

Recognized Component Marking Data Page (RCMDP)

(FILE IMMEDIATELY AFTER AUTHORIZATION PAGE)

RECOGNIZED COMPONENT MARKING

Products Recognized under UL's Component Recognition Service are identified by marking elements consisting of:

1. The Recognized Company's identification specified in this document.
2. A catalog, model or other applicable product designation specified in the descriptive sections of this document.
3. The UL Recognized Component Mark shown below.

Only those components, which actually bear the Marking, should be considered as being covered under the Recognition Program. The UL Listing or Classification Mark is not authorized for use on or in connection with Recognized Components.

Recognized Component Mark



Minimum size of the Recognized Component Mark is not specified as long as it is legible. Minimum height of the registered symbol ® shall be 3/64 inch but may be omitted if it is out of proportion to the Recognized Component Mark or not legible to the naked eye.

The manufacturer may reproduce the Mark electronically. Any decision regarding the acceptability of the manufacturer's Mark reproduction will be made at the Reviewing Office.

## INDEX

Product / Model Numbers	Section
Lithium ion Battery, Model GS-1907	1

## APPENDIX A

## SPECIAL INSTRUCTIONS

## UL REPRESENTATIVE:

## SAMPLES

Once each year, select the appropriate type and number of samples for each group as specified in Table A, marked with the appropriate identification, and forward to:

- ☐ BREA - BREA
- ☐ CAM - CAMAS
- ☐ NKW - Northbrook West Bldg. 6A
- ☐ NWT - NEW TERRITORY, HONG KONG
- ☐ TKY - TOKYO, JAPAN
- ☒ TPI - TAIPEI, TAIWAN

Models are tabulated under a specific group based upon common construction features. The number of models chosen reflects 1 model for every 4 models within each group. For example, if there are 8 models within a group, 2 models are chosen for follow up testing and examination each year. Records should be maintained to ensure that all models for each group are subjected to follow up testing within approximately every four years.

The UL Representative is responsible for selecting the quantity of samples at the stated frequency for Follow-Up testing in accordance with the Sample Selection criteria noted above. Samples shall be identified and tagged with the applicable information using a Sample Tag (Form 300-217). Unless otherwise stated, the UL Representative shall inform the manufacturer that the samples are to be forwarded to the Test Office(s) as designated on the specific Procedure Volume subscriber card.

Samples for tests shall be provided as outlined in Table A and sample information following Table A.

Samples provided for short circuit test and for either abusive overcharge or abnormal charging test shall be provided with unsealed enclosures as outlined in Table A and sample information following.

Samples provided for the drop impact test shall be provided with sealed enclosures as outlined in Table A and sample information following.

[illegible]

## PROJECTILE TEST (CELLS ONLY):

## METHOD

Five samples from each group and models to be tested, as outlined in Table A, are subjected to this test.

Note: This test is not conducted on battery packs that employ Recognized cells subjected to this test as part of the cell Recognition and follow up service testing.

