SAMSUNG SDI

Introduction of ICR18650-22F

Jan. 05th, 2009

Development Team
Energy Business Division

General Specification

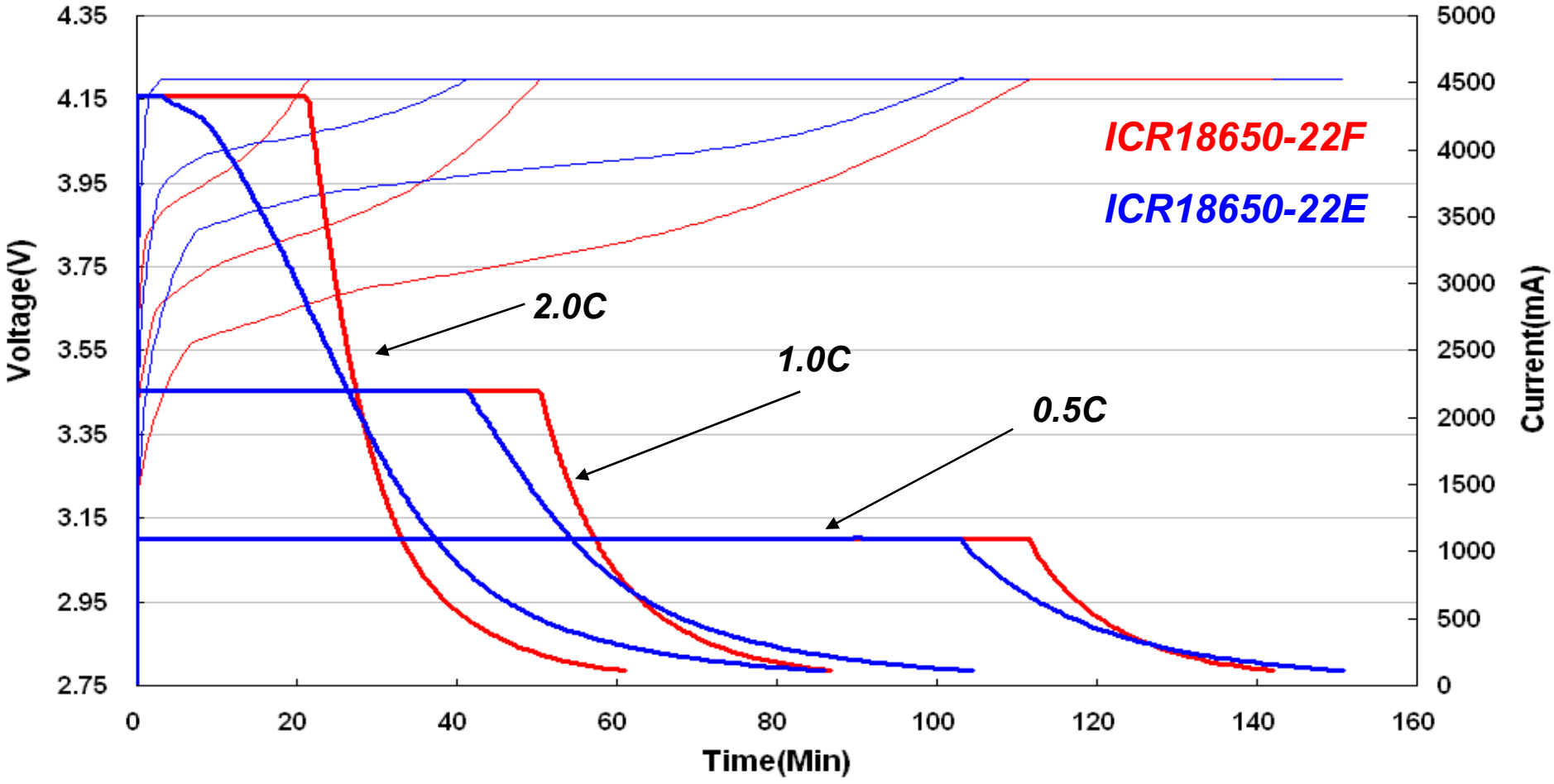
With Tube

●	Capacity	Nominal	2200	mAh
		Minimum	2150	mAh
●	Nominal Voltage		3.60	
●	Charging Method		CC-CV	
●	Charging Voltage		4.2	Volt
●	Charging Current	Standard	1100	mA
		Rapid	2200	mA
●	Charging Time	Standard	3.0 (1100 mA)	Hour
		Rapid	2.5 (2200 mA)	Hour
●	Discharge Voltage Cut-off		2.75	Volt
●	Discharging Current	Max.	4400	mA
●	Weight		Approx. 43.5	gr.
●	Energy Density	Typical	490	Wh/L

