

TEST RECORD NO. 1

## SAMPLES:

The manufacturer furnished representative samples of the cell models noted below for the investigation. These samples were subjected to the test program described on the following pages.

Model	Cell Chemistry	Cell Shape	Energy Density, mAh/mm <sup>3</sup>	Nominal Voltage Rating, V dc	Capacity, mAh	Top off charge voltage, Vdc	Maximum Charging Current, mA	Maximum Charging Voltage, V dc	Discharge cut off voltage, V dc
ISR18650-1000	Li (Mn-Ni-Co)O <sub>2</sub>	Cylindrical	0.06048	3.6	1000	4.2	1000	4.2	2.75
ISR18650-1300			0.07863	3.6	1300	4.2	1300	4.2	2.75
ISR18650-1500			0.09073	3.6	1500	4.2	1500	4.2	2.75
ISR18650-1700			0.10283	3.6	1700	4.2	1700	4.2	2.75
ISR18650-1900			0.11492	3.6	1900	4.2	1900	4.2	2.75
ISR18650-2100			0.12702	3.6	2100	4.2	2100	4.2	2.75
ISR18650-2200			0.13307	3.6	2200	4.2	2200	4.2	2.75

Samples of the following model were also tested after the following pre-conditioning:

Model	Type		Preconditioning		
	Primary	Secondary	Complete Discharged	One Half Discharged	Charge/Discharge Cycled
ISR18650-2200	-	X	-	-	X

## GENERAL:

Test results relate only to the items tested.

Secondary Lithium ion cylindrical cell, Models ISR18650-1000, ISR18650-1300, ISR18650-1500, ISR18650-1700, ISR18650-1900, ISR18650-2100, ISR18650-2200 are submitted for UL investigation. This models are similar to each other except for capacity, dimension, weight and separator.

All test programs were conducted on Model ISR18650-2200 (including fresh and cycled cell).

Abbreviated test programs (V1 or V2) were conducted on Models ISR18650-1700 and ISR18650-1000.

Abbreviated test programs (Abnormal charge test and Short circuit test 55C) were conducted on Model ISR18650-1500.

Unless otherwise indicated, all tests were conducted on Models ISR18650-2200, ISR18650-1700, ISR18650-1500 and ISR18650-1000. All tests conducted on Models ISR18650-2200, ISR18650-1700, ISR18650-1500 and ISR18650-1000 were considered to be representative of all Models above.

The following tests were conducted.

Model	Test	UL 1642, Section	Complied, Y, N or N/A	Comments
ISR18650-2200 (A, D)	Short Circuit Test: (At Room Temperature)	10	Y	Complying
ISR18650-2200 (A, D), ISR18650-1500, ISR18650-1700 and ISR18650-1000	Short Circuit Test: (At 55°C)	10	Y	Complying
ISR18650-2200 (A, D), ISR18650-1500, ISR18650-1700 and ISR18650-1000	Abnormal Charging Test:	11	Y	Complying
ISR18650-2200 (A, D), ISR18650-1700 and ISR18650-1000	Crush Test:	13	Y	Complying
ISR18650-2200 (A, D), ISR18650-1700 and ISR18650-1000	Impact Test:	14	N for ISR18650- 2200, Y for ISR18650- 1700 and ISR18650- 1000	COA was added for non- complied Models
ISR18650-2200 (A, D)	Shock Test:	15	Y	Complying
ISR18650-2200 (A, D)	Vibration Test:	16	Y	Complying
ISR18650-2200 (A, D), ISR18650-1700 and ISR18650-1000	Heating Test:	17	Y	Complying
ISR18650-2200 (A, D)	Temperature Cycling Test:	18	Y	Complying
ISR18650-2200 (A, D)	Low Pressure (Altitude Simulation) Test:	19	Y	Complying
ISR18650-2200 (A), ISR18650-1700 and ISR18650-1000	Projectile Test:	20	Y	Complying
Cell Condition Key:				
(A)-Fully Charged and not preconditioned.				
(D)-Fully charged and also preconditioned, Charge-discharged cycled.				
Comments:				
ISR18650-1900 and ISR18650-2100 were considered noncompliance with Impact Test due to the test result of Model ISR18650-2200.				

The test methods and results of the above tests have been reviewed and found in accordance with the requirements (unless noted above) in the Standard for Lithium Batteries, UL 1642, Fourth Edition, Dated September 19, 2005 and contains revisions through and including November 25, 2009.

Test Record Summary:

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in the UL Standard for Safety for Lithium Batteries, UL 1642 Fourth Edition, Dated September 19, 2005 and contains revisions through and including November 25, 2009, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

TEST RECORD NO. 2

## SAMPLES:

The manufacturer furnished representative samples of the cell Models noted below for the investigation. These samples were subjected to the test program described on the following pages.

Model	Cell Chemis try	Cell Shape	Energy Density, mAh/mm3	End Point Voltage, V dc	Nominal Voltage Rating, V dc	Capacity, mAh	Maximum Charging Current, mA	Maximum Charging Voltage, V dc
INR18650 1400mAh	LiNiCo	Cylin	0.08464	2.5	3.6	1400	2800	4.25
INR18650 2400mAh	MnO2	drica	0.1451	2.5	3.6	2400	3000	4.25
INR18650 3000mAh		1	0.181373	2.5	3.6	3000	3600	4.25

## GENERAL:

Test results relate only to the items tested.

