

Number of pages in this package 26 ~~including additional pages~~
(Fill in when using printed copy as record)

CLIENT INFORMATION	
Company Name	SAMSUNG SDI CO LTD
Address	467 BEONYEONG-RO, SEOBUK-GU, CHEONAN-SI, CHUNGCHONGNAM-DO 31086, KOREA

AUDIT INFORMATION:			
Description of Tests	Per Standard No.	[] IEC 62133-2 [X] UL 62133-2 [X] CSA C22.2 No. 62133-2:20 [] EN 62133-2	Edition/ Revision Date Ed.1/ 2020- 01-10 Ed.1/ 2020- 01-10 N/A / 2017-05
[X] Tests Conducted by ¹	Hank Chou	Hank Chou	
[] UL Staff conducting or witnessing testing (WTD, CTF Stage 1 or 2 only) [] UL Staff supervising UL Staff in training			
[] Authorized Signatory (CTDP, TPTDP, TCP, PPP, CTF Stage 3 or 4)			
		Printed Name	Signature. Include date for CTDP, TPTDP, TCP, PPP, CTF Stage 3 or 4
Reviewed and accepted by qualified Project Handler		SunMe Lee	SunMe Lee
		Printed Name	Signature

TESTS TO BE CONDUCTED:			
Test No.	Done ³	Test Name	[X] Comments/Parameters [] Tests Conducted by ² [] Link to separate data files ⁴
N/A	N/A	GENERAL	N/A
1	X	CONTINUOUS CHARGING AT CONSTANT VOLTAGE (CELL)	Compliance
2	X	EXTERNAL SHORT CIRCUIT (CELL)	Compliance
3	X	FREE FALL	Compliance
4	X	THERMAL ABUSE	Compliance
5	X	CRUSHING OF CELLS	Compliance
6	X	FORCED-DISCHARGE	Compliance

Instructions -

IEC-62133-BBTG-Datasheet-2003
Form Page 1

Form Issued: 2017-06-16
Form Revised: 2020-04-29

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1 - When all tests are conducted by one person, name can be inserted here instead of including name on each page containing data.
2 - When test conducted by more than one person, name of person conducting the test can be inserted next to the test name instead of including name on each page containing data. Test dates may be recorded here instead of entering test dates on the individual datasheet pages.
3 - Use of this field is optional and may be employed differently. If used to include a date instead of entering the testing date on the individual datasheet pages, the date shall be the date the test was conducted.
4 - Link to separate data files for a test can be inserted here. The link must be to a server that is accessible to UL staff, that provides for backup, required retention periods and a path, including file name, that does not change and result in a broken link. Not applicable to DAP.

Special Instructions -

☒ Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be recorded at the time the test is conducted.

Ambient Temperature, C 20 ± 5 Relative Humidity, % -- Barometric Pressure, mBar --

☐ No general environmental conditions are specified in the Standard(s) or have been identified that could affect the test results or measurements.

RISK ANALYSIS RELATED TO TESTING PERFORMANCE:

The following types of risks have been identified. Take necessary precautions. This list is not all inclusive.

☐ Electric shock	☐ Radiation
☒ Energy related hazards	☒ Chemical hazards
☒ Fire	☐ Noise
☒ Heat related hazards	☐ Vibration
☒ Mechanical	☒ Other (Specify) __Explosion

MEASUREMENT EQUIPMENT ACCURACY:

The overall accuracy of controlled or measured values, relative to the specified or actual parameters, shall be within these tolerances:

Requirement	Accuracy of Measurement System Used
± 1 % for voltage	± 1 % for voltage
± 1 % for current	± 1 % for current
± 2 °C for temperature	± 2 °C for temperature
± 0.1 % for time	± 0.1 % for time
± 1 % for dimension	± 1 % for dimension
± 1 % for capacity	± 1 % for capacity

These tolerances comprise the combined accuracy of the measuring instruments, the measurement techniques used, and all other sources of error in the test procedure.

Tested by: _____

See each
Date test page.

Model	Chemistry	Internal Cell Protective Devices		Capacity, mAh	Nominal Voltage, Vdc	Test Current (It), mA
		Mfg / Part no.	Type			
INR21700-50G	Li-ion	--	--	4900	3.63	4900

SPECIFICATIONS:

Model	Charging Voltage, Vdc	Charging Current, mA	End of Charge Current (or 0.05-C), mA	End of Discharge Voltage, Vdc
INR21700-50G	4.20	2450	98	2.5

Model	Upper Limit Charging Voltage, Vdc	Maximum Charging Current, mA	Charging Temp. Upper Limit, °C	Charging Temp. Lower Limit, °C
INR21700-50G	4.25	4900	45	0

Tested by: _____

See each
Date test page.

TEST LOCATION: (To be completed by Staff Conducting the Testing)					
☒ UL or Affiliate	☐ WTDP	☐ CTDP	☐ TPTDP	☐ TCP	☐ PPP
	☐ WMT	☐ TMP	☐ SMT		
Company Name: Underwriters Laboratories Taiwan Co., Ltd.					
Address: 2nd Fl., 260, Da Yeh Road, Peitou, Taipei City					

TEST EQUIPMENT INFORMATION

☒ UL test equipment information is recorded on Labware. Meter Use☐ UL test equipment information is recorded on <<insert location and local laboratory equipment system identification.>>

Inst. ID No.	Instrument Type	Test Number +, Test Title or Conditioning	Function /Range	Last Cal. Date	Next Cal. Date
N/A					

+ - If Test Number is used, the Test Number must be identified on the data sheet pages or on the Data Sheet Package cover page.