@ Reliability

Rate charge profile

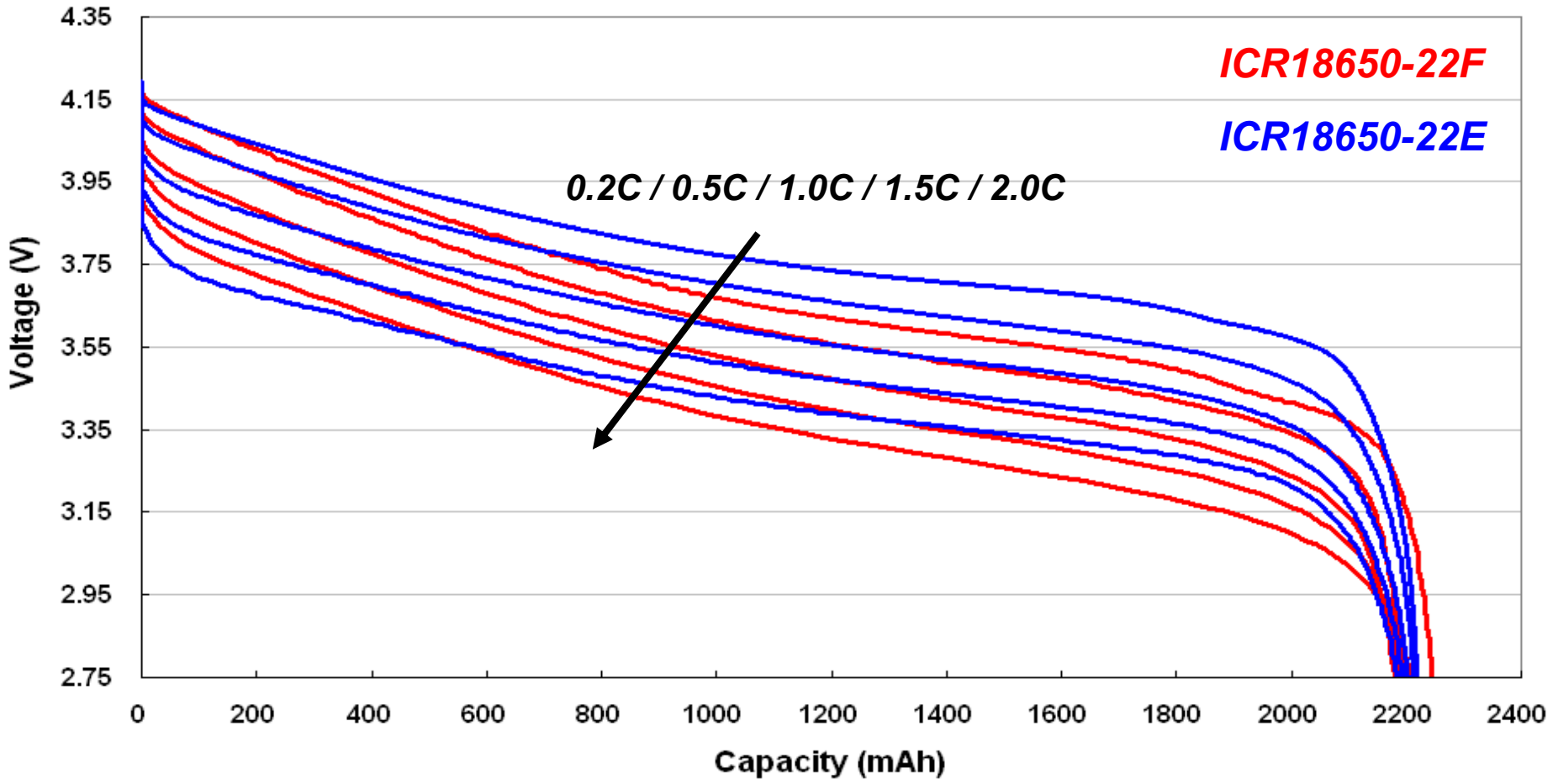
Model : ICR18650-22F
Method : Charge : CC-CV 0.5C/1.0C/2.0 4.2V 20mA cut off at 23 ℃ 1C=2200mA