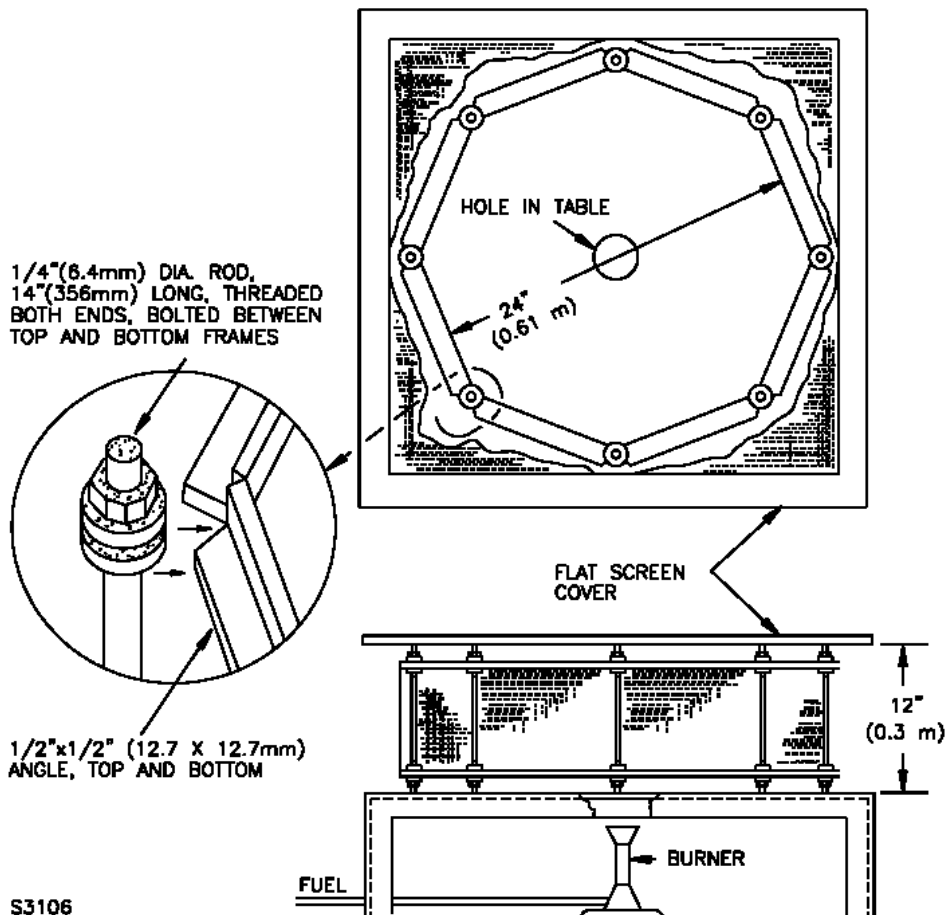
Each test sample cell is placed on a screen that covers a 102 mm (4 inch) diameter hole in the center of a platform table. The screen is constructed of steel wire mesh having 20 openings per inch (25.4 mm) and a wire diameter of 0.017 in. (0.43 mm). The screen is mounted 38 mm (1-1/2 inch) above a burner. The fuel and airflow ratios are set to provide a bright blue flame that causes the supporting screen to glow a bright red.

An eight-sided covered wire cage, 610 mm (2 feet) across and 305 mm (1 foot) high, made from metal screening is placed over the test sample as shown in Figure 19.3 of UL 1642. The metal screening is constructed from 0.25 mm (0.010 inch) diameter aluminum wire with 16-18 wires per inch (25.4 mm) in each direction.

The sample is heated and shall remain on the screen until it explodes or the cell has ignited and burned out. It is not required to secure the sample in place unless it is at risk of falling off the screen before the test is completed. When required, the sample shall be secured to the screen with a single wire tied around the sample.

## PROJECTILE TEST (CELLS ONLY): (CONT'D)

Test apparatus for projectile test



## BASIS FOR ACCEPTABILITY

When subjected to the Projectile Test, no part of an exploding cell shall penetrate the wire screen such that some or the entire cell protrudes through the screen.

Note: A hole in the screen created by a piece of the cell sitting on the screen and burning a hole through the screen is not considered a failing result. Only those holes created by exploding parts puncturing the screen due to the force of the explosion are considered failing results.

## ABUSIVE OVER CHARGE TEST (SECONDARY BATTERY PACKS ONLY):

## METHOD

One fully charged sample shall be used for this test.

The battery pack shall be tested in an ambient temperature of  $20 \pm 5^{\circ}\text{C}$  ( $68 \pm 9^{\circ}\text{F}$ ). The room ambient temperature,  $T_{\text{amb}}$ , shall be recorded.

Each battery shall be discharged at a constant current rate of 0.2C/1 hour to a manufacturer specified discharge endpoint voltage.

The Sample is subjected to a constant charging current at 10 times the  $C_5$  amp rate using a supply voltage sufficient to maintain the charging rate through the duration of the test. A thermocouple is attached to each test battery pack. The test is continued until the battery explodes, vents or the temperature of the outer battery casing reaches a steady state condition or returns to ambient.

ABUSIVE OVER CHARGE TEST (SECONDARY BATTERY PACKS ONLY):  
(CONT'D)

BASIS OF ACCEPTABILITY

When subjected to the abusive overcharge test, secondary battery packs shall not explode or catch fire.

Model	Section	Top of Parameters,	Capacity, Ah	Mfg. Specified End Pont Voltage, Vdc	10 x C <sub>5</sub> Amp Rate Current, A	Minimum Supply Voltage For Testing, V dc
GS-1907	1	12.6 V, 0.52 A, Endpoint current 130 mA	2.6	9	5.2	18



ABNORMAL CHARGING TEST: (Secondary battery packs not subjected to the abusive overcharge test)

#### METHOD

The battery packs not subjected to the abusive overcharge test shall be subjected to the Abnormal Charging Test as outlined below.

One fully charged sample shall be used for this test.