The following additional information is required when using client's or rented equipment, or when a UL ID Number for an instrument number is not used. The Inst. ID No. below corresponds to the Inst. ID No. above.

Inst. ID No.	Make/Model/Serial Number/Asset No.
N/A	N/A

Tested by: _____

See each
Date test page.

TEST SAMPLE IDENTIFICATION:

The table below is provided to establish correlation of sample numbers to specific product related information. Refer to this table when a test identifies a test sample by "Sample No." only.

Sample Card No.	Date Received	☒ Test No.+	Sample No.	Manufacturer, Product Identification and Ratings
5106385	2022-06-29	1	Please see below test item	SAMSUNG SDI CO LTD, Rechargeable lithium-ion cell, INR21700-50G, 3.63Vdc, 4900mAh
		2		
		3		
		4		
		5		
		6		

+ - If Test Number is used, the Test Number or Numbers the sample was used in must be identified on the data sheet pages or on the Data Sheet Package cover page.

☐ Sampling Procedure -

☒ This document contains data or information using color and if printed, should be printed in color to retain legibility and the information represented by the color.

Tested by: _____

See each
Date test page.

GENERAL

CELL SAFETY TESTING PRACTICES

Follow all battery SOPs when handling, testing, storing or disposing of battery samples. Follow appropriate procedures to prevent inadvertent shorting of battery and cell terminals during handling, storage and disposal of batteries. Follow MSDS sheets and battery SOPs when handling batteries where there is evidence of electrolyte leakage.

Some batteries are capable of exploding when subjected to battery tests. It is important that personnel be protected from the flying fragments, explosive force, fire and sudden release of heat and noise that results from such explosions.

The test area is to be well ventilated to protect personnel from possible harmful fumes or gases that may be emitted during battery testing.

All personnel involved in the testing of lithium batteries are to be instructed never to approach a lithium battery while the surface temperature exceeds 90°C (194°F).

When testing large cells (i.e. ≥ 10 Ah), the cells shall be isolated during testing in individual test chambers to decrease the available energy during a cell failure within the test chamber.

Tested by: _____

See each
Date test page.

GENERAL (CONT'D)

PARAMETER MEASUREMENT TOLERANCES

The overall accuracy of controlled or measured values, relative to the specified or actual parameters were within these tolerances:

±1% - Voltage
±1% - Current
±2°C - Temperature
±0.1% - Time
±1% - Dimension
±1% - Capacity

These tolerances comprised the combined accuracy of the measuring instruments, the measurement techniques used, and all other sources of error in the test procedure.

See "Test Equipment Information" section for additional details of the test equipment utilized.

Tested by: _____

See each
Date test page.

GENERAL (CONT'D)

SAMPLE SIZE FOR TYPE TESTS

Tests were made with the number of cells or batteries specified in Table 1 below using cells or batteries that were not more than six months old.

Unless otherwise specified, tests were carried out in an ambient temperature of 20°C ± 5°C.

Table 1 - Sample Size for Type Tests

Test Clause	Test Name	Cell	Battery
5.2	Insulation and wiring test	-	1
7.2.1	Continuous charge	5	-
7.2.2	Case stress	-	3
7.3.1	External short circuit	5/Temp	-
7.3.2	External short circuit	-	5
7.3.3	Free fall	3	3
7.3.4	Thermal abuse	5/Temp	-
7.3.5	Crush	5/Temp	-
7.3.6	Overcharge	-	5
7.3.7	Forced Discharge	5	-
7.3.8	Mechanical	-	
	- 7.3.8.1 Vibration		3
	- 7.3.8.2 Mechanical shock		3
7.3.9	Forced Internal Short @	5/Temp	-
8.2	Determine of small cell or battery	1	1
D.2	Measurement of the internal AC resistance for coin cells	3	-
@ - Only required for France, Japan, Korea and Switzerland and is not required on polymer cells. Polymer cell - Cell using gel polymer electrolyte or solid polymer electrolyte, not liquid electrolyte			

Tested by: _____

See each
Date test page.

GENERAL (CONT'D)

CHARGING PROCEDURE FOR TEST PURPOSES

7.1.1 First Charging Procedure

Unless otherwise stated in the test methods, the charging procedure for test purposes was carried out in an ambient temperature of $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using the method declared by the manufacturer.

Prior to charging, the battery was discharged at $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ at a constant current of $0.2 I_t$ A down to a specified end voltage.

The test current, I_t , is defined as below:

$$I_t \text{ (A)} = C_n \text{ (Ah)} / 1 \text{ (h)}$$

Where:

- C_n = Rated capacity declared by the manufacturer in ampere hours (Ah).
- n = time base in hours (h) for which the rated capacity is declared.

Model	End of Charge Current (0.05 C), mA	End of Discharge Voltage, Vdc	C_n : Rated capacity, (Ah)	Test Current, I_t , A	Ambient temperature, $^{\circ}\text{C}$
INR21700-50G	98	2.5	4.900	4.900	$20^{\circ}\text{C} \pm 5^{\circ}\text{C}$

Tested by: _____

See each
Date test page.

GENERAL (CONT'D)

CHARGING PROCEDURE FOR TEST PURPOSES (CONT'D)

7.1.2 Second Charging Procedure

This charging procedure applies only to 7.3.1, 7.3.4, 7.3.5, and 7.3.9.