Rate discharge profile

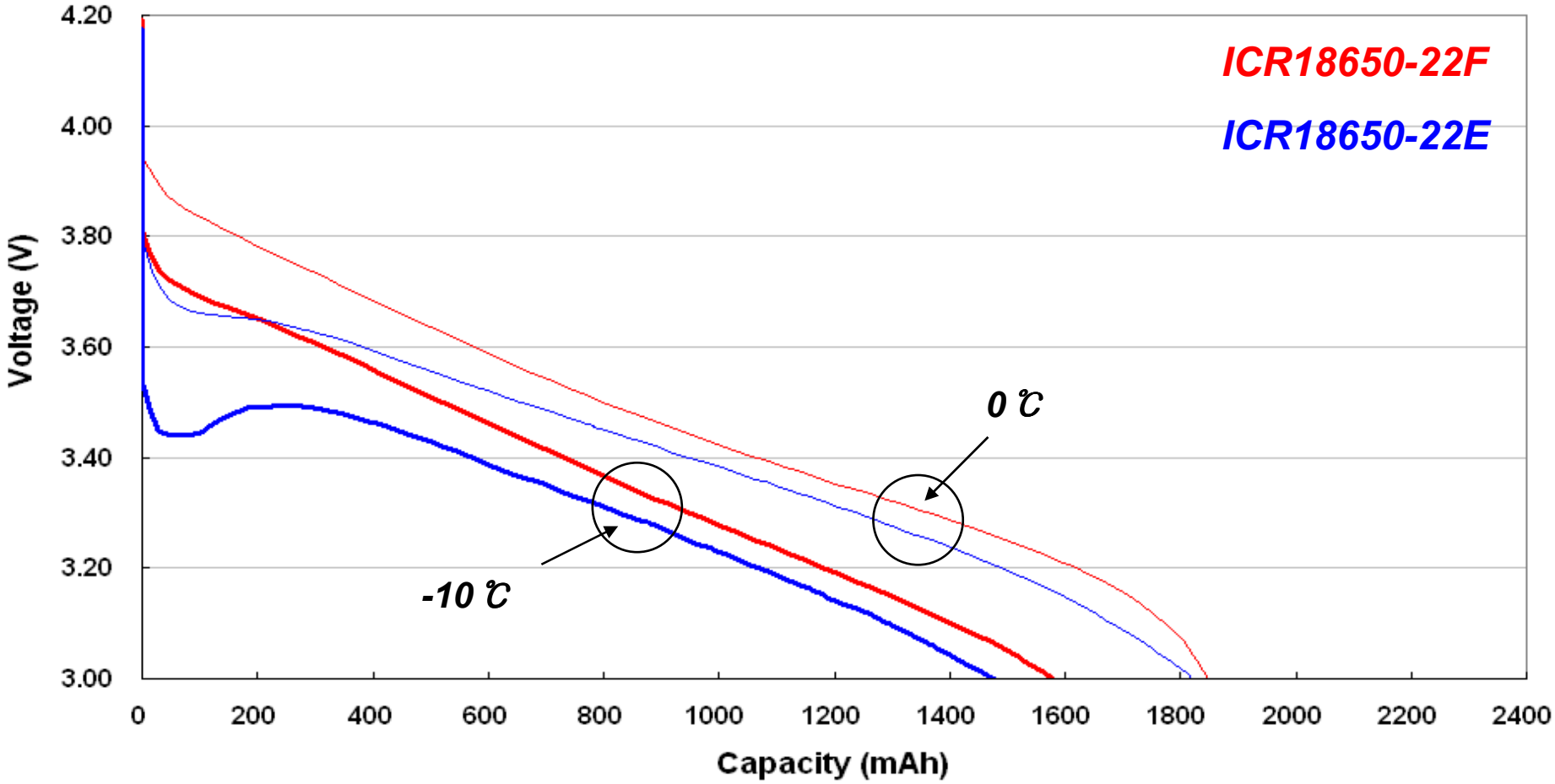
14.5 * 25.5

Model : ICR18650-22F
Method : Charge : CC-CV 0.5C 4.2V 3Hr or 20mA cut off at 23 ℃
Discharge : CC 0.2C/0.5C/1.0C/1.5C/2.0C 2.75V cut off at 23 ℃ *1C=2200mA*



Low temperature characteristics on discharge

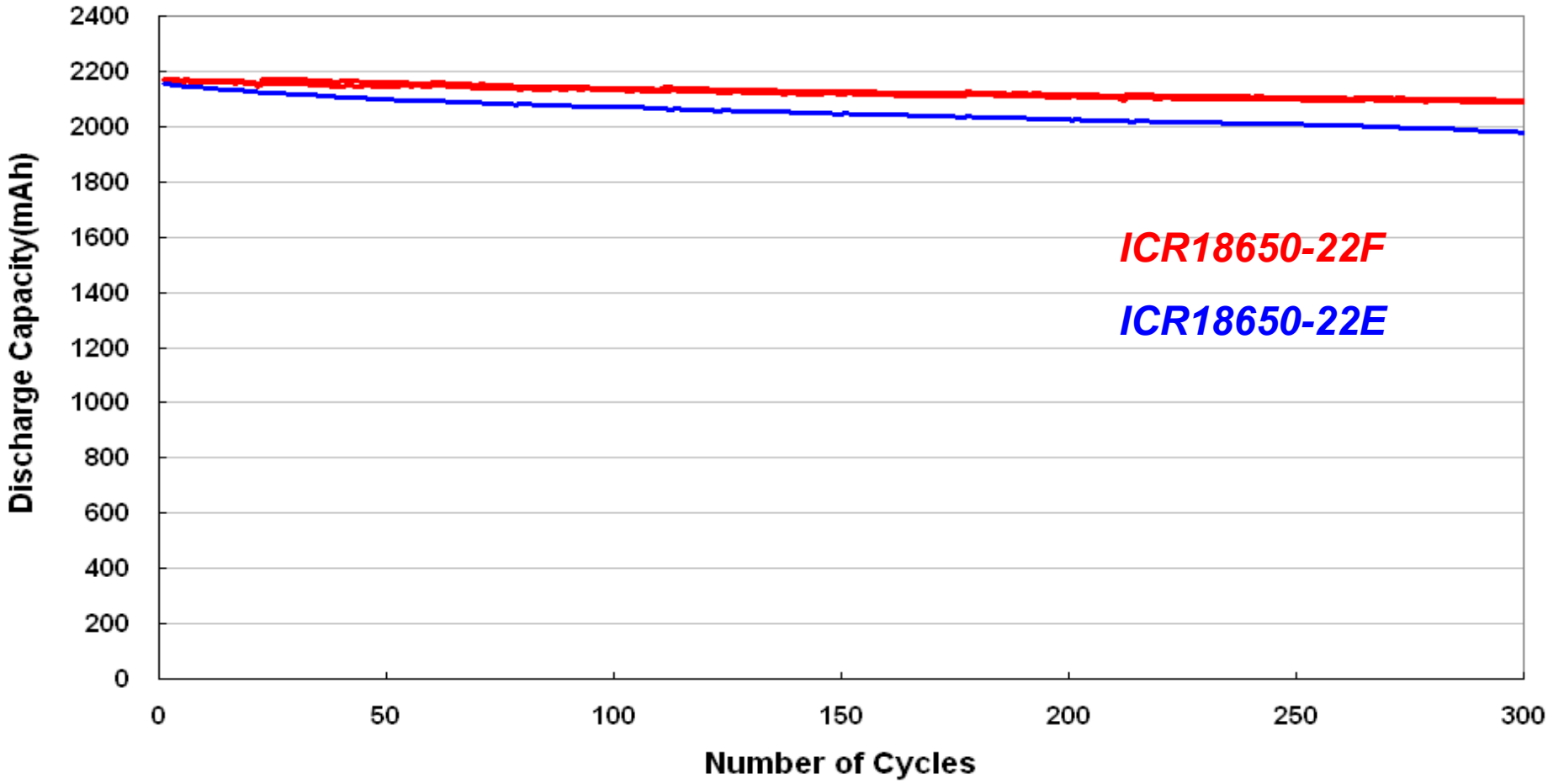
Model : ICR18650-22F
Method : Charge : CC-CV 0.5C 4.2V 3Hr or 20mA cut off at 23 ℃
Discharge : CC 0.8C 3V cut off at -20 ℃/-10 ℃/0 ℃/25 ℃/45 ℃/60 ℃ 1C=2200mA



Cycle life (25 ℃)

