
- Allow to stand for 120 minutes.
- The current 5C charges the capacitor to 4.0V at a constant current;
- Maintain constant voltage charging for 20 minutes.
- Discharge at 5C constant current.

Test Data

Test Temperature (°C)	Charging Time (min)	Discharge Time (min)	Total Charge Capacity (mAh)	Discharge Capacity (mAh)	Retention Rate
+85	9.56	55.52	185.46	186.24	92.57%
+55	8.72	54.45	174.06	182.92	90.92%
+20	7.10	48.93	167.63	164.19	81.61%
0	4.76	37.71	155.36	126.91	63.08%
-10	3.25	26.63	141.46	89.60	44.54%
-20	0.00	7.61	81.88	25.53	12.69%
-30	0.00	0.13	42.38	0.44	0.22%
-40	0.00	0.01	18.28	0.04	0.02%

Variation Curve Graph



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Date: 2024/05/13 Revision: 1.1 Page: 13	
Grade: General	

LIB1620Q4R0407 Test Data(8C)

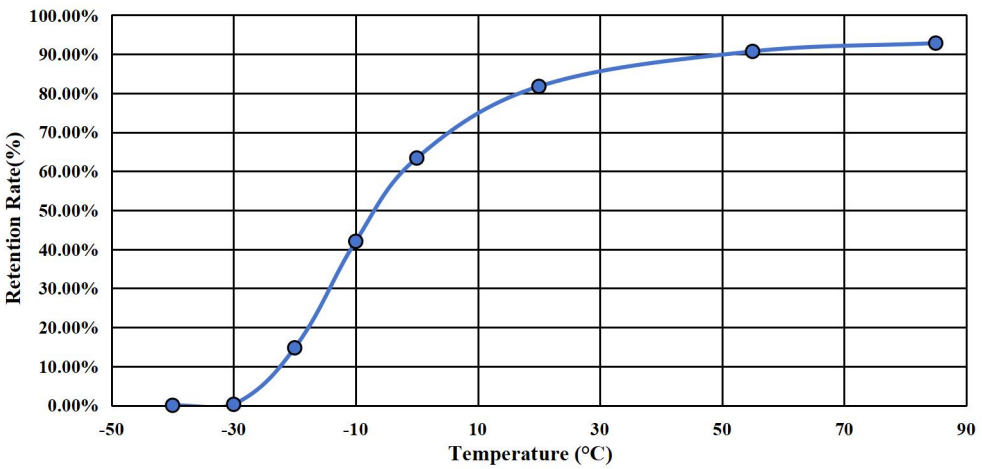
Test Conditions:

- Place the capacitor in environments of +85°C, +55°C, +20°C, 0°C, -10°C, -20°C, -30°C, and -40°C.
- Allow to stand for 120 minutes.
- The current 8C charges the capacitor to 4.0V at a constant current;
- Maintain constant voltage charging for 20 minutes.
- Discharge at 8C constant current.

Test Data

Test Temperature (°C)	Charging Time (min)	Discharge Time (min)	Total Charge Capacity (mAh)	Discharge Capacity (mAh)	Retention Rate
+85	5.96	56.17	186.19	188.76	92.82%
+55	5.15	54.74	175.06	184.46	90.70%
+20	4.10	49.44	169.81	166.21	81.73%
0	2.29	38.09	156.88	128.90	63.38%
-10	0.10	25.61	137.86	85.50	42.04%
-20	0.00	8.92	84.00	30.00	14.75%
-30	0.00	0.17	42.65	0.55	0.27%
-40	0.00	0.01	18.35	0.04	0.02%

Variation Curve Graph



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LIB Series High and low Temperature Charge and Discharge Test Report

LIB1620Q4R0407 Test Data(10C)

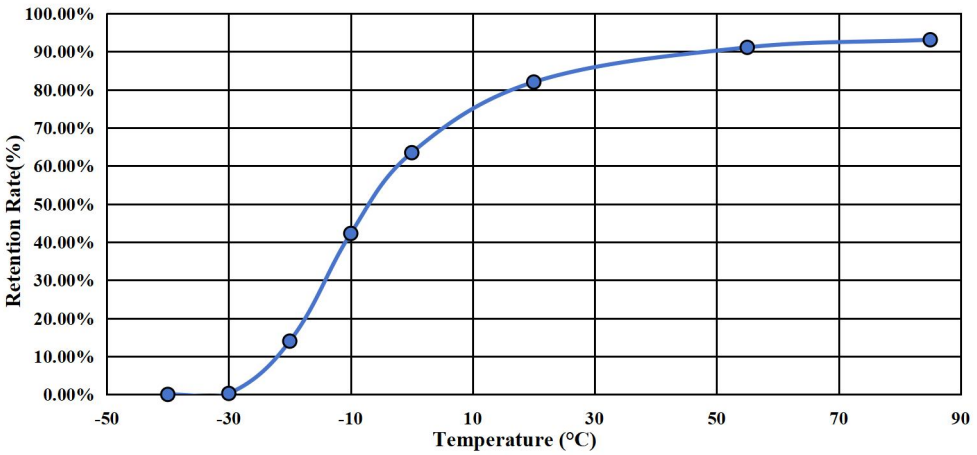
Test Conditions:

- Place the capacitor in environments of +85°C, +55°C, +20°C, 0°C, -10°C, -20°C, -30°C, and -40°C.
- Allow to stand for 120 minutes.
- The current 10C charges the capacitor to 4.0V at a constant current;
- Maintain constant voltage charging for 20 minutes.
- Discharge at 10C constant current.

Test Data

Test Temperature (°C)	Charging Time (min)	Discharge Time (min)	Total Charge Capacity (mAh)	Discharge Capacity (mAh)	Retention Rate
+85	4.26	56.01	185.94	187.80	93.09%
+55	3.82	54.68	174.30	183.78	91.10%
+20	2.92	49.34	169.15	165.43	82.00%
0	1.35	38.03	156.45	128.02	63.46%
-10	0.00	25.36	136.73	85.26	42.26%
-20	0.00	8.43	82.98	28.25	14.00%
-30	0.00	0.17	43.15	0.56	0.28%
-40	0.00	0.02	18.48	0.04	0.02%

Variation Curve Graph



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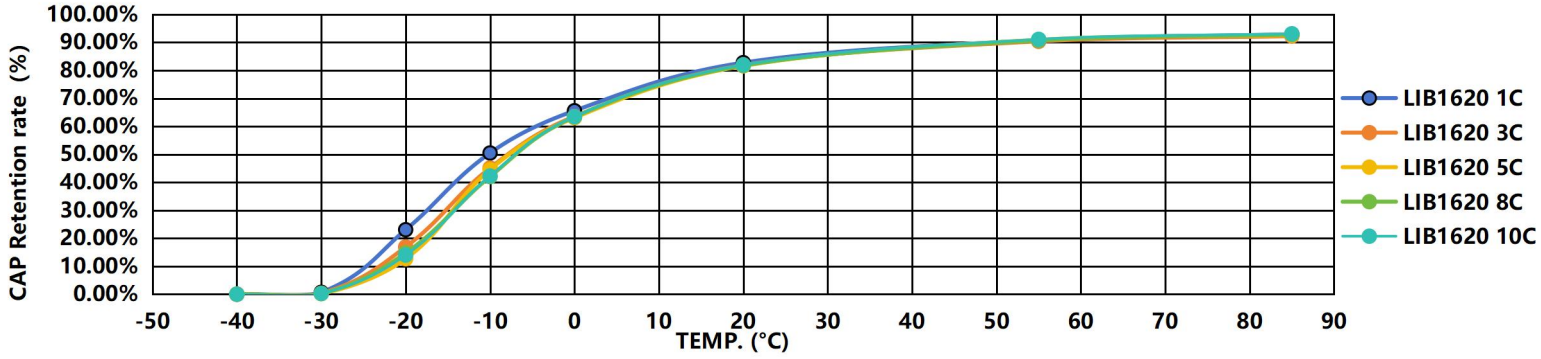
Date: 2024/05/13 Revision: 1.1 Page: 13	
Grade: General	

LIB1620Q4R0407 Comparison of Charge-Discharge Data at Different Temperatures

Charging Current	1C		3C		5C		8C		10C	
Test Temperature(℃)	Capacity (mAh)	Retention Rate(%)	Capacity (mAh)	Retention Rate(%)	Capacity (mAh)	Retention Rate(%)	Capacity (mAh)	Retention Rate(%)	Capacity (mAh)	Retention Rate(%)
+85	189.13	92.90	188.04	92.24	186.24	92.57	188.76	92.82	187.80	93.09
+55	184.81	90.78	184.21	90.37	182.92	90.92	184.46	90.70	183.78	91.10
+20	168.49	82.76	166.87	81.86	164.19	81.61	166.21	81.73	165.43	82.00
0	133.52	65.58	129.55	63.55	126.91	63.08	128.90	63.38	128.02	63.46
-10	102.77	50.48	91.95	45.11	89.60	44.54	85.50	42.04	85.26	42.26
-20	46.94	23.06	34.49	16.92	25.53	12.69	30.00	14.75	28.25	14.00
-30	1.45	0.71	0.74	0.36	0.44	0.22	0.55	0.27	0.56	0.28
-40	0.05	0.02	0.04	0.02	0.04	0.02	0.04	0.02	0.04	0.02

***1C=200mA**



Note: Design and specifications are subject to change without prior notice.
It is recommended that you obtain technical specifications from CDA to ensure that the component is suitable for your use.