After stabilization for 1 to 4 hours respectively at ambient temperature of highest test temperature and lowest test temperature, as specified in Table 2 (currently for lithium cobalt oxide), cells are charged by using the upper limited charging voltage and maximum charging current, until the charging current is reduced to $0.05 I_t$ A, using a constant voltage charging method.

Table 2 - Condition of Charging Procedure

Upper Limit Charging Voltage	Maximum Charging Current	Charging Temp. Upper Limit	Charging Temp. Lower Limit
Specified by the Manufacturer of Cells	Specified by the Manufacturer of Cells	Specified by the Manufacturer of Cells	Specified by the Manufacturer of Cells

Model	Upper Limit Charging Voltage, Vdc	Maximum Charging Current, A	Charging Temp. Upper Limit, °C	Charging Temp. Lower Limit, °C
INR21700-50G	4.25	4.900	45	0

Tested by: _____

See each
Date test page.

GENERAL (CONT'D)

DEFINITIONS OF FAILING RESULTS CRITERIA

Leakage - Visible evidence of unplanned liquid electrolyte that escaped the cell casing.

Explosion - Violent opening of the cell or battery casing where major components were forcibly expelled.

Fire - The emission of flames from a cell or battery.

Venting - Release of excessive internal pressure from a cell or battery in a manner intended by design to preclude rupture or explosion.

Rupture - Mechanical failure of a cell container or battery case induced by an internal or external cause, resulting in exposure or spillage but not ejection of materials.

Tested by: _____

See each
Date test page.

CONTINUOUS CHARGING AT CONSTANT VOLTAGE (CELL)

7.2.1

METHOD

Fully charged cells followed the procedure in 7.1.1 were subjected for 7 days to a charge as specified by the manufacturer.

RESULTS

Model: INR21700-50G

Recommended Charging Method (CC, CV, or CC/CV): CC/CV

Time/Date Started: 2022-07-01 16:50

Time/Date Ended: 2022-07-08 16:50

Sample No.	Recommended Charging Voltage V_c (Vdc)	Recommended Charging Current I_{rec} (A)	OCV Before Test (Vdc)	Results
5106385-S39	4.2	2.45	4.169	A
5106385-S40	4.2	2.45	4.168	A
5106385-S41	4.2	2.45	4.169	A
5106385-S42	4.2	2.45	4.166	A
5106385-S43	4.2	2.45	4.156	A
Results: A - No fire. No explosion. No leakage. B - Fire. C - Explosion. D - Leakage. E - Bulge. F - Others (please explain).				

Ambient Temperature, °C: 22°C /60%RH

Test date: 2022-07-01 to 2022-07-08

As a result of 7 days of charging, there ~~was~~ [was no] sign of fire, explosion or leakage.

Tested by: _____

See each
Date test page.

EXTERNAL SHORT CIRCUIT (CELL)

7.3.1

METHOD

Fully charged cells followed the procedure in 7.1.2 were stored in an ambient of $55^{\circ}\text{C} \pm 5^{\circ}\text{C}$, and then short-circuited by connecting the positive and negative terminals with a total external resistance of $80\text{ m}\Omega \pm 20\text{ m}\Omega$.

A thermocouple was placed on cell casing to monitor the temperature during the test.

The samples remained on the test for 24 h or until the case temperature declined by 20% of the maximum temperature rise, whichever was the sooner.

RESULTS

Model: INR21700-50G

Sample No.	Ambient T ($^{\circ}\text{C}$)	OCV at Start of Test (Vdc)	Resistance of Circuit ($\text{m}\Omega$)	Maximum Case Temp. Rise ΔT ($^{\circ}\text{C}$)	Results
Samples with upper limit charging temperature ($^{\circ}\text{C}$): 45					
5106385-S1	55.2	4.186	69.2	56.1	A, H
5106385-S2	55.2	4.185	69.0	57.8	A, D, H
5106385-S3	55.2	4.186	68.8	57.1	A, H
5106385-S4	55.2	4.185	69.3	63.2	A, D, H
5106385-S5	55.2	4.185	69.7	50.8	A, H
Samples with lower limit charging temperature ($^{\circ}\text{C}$): 0					
5106385-S6	55.2	4.147	68.3	74.1	A, D, F, H
5106385-S7	55.2	4.146	72.3	59.5	A, H
5106385-S8	55.2	4.153	68.5	38.2	A, H
5106385-S9	55.2	4.153	70.7	30.6	A, H
5106385-S10	55.2	4.151	69.1	46.4	A, D, H
Results: A - No fire. No explosion. B - Fire. C - Explosion. D - Leakage. E - Bulge. F - Others: leaking of melted insulation disc disk with venting(refer to below figures). G - The test was completed after 24 h. H - The test was completed after the cell casing cooled to 20% of the maximum temperature rise.					

Ambient Temperature, $^{\circ}\text{C}$: 20.3°C /67.5%RH

Test date: 2022-07-06

As a result of the external short circuit, there ~~was~~ [was no] evidence of fire or explosion.

Tested by: _____

See each
Date test page.

Note:

The sample picture of 5106385-S6 is after the test is completed.