Model : ICR18650-22F
Method : Charge : CC-CV 0.8C 4.2V 110mA cut off at 23 ℃
Discharge : CC 1.0C 3.0V cut off at 23 ℃

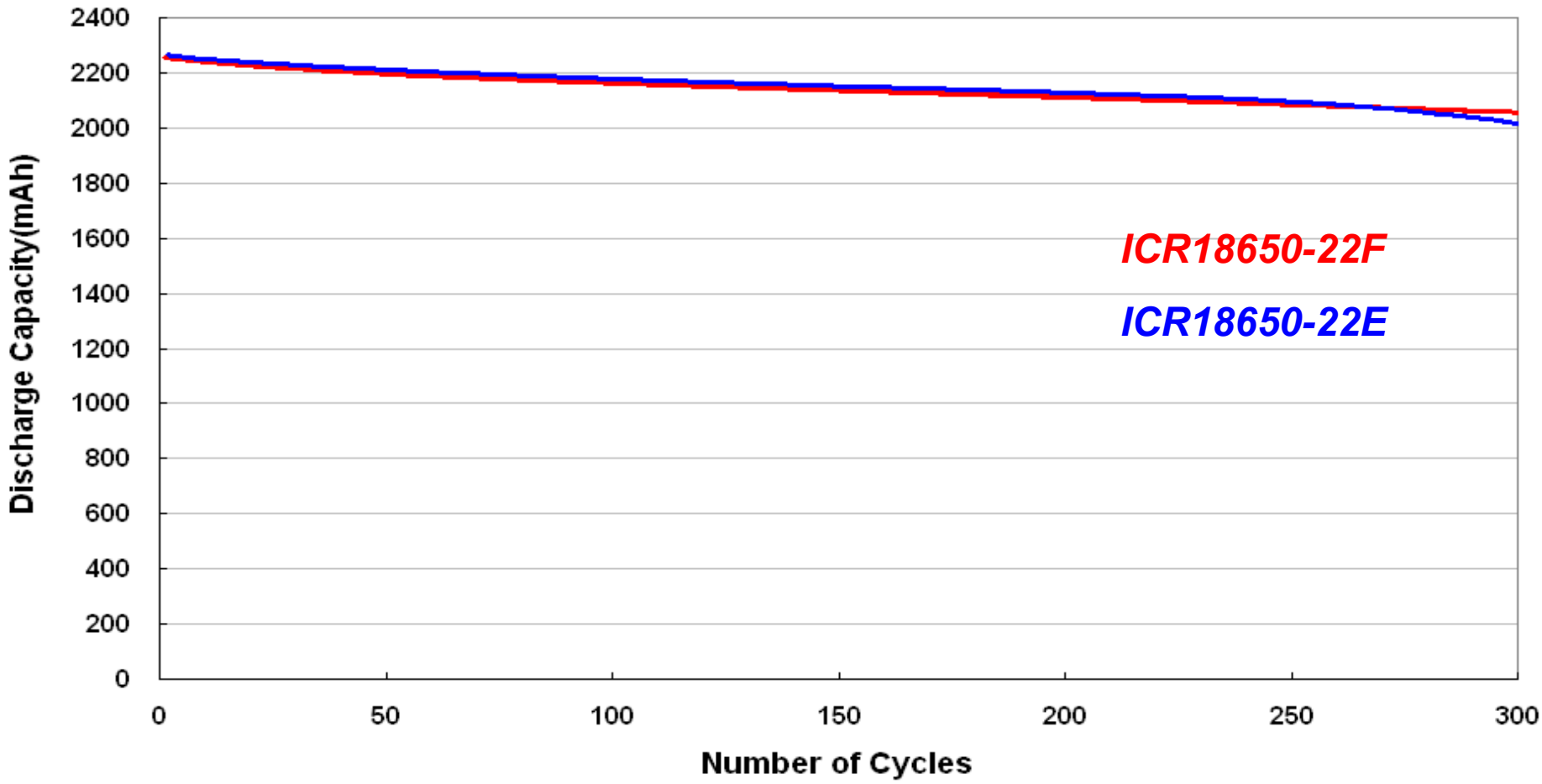
1C=2200mA



Cycle life (45 ℃)

Model : ICR18650-22F
Method : Charge : CC-CV 0.8C 4.2V 110mA cut off at 45 ℃
Discharge : CC 1.0C 3.0V cut off at 45 ℃