The sample shall be tested in an ambient temperature of  $20 \pm 5^{\circ}\text{C}$  ( $68 \pm 9^{\circ}\text{F}$ ). The room ambient temperature,  $T_{\text{amb}}$ , shall be recorded. A thermocouple shall be attached to the casing of internal cells to monitor temperatures in order to determine ultimate results.

The sample shall be discharged at a constant current rate of 0.2C/1 hour to a manufacturer specified discharge endpoint voltage.

The sample shall be subjected to the following overcharge condition:

Condition:

A sample battery pack shall be charged with a constant maximum specified charger output voltage and a current limit of three times the maximum charging current  $I_c$ , specified by the manufacturer. The charging duration shall be the time required to reach the manufacturer's specified end-of-charge conditions and ultimate results have occurred.

Ultimate results are assumed to have occurred with one of the following:

- 1) The sample had reached the manufacturer's specified end-of-charge conditions and the internal cell case temperatures to have stabilized or returned to within 10 degrees of ambient temperature, or
- 2) The sample caught on fire or exploded.

This sample shall not be subjected to single fault condition.

[illegible]

DROP IMPACT (BATTERY PACKS WITH ENCLOSURES ONLY):

METHOD

Three complete, fully charged battery pack samples are to be subjected to this test in an ambient of  $20^{\circ} \pm 5^{\circ}\text{C}$ .

Each of three samples is dropped from height of  $1\text{ m} \pm 0.005\text{ m}$  so it strikes a concrete surface in the position that is most likely to produce adverse results (i.e. on corners or any sides or parts that may appear less robust). Each sample is dropped three times hitting a different location each time.

The samples are examined for signs of damage to the enclosure that would damage or expose cells or protective parts, and for signs of fire or explosion as a result of the drops, a minimum of 2 hours but no more than 6 hours after conducting the testing.

Note: If damage to internal cells and protective parts is suspected, the sample enclosure shall be opened after the minimum 2 hour time to review the condition of its contents. Examples of damage would be dented or punctured cells and broken connections, etc. as a result of the drops.

[illegible]

SHORT CIRCUIT TEST (At  $55^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ):

## METHOD

One fully charged battery pack as outlined in Table A, shall be short-circuited by connecting the positive and negative terminals to a circuit having a maximum resistance of 0.1 ohm. The sample shall be discharged until a fire or explosion shall be obtained, or until it has reached a completely discharged state less than 0.2 volts and/or the internal cell case temperatures ( $T_{\text{max}}$ ) have returned to  $+10^{\circ}\text{C}$  of ambient temperature.

Tests shall be conducted at  $55^{\circ}\text{C} \pm 5^{\circ}\text{C}$ , and the sample shall reach equilibrium at  $55^{\circ} \pm 5^{\circ}\text{C}$  before the terminals are connected.

The sample shall not be subjected to single faults across any electrical protective device during this test.

[illegible]

\*\*\* - Only conducted on cells which are not Recognized and not subjected to this follow up test as part of Recognition

## Sample Code:

- A - Represents a total of 2 secondary battery packs required: 2 complete samples with unsealed enclosures for abusive overcharge or abnormal charge test and for short circuit test for sample pickup by the Field Representative.
- B - Represents a total of 5 secondary battery packs required: 2 complete samples with unsealed enclosures for the abusive overcharge or abnormal charge test, and short circuit test; and 3 complete samples with sealed enclosures for the drop impact test for sample pickup by the Field Representative.
- C - Represents a total of 2 primary battery packs required: 1 complete sample for the open circuit voltage test; and 1 complete sample with unsealed enclosure for the short circuit test for primary packs for sample pickup by the Field Representative
- D - Represents a total of 5 primary battery packs required - 1 complete sample for open-circuit voltage; 1 complete sample with unsealed enclosure for short circuit test; and 3 complete samples with sealed enclosures for drop impact test for sample pickup by the Field Representative.
- E - Represents 10 component cells required for the projectile test for sample pickup by the Field Representative.



## SECTION GENERAL

## PRODUCT COVERED:

COMPONENT BATTERIES, HOUSEHOLD AND COMMERCIAL

## MARKING:

The Recognized Company, trade name, trademark or other descriptive marking, catalog or model number, electrical rating, date code.

Additional marking requirements are outlined in the individual sections describing the batteries/packs.

## DATE OF MANUFACTURE MARKING

The batteries/packs shall be marked with the manufacturer's date of manufacture, which may be abbreviated; or may be in a nationally accepted conventional code; or in a code that does not repeat in less than 10 years.