H.C. 2022-07-06

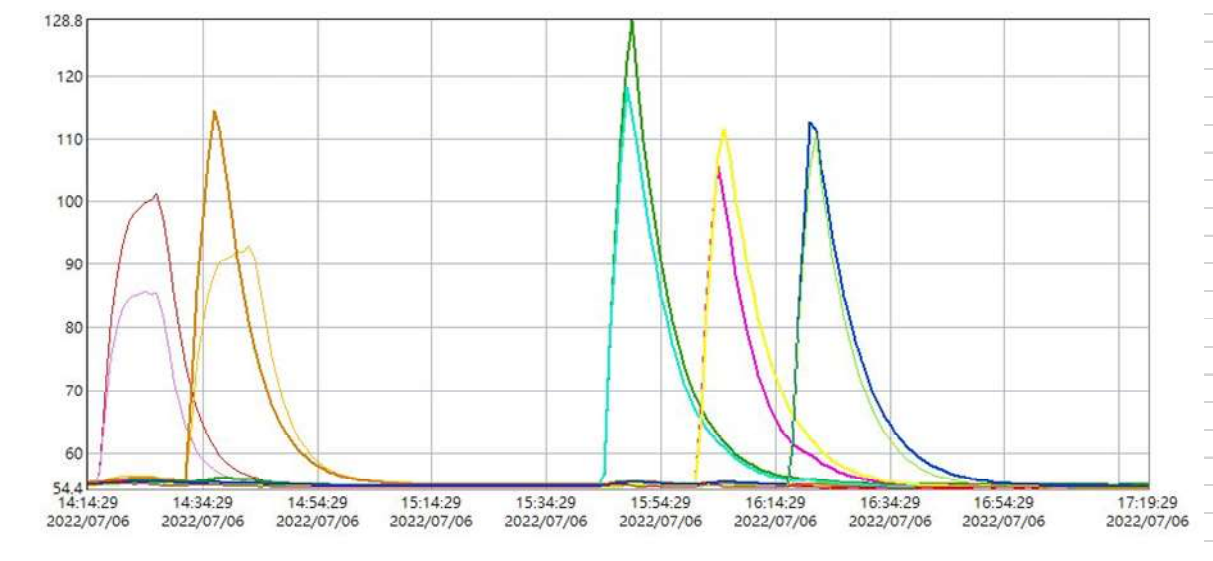


Tested by: _____

See each
Date test page.

Test ID	373992941790627													
Project No.	4790467428													
File No.	MH62097													
Model No.	INR21700-50G													
Sample No.	5106385-S1~S10													
Test Item	EXTERNAL SHORT CIRCUIT (CELL)													
Technician	HANK CHOU													
Scan Interval(Sec)	60													
Normalized Temp. to (°C)	55													
Termination Condition	Manual Stop													
Start Time	2022-07-06 14:14:29													
End Time	2022-07-06 17:20:18													
Duration	03:05:49													

Devises	CH	Description	Ambient	Max.Temp	Time	Ambinet	Max.rise	Time	Normalize	Normalize	Final	Time1	Temp1	Normalize
MX100-DL010	CH30		V	55.2	14:17:29	55.2	0.0	14:14:29	55.0	55	54.6			
MX100-DL010	CH11			110.6	16:21:29	54.5	56.1	16:21:29	111.1	111	54.4			
MX100-DL010	CH12			112.6	16:20:29	54.8	57.8	16:20:29	112.8	113	54.6			
MX100-DL010	CH13			111.7	16:05:29	54.6	57.1	16:05:29	112.1	112	54.4			
MX100-DL010	CH14			118.1	15:48:29	54.9	63.2	15:48:29	118.2	118	54.5			
MX100-DL010	CH15			105.8	16:04:29	55.0	50.8	16:04:29	105.8	106	54.6			
MX100-DL010	CH16			128.8	15:49:29	54.7	74.1	15:49:29	129.1	129	54.9			
MX100-DL010	CH17			114.5	14:36:29	55.0	59.5	14:36:29	114.5	115	54.8			
MX100-DL010	CH18			92.9	14:42:29	54.7	38.2	14:42:29	93.2	93	54.9			
MX100-DL010	CH19			85.7	14:24:29	55.1	30.6	14:24:29	85.6	86	54.6			
MX100-DL010	CH20			101.3	14:26:29	54.9	46.4	14:26:29	101.4	101	54.4			



Tested by: _____

See each
Date test page.

FREE FALL

7.3.3

METHOD

Fully charged batteries followed the procedure in 7.1.1 were dropped three times from a height of 1.0 m onto a [concrete] ~~[metal]~~ floor. The samples were dropped each time in a manner so as to obtain impacts in random orientations.

After the test, the cell or battery was put on rest for a minimum of one hour and then a visual inspection was performed.

RESULTS

Model: INR21700-50G

Sample No.	OCV at Start of Test (Vdc)	Drop No.	*Location Impacted	Results	Comments
5106385-S36	4.141	1	1	A	--
		2	2	A	--
		3	3	A	--
5106385-S37	4.138	1	1	A	--
		2	2	A	--
		3	3	A	--
5106385-S38	4.139	1	1	A	--
		2	2	A	--
		3	3	A	--
Results:					
A - No fire. No explosion.					
B - Fire.					
C - Explosion.					
D - Leakage.					
E - Bulge.					
F - Others (please explain).					

* refer to figure below

Ambient Temperature, °C: 19.2°C /70.3%RH

Test date: 2022-07-07

As a result of the drops, there ~~[was]~~ [was no] evidence of fire or explosion.

Note:

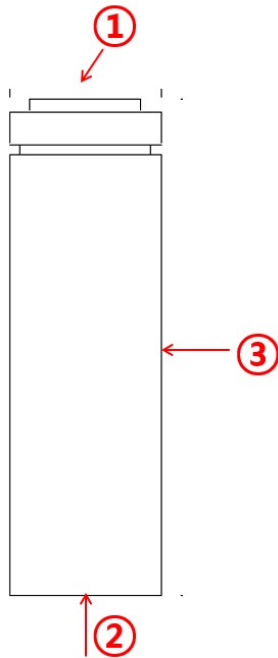
Samples were examined from: 2022-07-07 11:27 to 2022-07-07 12:27.