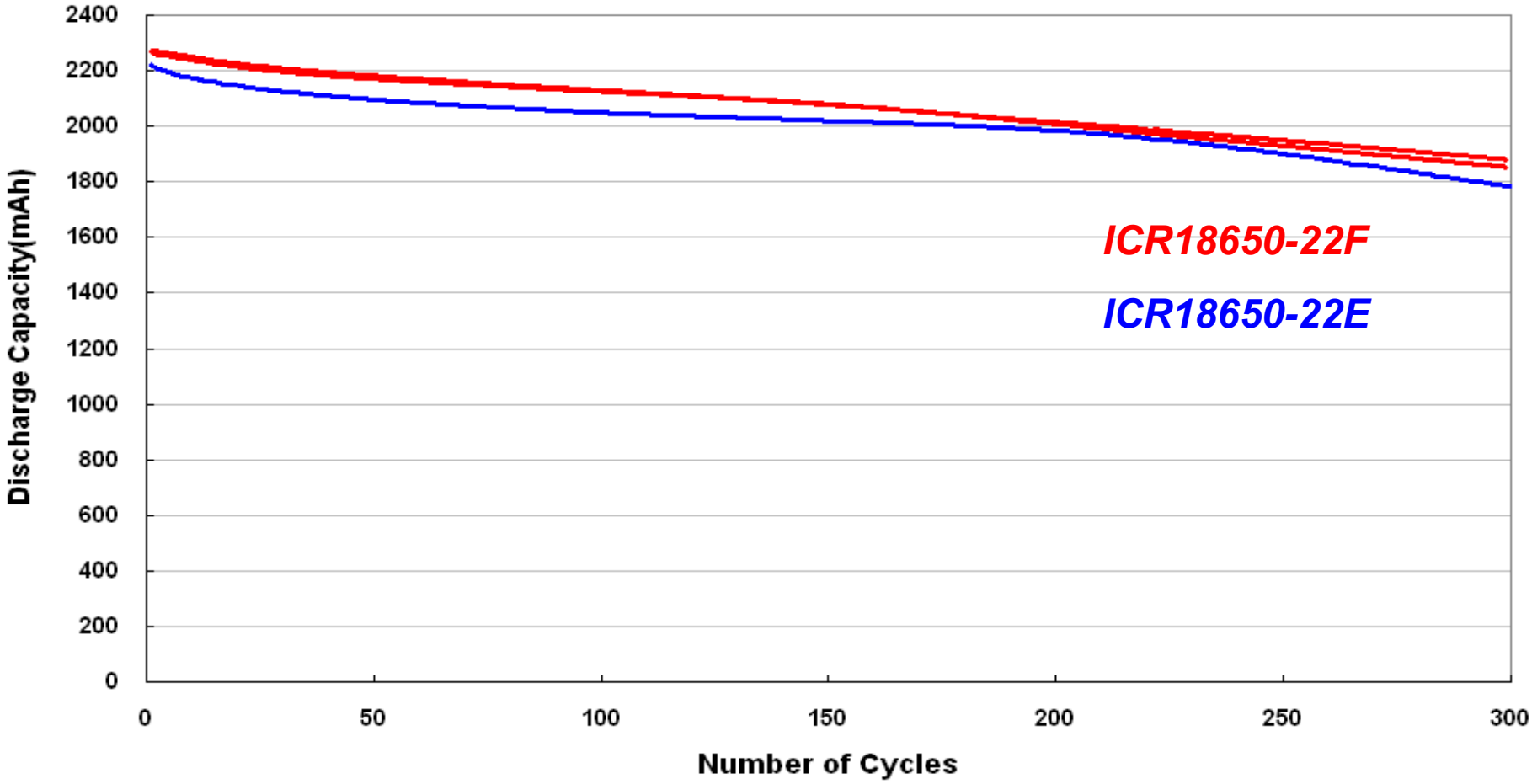
1C=2200mA



Cycle life (60 ℃)

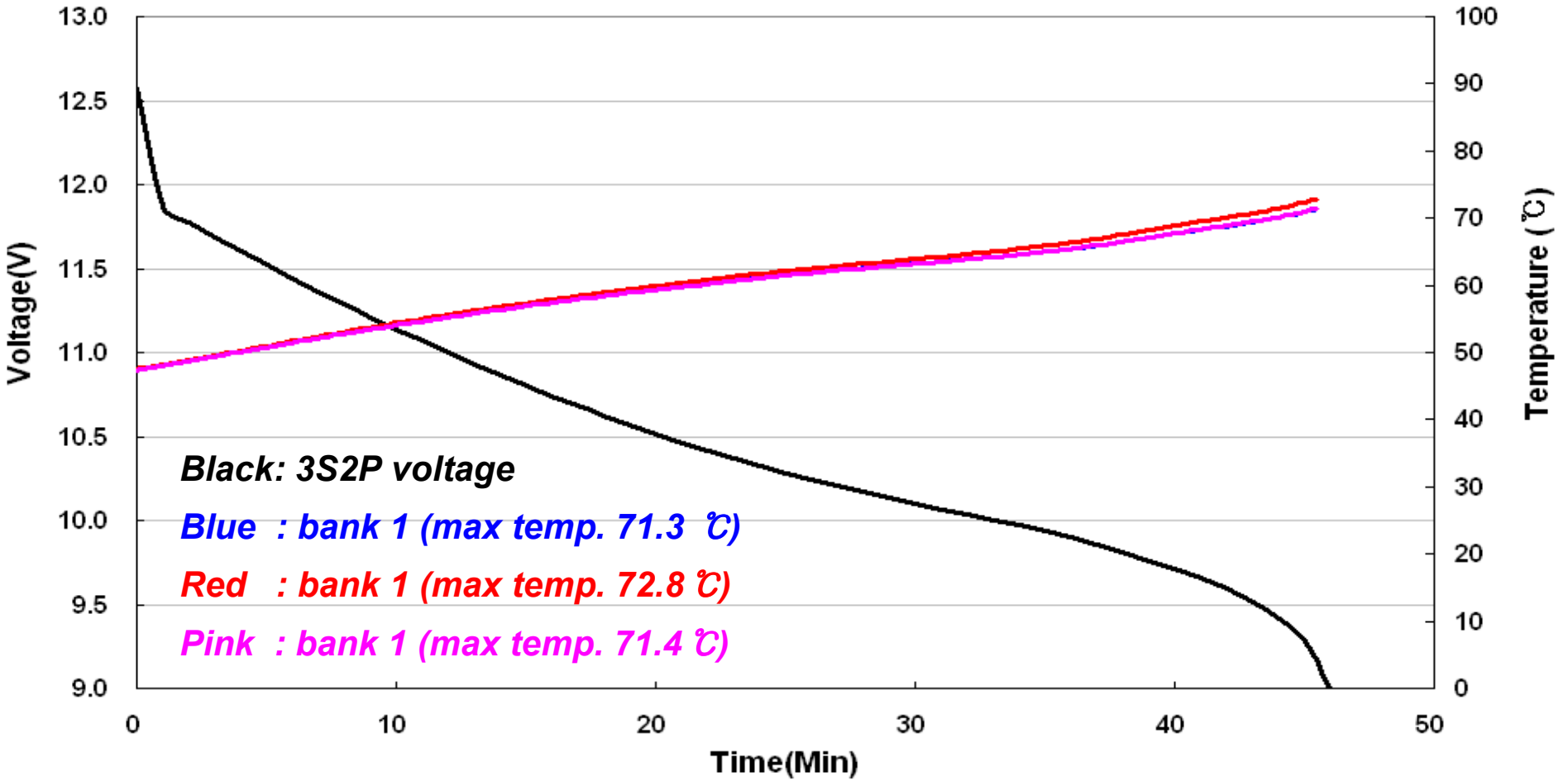
Model : ICR18650-22F
Method : Charge : CC-CV 0.7C 4.2V 110mA cut off at 60 ℃
Discharge : CC 1.0C 3.0V cut off at 60 ℃