All tests were conducted at UL-CCIC Suzhou.

Due to similarity of Models INR18650 1400mAh, INR18650 1600mAh, INR18650 1800mAh, INR18650 2000mAh, INR18650 2400mAh, INR18650 2500mAh, INR18650 2600mAh, INR18650 2800mAh, INR18650 3000mAh to R/C Models for this manufacturer in this report, except for capacity, weight, energy density, separator, only the following tests were conducted necessary.

Abbreviated tests program (V1) was conducted on Model INR18650 3000mAh, cell with larger capacity and density in family.

Abbreviated tests program (V2) was conducted on Model INR18650 1400mAh, cell with smaller capacity and density in family.

Abbreviated tests program (V3+crush+impact test) was conducted on Model INR18650 2400mAh, cell with intermediate capacity and density in family.

Tests on models INR18650 3000mAh, INR18650 1400mAh and INR18650 2400mAh were considered representative of another models.

Tests were considered covered as follows:

Test	File Reference	Report Date	Test Record No.
Short circuit at room temperature, Shock, Vibration, Temperature Cycling, Low Pressure	MH47380	2010-01-08	1

The following tests were conducted.

Model	Test	UL 1642, Section	Complied, Y, N Or N/A	Comments
INR18650 3000mAh, INR18650 1400mAh, INR18650 2400mAh	Short Circuit: (At 55°C)	10	Y	Complying
	Abnormal Charging	11	Y	Complying
	Crush	13	Y	Complying
	Impact	14	Y	Complying
	Heating	17	Y	Complying
	Projectile	20	Y	Complying

The test methods and results of the above tests have been reviewed and found in accordance with the requirements in the Standard for Lithium Batteries, UL 1642, 5th Edition, Dated March 13, 2012 and contains revisions through and including June 23, 2015.

Test Record Summary:

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in the UL Standard for Safety for Lithium Batteries, UL 1642, 5th Edition, Dated March 13, 2012 and contains revisions through and including June 23, 2015, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report. Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

Test Record by:

Becky Li  
Engineer Project Associate

Reviewed by:

Giggle Pei  
Project Engineer

TEST RECORD NO. 3

GENERAL:

No test considered necessary to create one new model INR18650-1500 identical to model ISR18650-1500 expect for designation and nominal voltage.

Test Record Summary:

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in the UL Standard for Safety for Lithium Batteries, UL 1642, 5th Edition, Dated March 13, 2012 and contains revisions through and including June 23, 2015, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report. Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

Test Record by:  
Steven Mao  
Engineer Project Associate

Reviewed by:  
Jissea Liu  
Project Engineer

TEST RECORD NO. 4

GENERAL:

No test considered necessary to correct model designation from INR18650-1500 to INR18650P 1500mAh due to typo.

Test Record Summary:

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in the UL Standard for Safety for Lithium Batteries, UL 1642, 5th Edition, Dated March 13, 2012 and contains revisions through and including June 23, 2015, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report. Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

Test Record by:  
Steven Mao  
Engineer Project Associate

Reviewed by:  
Jissea Liu  
Project Engineer

## TEST RECORD NO. 5

No test considered necessary to create new models as below, which were identical to existed models expect for designation and nominal voltage.

New models	Existed models
INR18650P 1300mAh	ISR18650-1300
INR18650P 1400mAh	INR18650 1400mAh
INR18650H 1800mAh	INR18650 1800mAh
INR18650H 2000mAh	INR18650 2000mAh
INR18650H 2200mAh	ISR18650-2200
INR18650H 2400mAh	INR18650 2400mAh
INR18650H 2500mAh	INR18650 2500mAh
INR18650H 2600mAh	INR18650 2600mAh
INR18650H 2800mAh	INR18650 2800mAh

## Test Record Summary:

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in the UL Standard for Safety for Lithium Batteries, UL 1642, 5th Edition, Dated March 13, 2012, including revision through including June 23, 2015, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report. Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

Record by:  
Cecilia Jiang  
Project Engineer

Reviewed by:  
Ian Chen  
Project Engineer



## CONCLUSION

A sample of the component covered by this Report has been found to comply with the requirements covering the category and the component is found to comply with UL's applicable requirements. The description and test result in this Report are only applicable to the sample(s) investigated by UL and does not signify the product(s) described as being covered under UL's Follow-Up Service Program. When covered under UL's Follow-Up Service Program, the manufacturer is authorized to use the Recognized Marking on such products which comply with UL's Follow-Up Service Procedure and any other applicable requirements of Underwriters Laboratories Inc. The Recognized Component Mark of Underwriters Laboratories Inc. on the product, or the Recognized Marking symbol on the product and the Recognized Component Mark on the smallest unit container in which the product is packaged, is the only method to identify products investigated by UL to published requirements and manufactured under UL's Recognition and Follow-Up Service.

This Report is intended solely for the use of UL and the Applicant for establishment of UL certification coverage of the product under UL's Follow-Up Service. Any use of the Report other than to indicate that the sample(s) of the product covered by the Report has been found to comply with UL's applicable requirements is not authorized and renders the Report null and void. UL shall not incur any obligation or liability for any loss, expense, or punitive damages, arising out of or in connection with the use or reliance upon the contents of this Report to anyone other than the Applicant as provided in the agreement between UL and Applicant. Any use or reference to UL's name or certification mark(s) by anyone other than the Applicant in accordance with the agreement is prohibited without the express written approval of UL.

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