H.C. 2022-07-07

Tested by: _____

See each
Date test page.

*Location Impacted 1~3



Tested by: _____

See each
Date test page.

THERMAL ABUSE

7.3.4

METHOD

Fully charged cells followed the procedure in 7.1.2, after stabilized to room temperature of $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$, were placed in a gravity or circulating air-convection oven. The oven temperature was raised from $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ at a rate of $5\text{ }^{\circ}\text{C} / \text{min} \pm 2\text{ }^{\circ}\text{C} / \text{min}$ to a temperature of $130\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and held at that temperature for 30 min before the test was discontinued.

RESULTS

Model: INR21700-50G

Sample No.	Ambient T ($^{\circ}\text{C}$)	OCV at Start of Test (Vdc)	Start Time of Holding Temp. at $130^{\circ}\text{C} \pm 2^{\circ}\text{C}$	End Time of Holding Temp. at $130^{\circ}\text{C} \pm 2^{\circ}\text{C}$	Results	Comments
Samples with upper limit charging temperature ($^{\circ}\text{C}$):45						
5106385-S16	23.6	4.191	2022-07-06 17:11	2022-07-06 17:41	A, D	--
5106385-S17	23.6	4.191	2022-07-06 17:11	2022-07-06 17:41	A, D	--
5106385-S18	23.6	4.191	2022-07-06 17:11	2022-07-06 17:41	A, D	--
5106385-S19	23.6	4.191	2022-07-06 17:11	2022-07-06 17:41	A, D	--
5106385-S20	23.6	4.191	2022-07-06 17:11	2022-07-06 17:41	A, D	--
Samples with lower limit charging temperature ($^{\circ}\text{C}$):0						
5106385-S21	23.6	4.149	2022-07-06 17:11	2022-07-06 17:41	A, D	--
5106385-S22	23.6	4.153	2022-07-06 17:11	2022-07-06 17:41	A, D	--
5106385-S23	23.6	4.154	2022-07-06 17:11	2022-07-06 17:41	A, D	--
5106385-S24	23.6	4.153	2022-07-06 17:11	2022-07-06 17:41	A, D	--
5106385-S25	23.6	4.152	2022-07-06 17:11	2022-07-06 17:41	A, D	--
Results: A - No fire. No explosion. B - Fire. C - Explosion. D - Leakage. E - Bulge. F - Others (please explain).						

Ambient Temperature, $^{\circ}\text{C}$: 24.1 $^{\circ}\text{C}$ /65.6%RHIEC-62133-BBTG-Datasheet-2003
Form Page 18Form Issued: 2017-06-16
Form Revised: 2020-04-29

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Tested by: _____

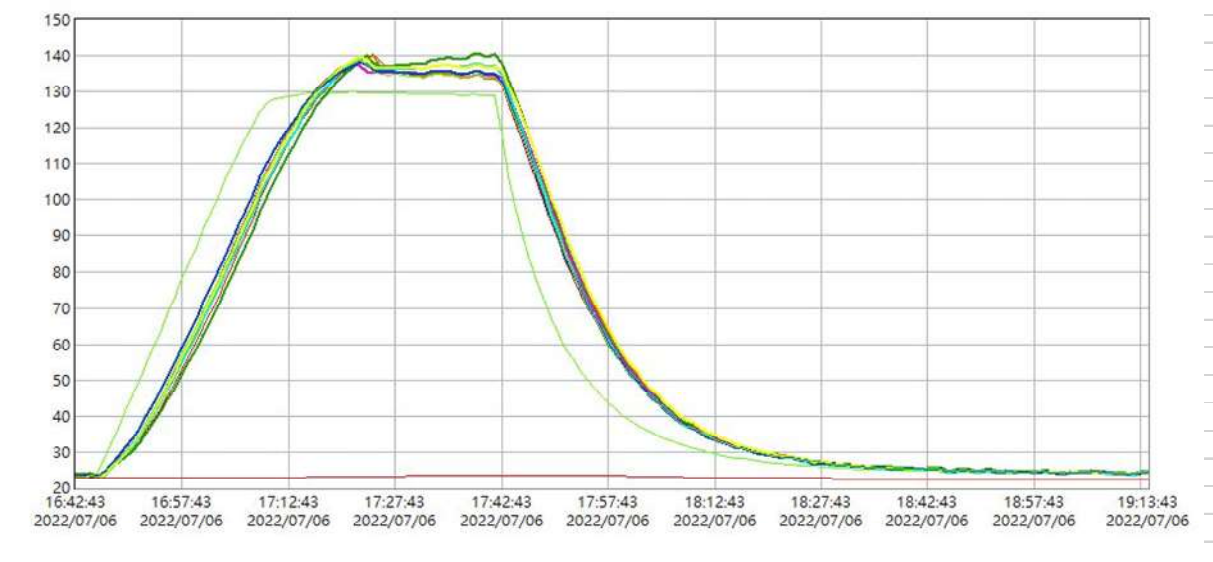
See each
Date test page.

Test date: 2022-07-06

As a result of the conditioning, there ~~was~~ [was no] evidence of fire or explosion.