1C=2200mA



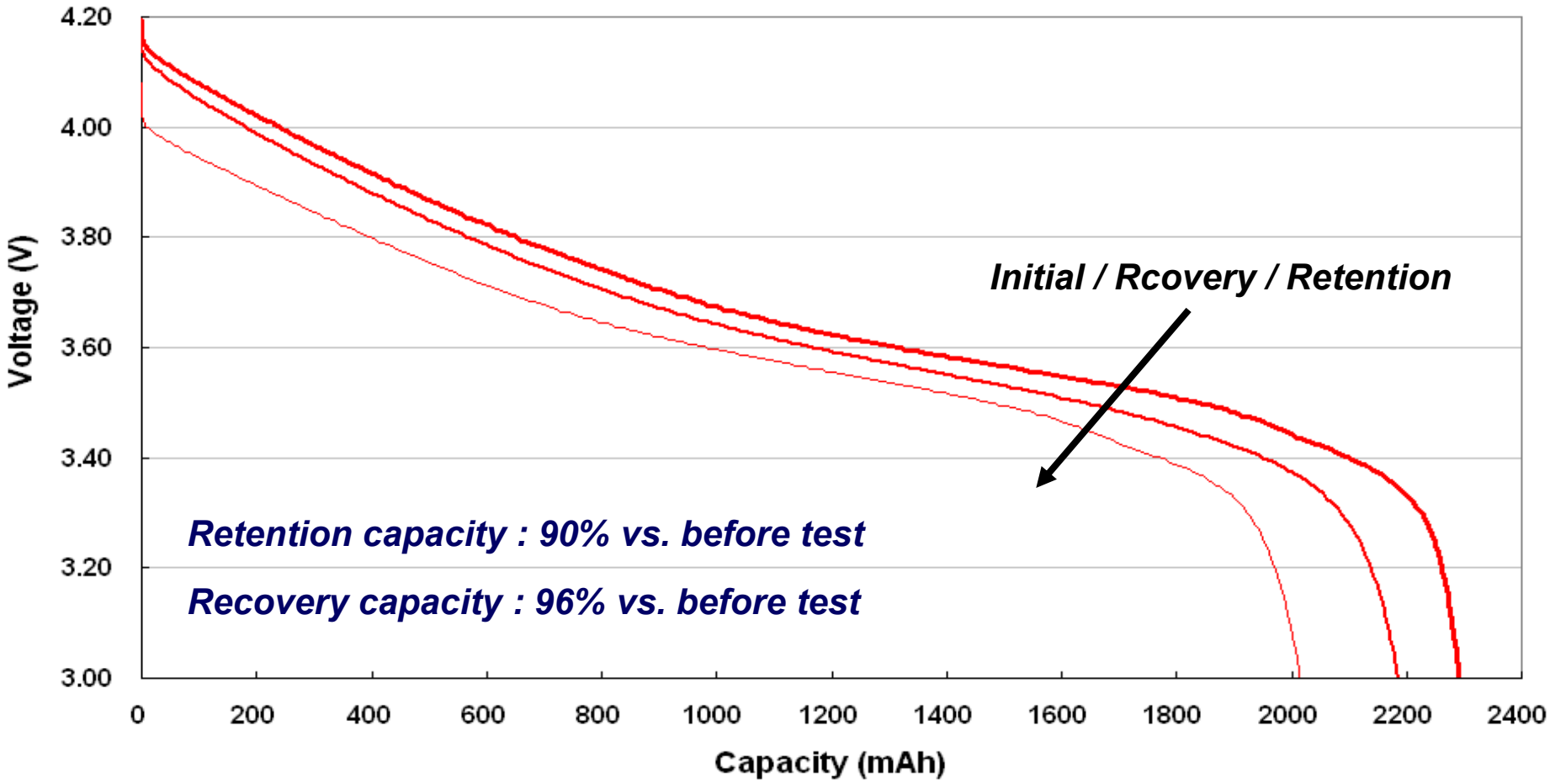
Temperature of 3S2P, 60W discharge at 45 ℃

Model : ICR18650-22F
Method : 3S2P, 60W discharge at 45 ℃



Storage charateristics at 60 ℃

Model : ICR18650-22F
Method : SOC 100%, 60 ℃ 1 Month storage



@ Safety

Safety Test Results

	Criteria	Test Result
▶ Electrical Abuse		
- External Short (25℃)	Level 0	n= 5, all Level 0
- External Short (60℃)	Level 0	n= 5, all Level 0
- Overcharge at 1C	Level 0	n= 10, all Level 0
- Overcharge at 2C	Level 0	n= 10, all Level 0
- Overcharge at 3C	Level 0	n= 10, all Level 0
▶ Mechanical Abuse		
- Nail	Level 1	n= 5, all Level 1
- Crush	Level 1	n= 5, all Level 0
- Impact	Level 1	n= 5, all Level 0
▶ Thermal Abuse		
- Hot Oven at 150'C	> 10min.	n= 5, all > 1Hr