The manufacturer's date code is contained in a traceable code, as follows:  
MMYY

MM Represents the month in which the product is manufactured

YY: Represents the year in which the product is manufactured.

File MH48245  
Project 11CA02193

January 19, 2011

REPORT

On

COMPONENT - Batteries, Household and Commercial

GLOBTEK (HONG KONG) LTD  
KOWLOON, HONG KONG

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## DESCRIPTION

## PRODUCT COVERED:

USR - Lithium ion Battery, Model GS-1907.

## ELECTRICAL RATING:

Model	Voltage (Nominal), Vdc	Capacity (Nominal), Ah/Wh
GS-1907	11.1	2.6 Ah/ 28.86 Wh
Note: The packs have been tested based upon their electrical ratings but no capacity performance testing has been conducted. In addition, no testing with a host product including a charger has been conducted.		

## CELL CHEMISTRY AND CONFIGURATION:

Pack Model	Cell Model	Cell Chemistry and Type#	Number of Cells	Configuration*: X-S/Y-P
GS-1907	ICR18650-26F	Lithium ion cylindrical	3	3-S/1-P
* - X = No. of cells in series; Y = Number of parallel strings # - e.g. lithium ion cylindrical, lithium ion prismatic, lithium ion polymer (soft pouch), Ni-Cad prismatic, etc.				

## MANUFACTURER'S RECOMMENDED CHARGING PARAMETERS:

Model	Standard Charging Current, A	Standard Charging Voltage, Vdc	Maximum Charging Current, A	Maximum Charging Voltage, Vdc
GS-1907	0.52	12.6	0.52	12.6

## TECHNICAL CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

Products indicated as USR have been investigated using requirements contained in the Second Edition of UL 2054, Standard for Household and Commercial Batteries, issue dated October 29, 2004 and contains revisions through and including November 11, 2009.

Condition of Acceptability - When installed in the end product, consideration shall be given to the following:

1. These battery packs have been evaluated based upon manufacturers specifications for charging, discharging and temperature limits. They have not been evaluated in combination with charger(s) or host product(s). Additional evaluation to determine that the compatibility of the host with the battery pack and the charger with the battery pack will be needed to ensure that the battery pack is not used outside of its rated limits.
2. The battery pack was subjected to the Abnormal Charging test of UL 2054 which is a high rate charging test for 7 hours minimum based upon the parameters noted in the table below, with acceptable results. The end product evaluation shall determine that the maximum current and the maximum voltage limit noted below are not exceeded under any single fault conditions of the charging circuit.

Abnormal Charging Test Values		
Battery Pack Model	Maximum Abnormal Charging Current, A	Maximum Abnormal Charging Voltage Limit, V
GS-1907	15.6	12.6

The battery pack was also subjected to the Abusive Overcharge test of UL 2054 with acceptable results. The abusive overcharge test consisted of charging the pack at a constant current charge rate until ultimate results, based upon the parameters noted in the table below.

Abusive Overcharge Test Values		
Battery Pack Model	10 x C5 constant current (CC) charge rate, A	5 x C5 constant current charge rate, A
GS-1907	5.2	2.6

The need to conduct additional abnormal/abusive charge testing in the end use application shall be determined.

3. The battery pack has been subjected to a short circuit test at both ambient ( $20 \pm 5^{\circ}\text{C}$ ) and  $55 \pm 2^{\circ}\text{C}$ , with a resistance load in the range of  $80 \pm 20 \text{ m}\Omega$ . The need to conduct additional abnormal discharge testing shall be determined in the end use application.

4. The output of the battery pack has been determined to be a non-limited power source in accordance with the Second Edition of UL 2054. For non-limited power sources, the need for additional protective circuitry and an appropriate fire enclosure for the end product, which is supplied by the battery pack, shall be determined in the end product evaluation.
5. The battery packs have been subjected to temperature testing under maximum load charging and discharging conditions and for use in a maximum ambient as noted below. If used in an ambient in excess of the maximum values noted, additional evaluation may be necessary.

Model	Ambient Use Temperatures, C
GS-1907	0~45 °C for charge, -10~50 °C for discharge

6. A temperature test with the battery pack in the end use installation shall be conducted under both maximum charging and discharging conditions. During the temperature test, the following temperature limits on temperature sensitive components shall not be exceeded:

Component	Model No.	Temperature Limits, °C
Cell (measured on Casing)	ICR18650-26F	100
PWB	--	105

7. The battery pack does not employ a protective a mechanical enclosure in accordance with the enclosure requirements of UL 2054. A mechanical enclosure to protect cells and internal circuitry and prevent user access under all conditions of use shall be provided in the end use application.