Test ID	373993944194787													
Project No.	4790467428													
File No.	MH62097													
Model No.	INR21700-50G													
Sample No.	5106385-S16-S25													
Test Item	THERMAL ABUSE													
Technician	HANK CHOU													
Scan Interval(Sec)	60													
Normalized Temp. to (°C)	25													
Termination Condition	Manual Stop													
Start Time	2022-07-06 16:42:43													
End Time	2022-07-06 19:13:43													
Duration	02:31:00													

Devises	CH	Description	Ambient	Max.Temp	Time	Ambinet	Max.rise	Time	Normalize	Normalize	Final	Time1	Temp1	Normalize
MX100-DL025	CH30		V	23.6	17:53:43	23.6	0.0	16:42:43	25.0	25	22.5			
MX100-DL025	CH1			138.6	17:22:43	23.1	115.5	17:22:43	140.5	141	24.5			
MX100-DL025	CH2			138.3	17:22:43	23.1	115.2	17:22:43	140.2	140	24.4			
MX100-DL025	CH3			139.7	17:22:43	23.1	116.6	17:22:43	141.6	142	24.4			
MX100-DL025	CH4			138.9	17:22:43	23.1	115.8	17:22:43	140.8	141	24.3			
MX100-DL025	CH5			137.8	17:21:43	23.0	114.8	17:21:43	139.8	140	24.2			
MX100-DL025	CH6			140.2	17:38:43	23.4	117.0	17:23:43	142.0	142	24.6			
MX100-DL025	CH7			140.1	17:24:43	23.2	116.9	17:24:43	141.9	142	24.6			
MX100-DL025	CH8			139.8	17:24:43	23.2	116.6	17:24:43	141.6	142	24.4			
MX100-DL025	CH9			139.2	17:23:43	23.1	116.1	17:23:43	141.1	141	24.4			
MX100-DL025	CH10			140.2	17:24:43	23.2	117.0	17:24:43	142.0	142	24.3			
MX100-DL025	CH29	OVEN		129.9	17:21:43	23.0	106.9	17:21:43	131.9	132	24.1			



Tested by: _____

See each
Date test page.

CRUSHING OF CELLS

7.3.5

METHOD

Fully charged cells followed the procedure in 7.1.2 were crushed between two flat surfaces. The force for the crushing was applied by a device exerting a force of $13 \text{ kN} \pm 0.78 \text{ kN}$. The crushing was performed in a manner that caused the most adverse result.

The voltage of the cells was monitored during the test.

Once the maximum force had been applied, or an abrupt voltage drop of one third of the original voltage was obtained, the force was released.

A cylindrical or prismatic cell was crushed with its longitudinal axis parallel to the flat surfaces of the crushing apparatus. Only the wide side of prismatic cells was tested.

A coin cell was crushed by applying the force on its flat surface.

Tested by: _____

See each
Date test page.

CRUSHING OF CELLS (CONT'D)

7.3.5

RESULTS

Model: INR21700-50G

Cell Type: ☒ Cylindrical ☐ Prismatic ☐ coin/button

Sample No.	OCV at Start of Test (Vdc)	OCV at Removal of Crushing Force (Vdc)	Maximum Force Applied to the Cell During Crush (kN/lbf)	Results
Samples with upper limit charging temperature (°C): 45				
5106385-S26	4.184	--	12.9888/2920	A,G
5106385-S27	4.186	--	13.4514/3024	A,G
5106385-S28	4.189	--	13.0911/2943	A,G
5106385-S29	4.183	--	13.3980/3012	A,G
5106385-S30	4.185	--	13.0466/2933	A,G
Samples with lower limit charging temperature (°C): 0				
5106385-S31	4.148	--	13.6605/3071	A,G
5106385-S32	4.145	--	13.4336/3020	A,G
5106385-S33	4.144	--	13.3536/3002	A,G
5106385-S34	4.150	--	13.4069/3014	A,G
5106385-S35	4.145	--	13.3625/3004	A,G
Results:				
A - No fire. No explosion.				
B - Fire.				
C - Explosion.				
D - Leakage.				
E - Bulge.				
F - Others (please explain).				
G - Force released after maximum level reached				
H - Force released after abrupt voltage drop of one-third the original value.				

Ambient Temperature, °C: 23.5°C /64.9%RH

Test date: 2022-07-07

As a result of the applied crushing force, there ~~was~~ [was no] evidence of fire or explosion.

Note:

Test force: 2923lbf

"Unit conversion calculated by Uconeer program"