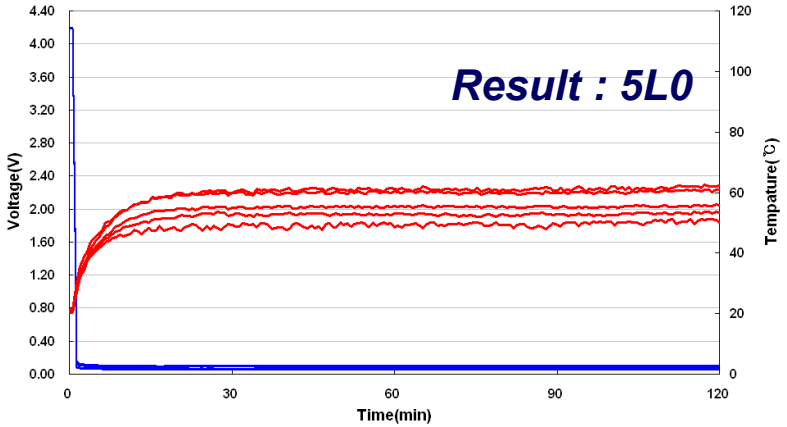
Level	*L0*	*L1*	*L2*	*L3*	*L4*	*L5*
Criteria	*No Change*	*Leak*	*Smoke,<200°C*	*Smoke,>200°C*	*Fire*	*Explosion*

External short at 60 ℃

Model : ICR18650-22F
Test method : External short at 60 ℃ after fully charged cell

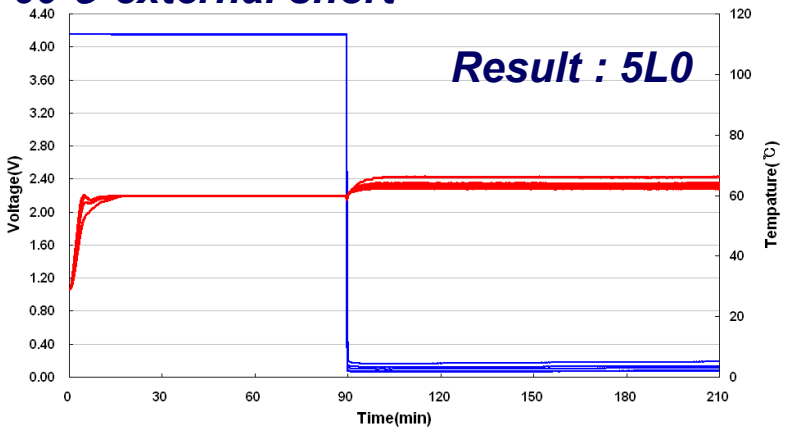
1C=2200mA

25 ℃ external short



- Blue : Voltage
- Red : Temperature

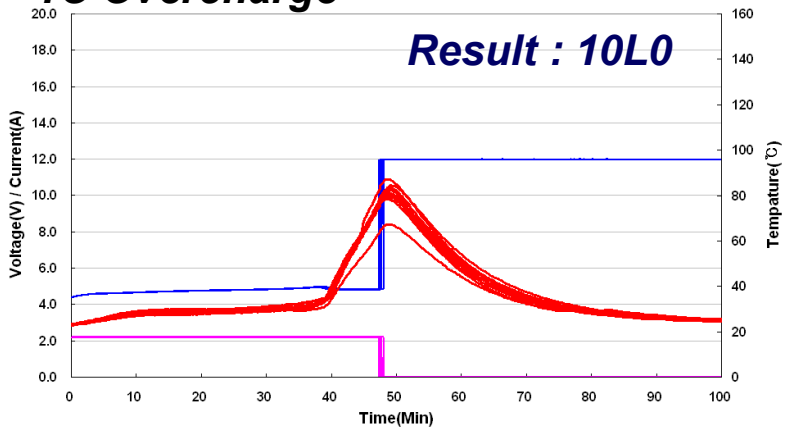
60 ℃ external short



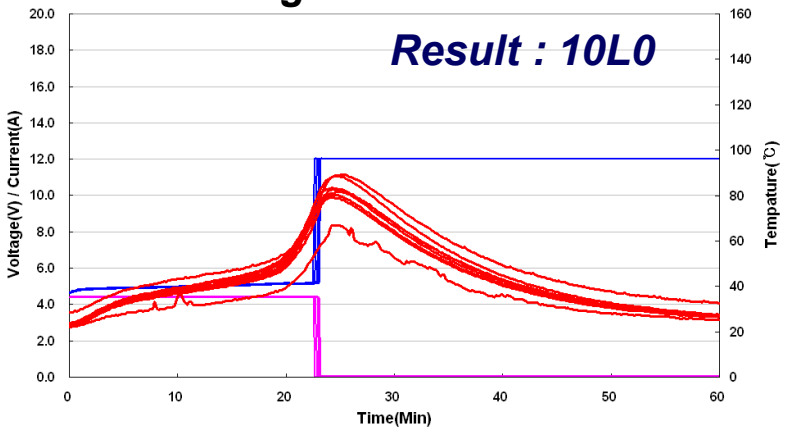
Overcharge

Model : ICR18650-22F
Test method : Charging 1C/2C/3C 12V, 2Hr/1Hr/1Hr cut off ***1C=2200mA***