1N=0.224809 lbf

13kN=2922.52=2923 lbf

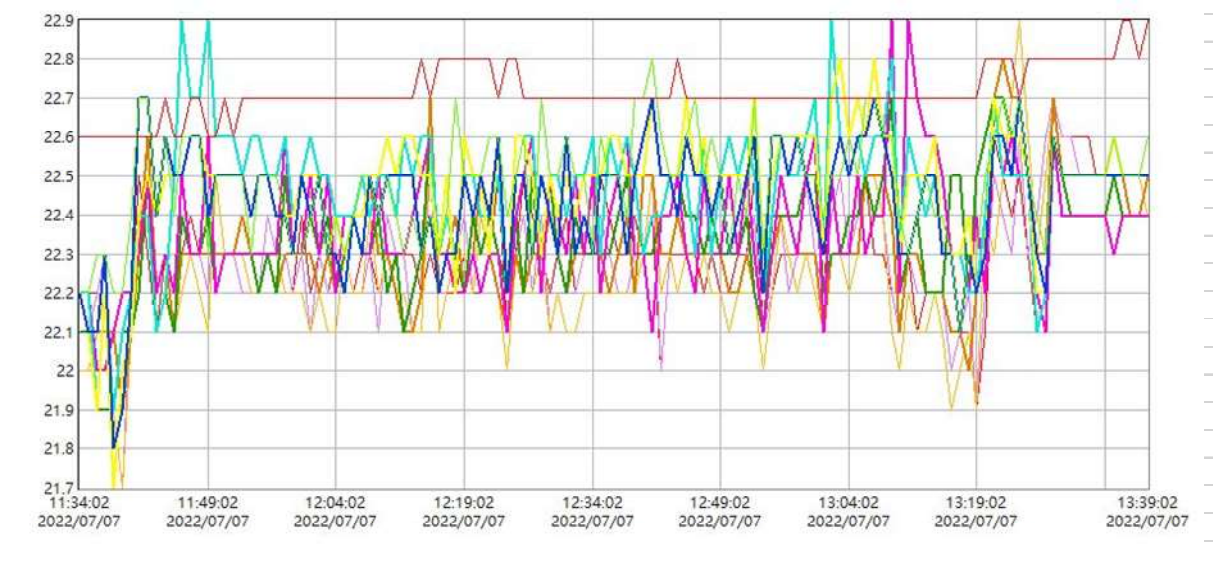
H.C. 2022-07-07

Tested by: _____

See each
Date test page.

Test ID	374000838895234													
Project No.	4790467428													
File No.	MH62097													
Model No.	INR21700-50G													
Sample No.	5106385-S26~S35													
Test Item	CRUSHING OF CELLS													
Technician	HANK CHOU													
Scan Interval(Sec)	60													
Normalized Temp. to (°C)	25													
Termination Condition	Manual Stop													
Start Time	2022-07-07 11:34:02													
End Time	2022-07-07 13:39:02													
Duration	02:05:00													

Devises	CH	Description	Ambient	Max.Temp	Time	Ambinet	Max.rise	Time	Normalize	Normalize	Final	Time1	Temp1	Normalize
MX100-DL016	CH2		V	22.9	13:36:02	22.9	0.0	11:34:02	25.0	25	22.9			
MX100-DL016	CH11			22.8	12:41:02	22.7	-0.6	13:17:02	24.4	24	22.6			
MX100-DL016	CH12			22.7	11:41:02	22.6	-0.8	11:38:02	24.2	24	22.5			
MX100-DL016	CH13			22.8	13:03:02	22.7	-0.9	11:38:02	24.1	24	22.5			
MX100-DL016	CH14			22.9	11:46:02	22.6	-0.7	11:36:02	24.3	24	22.5			
MX100-DL016	CH15			22.9	13:09:02	22.7	-0.7	12:24:02	24.3	24	22.4			
MX100-DL016	CH16			22.7	13:09:02	22.7	-0.7	11:36:02	24.3	24	22.4			
MX100-DL016	CH17			22.8	13:22:02	22.8	-0.7	11:39:02	24.3	24	22.5			
MX100-DL016	CH18			22.9	13:24:02	22.7	-0.9	11:39:02	24.1	24	22.4			
MX100-DL016	CH19			22.7	13:28:02	22.8	-0.9	11:39:02	24.1	24	22.5			
MX100-DL016	CH20			22.7	13:28:02	22.8	-0.8	11:38:02	24.2	24	22.5			



Tested by: _____

See each
Date test page.

FORCED-DISCHARGE

7.3.7

METHOD

Fully charged cells followed the procedure in 7.1.1 were discharged at $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ at a constant current of $0.2\text{ }I_t\text{ A}$ down to a manufacturer's specified end point voltage.

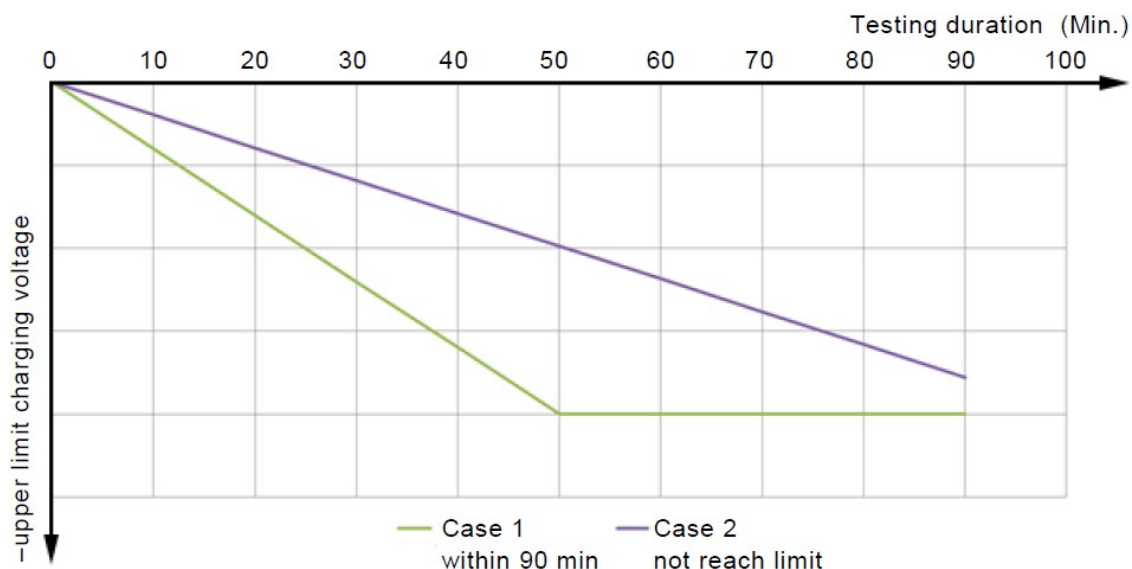
The discharged cells were then subjected to a reverse charge at $1.0\text{ }I_t\text{ A}$ for 90 min.

If the discharge voltage reached the negative value of upper limit charging voltage within the testing duration, the voltage was maintained at that value by reducing the current for the remainder of the testing duration (Case 1 of below Figure 1).

If the discharge voltage does not reach the negative value of upper limit charging voltage within the testing duration, the test was terminated at the end of the testing duration (Case 2 of below Figure 2).

Model	Discharge Current $0.2\text{ }I_t\text{ A}$	Manufacturer's Specified End Point Voltage, Vdc	Reverse Charge Current $I_t\text{ A}$	Negative Value of Upper Limit Charging Voltage, Vdc
INR21700-50G	0.98	2.5	4.900	4.25

Figure 1 - Forced Discharge Time Chart



Tested by: _____

See each
Date test page.

FORCED-DISCHARGE (CONT'D)

7.3.7

RESULTS

Sample No.	OCV at Start of Test (Vdc)	Measured Reverse Charge Current I_t (A)	Lower Limit Discharge Voltage (Vdc)	Results
5106385-S11	2.510	4.8993	2.5	A, H
5106385-S12	2.513	4.8997	2.5	A, H
5106385-S13	2.515	4.8994	2.5	A, H
5106385-S14	2.526	4.8996	2.5	A, H
5106385-S15	2.519	4.8998	2.5	A, H

Results:

A - No fire. No explosion.

B - Fire.

C - Explosion.

D - Leakage.

E - Bulge.

F - Others (please explain).

G - The voltage reached negative value of upper limit charging voltage within 90 min.

H - The voltage did not reach negative value of upper limit charging voltage.

Ambient Temperature: 24.0 °C /67.0%RH

Test date: 2022-07-06

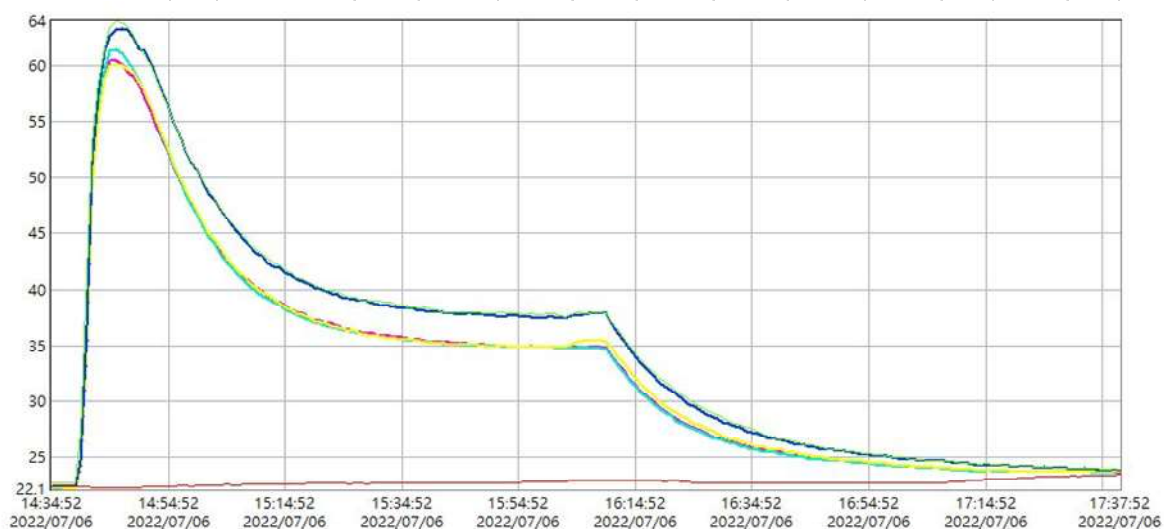
There ~~was~~ [was no] fire or explosion as a result of the reverse charging of the cells.

Tested by: _____

See each
Date test page.

Test ID	373993201498052													
Project No.	4790467428													
File No.	MH62097													
Model No.	INR21700-50G													
Sample No.	5106385-S11~S15													
Test Item	FORCED-DISCHARGE													
Technician	HANK CHOU													
Scan Interval(Sec)	60													
Normalized Temp. to (°C)	25													
Termination Condition	Manual Stop													
Start Time	2022-07-06 14:34:52													
End Time	2022-07-06 17:38:41													
Duration	03:03:49													

Devices	CH	Description	Ambient	Max.Temp	Time	Ambinet	Max.rise	Time	Normalize	Normalize	Final	Time1	Temp1	Normalize
MX100-DL025	CH30		V	23.4	17:37:52	23.4	0.0	14:34:52	25.0	25	23.4			
MX100-DL025	CH16			64.0	14:45:52	22.2	41.8	14:45:52	66.8	67	23.9			
MX100-DL025	CH17			63.3	14:46:52	22.2	41.1	14:46:52	66.1	66	23.8			
MX100-DL025	CH18			60.0	14:44:52	22.2	37.8	14:44:52	62.8	63	23.6			
MX100-DL025	CH19			61.4	14:45:52	22.2	39.2	14:45:52	64.2	64	23.6			
MX100-DL025	CH20			60.5	14:45:52	22.2	38.3	14:45:52	63.3	63	23.6			



Project No. 4790467428

File MH62097

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Tested by: _____

See each
Date test page.

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