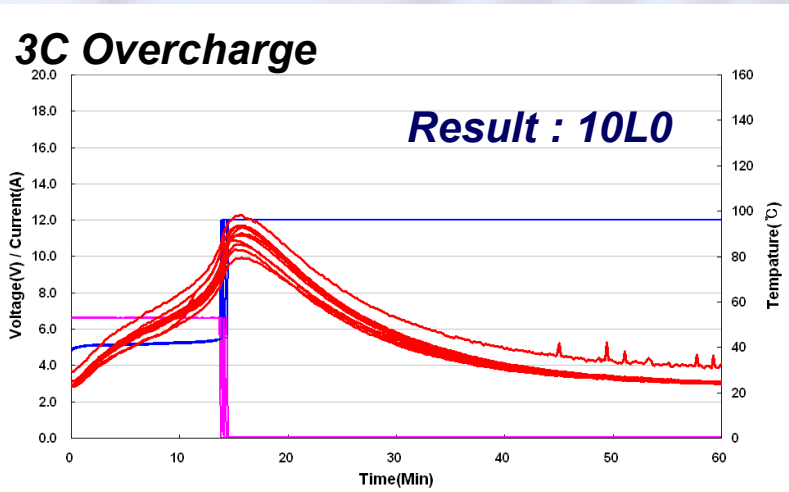
1C Overcharge



2C Overcharge



3C Overcharge



Blue : Voltage

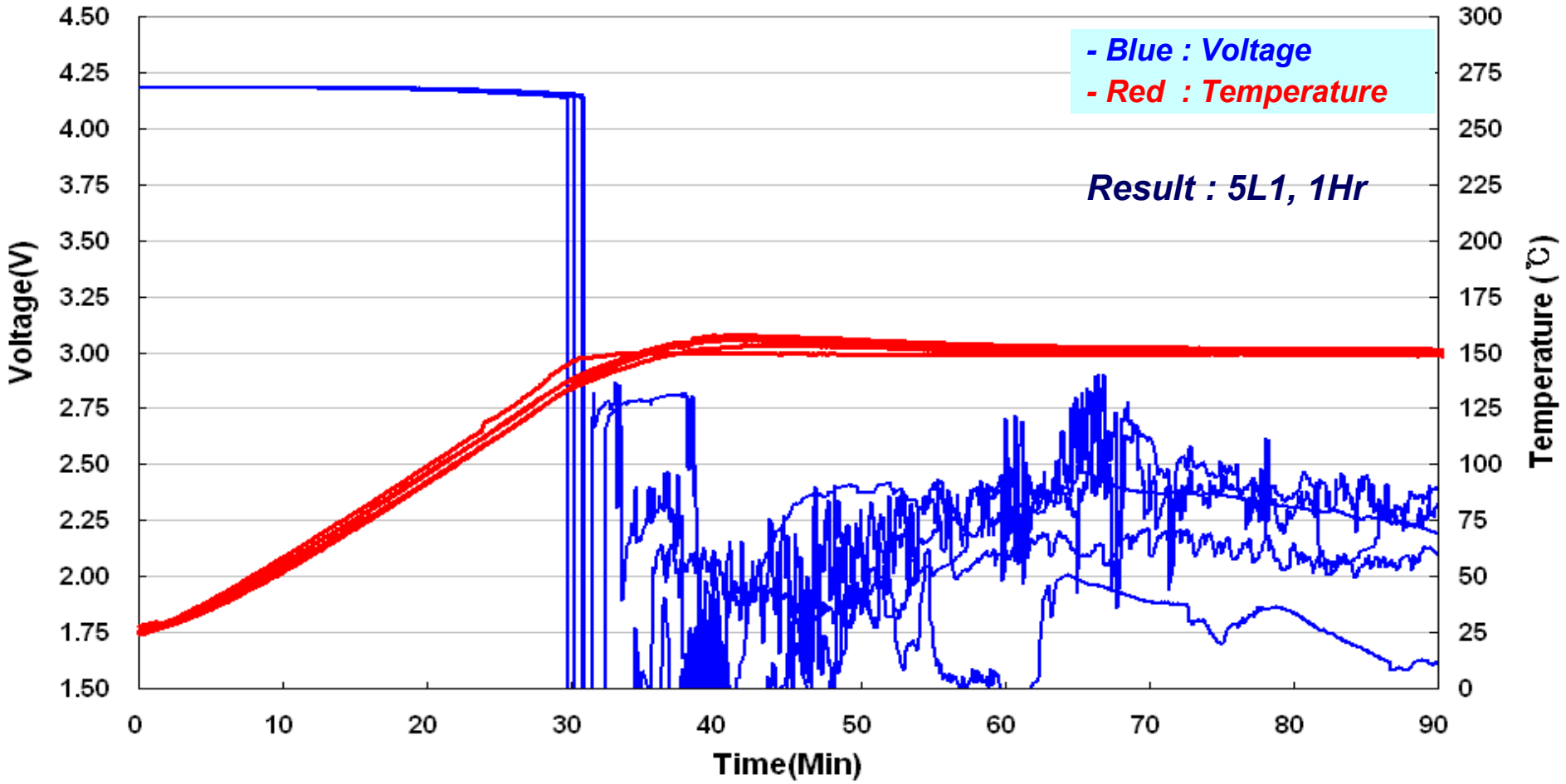
Pink : Current

Red : Temperature

Hot oven at 150 ℃

Model : ICR18650-22F
Test method : Heat exposure at 150 ℃ after fully charged cell in hot oven
(25 ℃ → 150 ℃, 5 ℃/min ↑)

1C=2200mA



Nailing

● Nailing

-. Test method : 0.5C 4.20V 3hr Charged condition,
Φ5mm Nail, 60mm/sec

Cell No.	Level	Max temp.	Result
#1	L1	87.2℃	OK
#2	L1	75.4℃	OK
#3	L1	88.2℃	OK
#4	L1	74.5℃	OK
#5	L1	77.9℃	OK

Result 5L1

Crush & Impact

● Crush

-. Test method : 0.5C 4.2V 3hr Charged condition,
13KN iron plate

-. No Event, No temperature rise

Result 5L0

● Impact

-. Test method : 0.5C 4.2V 3hr Charged condition
15.8 ϕ circular rod, 9.1kg 61cm

-. No Event, No temperature rise

Result 5L0