The battery pack does not employ a fire enclosure with V-1 flammability  
The suitability of the battery pack enclosure's flammability shall be determined in end product evaluation.

8. The end use application shall consider the need for the following markings and instructions or equivalent for the safe use of the battery pack:

Marking:

"Replace battery with (battery Recognized Company or end product manufacturer's name, part number) only. Use of another battery may present a risk of fire or explosion."

or "See Operating or maintenance Instructions for type of battery to be used" or equivalent with instructions for replacement of the correct battery pack provided.

or A symbol indicating the need to refer to the instruction manual may be used instead of the text noted above.

Instructions:

- a. A warning notice with the following or equivalent:

"Caution - The battery used in this device may present a risk of fire or chemical burn if mistreated. Do not disassemble, heat above (manufacturer's maximum temperature limit), or incinerate. Replace battery with (battery manufacturer's name or end product manufacturer's name and part number) only. Use of another battery may present a risk of fire or explosion."

- b. Complete instructions as to how to replace the battery including the following or equivalent statement:

"Dispose of used battery promptly. Keep away from children. Do not disassemble and do not dispose of in fire."

## MARKINGS/INSTRUCTIONS:

All markings shall be legible and permanent such as ink stamped, etched, adhesive labels, etc. All adhesive labels shall be R/C (PGDQ2) component marking and labeling systems or printed on R/C (PGJI2) Component Printing Materials.

Nameplate Marking - The Recognized Company, trade name, trademark or other descriptive marking, catalog or model number, electrical rating including Voltage(Vdc) and Capacity(Ah), and UL Recognition Marking.

Date of Manufacturer Marking - See Section General for information on date of manufacturer marking.

Factory Location Marking - See Section General for manufacturing location marking.

Cautionary Markings/Instructions - Each 1) battery pack; or 2) the smallest unit package, must be marked with; or 3) instructions provided with each battery, must include the following statements or equivalent:

- a. An attention word such as "CAUTION", "WARNING", or "DANGER", and a brief description of possible hazards associated with mishandling of the battery pack such as burn hazard, fire hazard, explosion hazard, and
- b. A list of actions to take to avoid possible hazards, such as do not crush, disassemble, dispose of in fire, or similar actions.
- c. Instructions regarding replacement batteries.

A lithium ion battery pack shall be marked with the following or equivalent: "CAUTION: Risk of Fire and Burns. Do Not Open, Crush, Heat Above (manufacturer's specified maximum temperature) or Incinerate. Follow Manufacturer's Instructions." This wording or equivalent shall also be included in the instructions packaged with the battery pack.

Charging Marking/Instructions - Recommended charging information is also provided on the product, its smallest packaging unit, or the instructions provided with each battery pack.

The charging limits as outlined in the Manufacturer's Recommended Charging Parameters Table above are provided as part of these instructions.

The manufacturers recommended charger (whose output has been determined to not exceed the values outlined in the Manufacturer's Recommended Charging Parameters Table above) is included as part of these instructions.

Lithium ion Battery, Model GS-1907, Fig. 1 to Fig.5.

1. Cell(s) - See tables and information below:

Battery Pack Model	Cell Manufacturer	Cell Model	R/C Cells, Y or N*	File Reference	
				File No.	Report Date
GS-1907	SAMSUNG SDI CO LTD	ICR18650-26F	Y	MH21015	2000-06-20
Note: See Cell Chemistry and Configuration Table at beginning of report for information on type of cells, number of cells and their configuration in the battery pack circuit.					

Connections to cell terminals are constructed as noted below:

Pack Model No.	Description	Ills. No. or description
GS-1907	Cell To Cell: Resistance Welding Cell to PCM: Soldering	Fig. 4

The battery pack is wrapped by the R/C (QMFZ2) material, rated minimum 80 degree C, HF-2 or V-2.

2. Protective Circuitry - Consists of the following Components:

Battery Pack Model No.	Type of Protective Component	Location of Component Within Pack	Component Manufacturer	Component Part No.	Component Ratings
GS-1907	MOSFET	G1, G2 on PWB	VISHAY	SI4435	--
	Control IC	U4	Seiko Instruments Inc.	S-8254	--
	Control IC	U3	Texas Instruments Inc.	TL494C	
	MOSFET	Q1	Texas Instruments Inc.	LM358	

See the following illustrations for details of protective circuitry:

Battery Pack Model Number	Illustration Number
GS-1907	ILL. 1 for PCB Layout



3. External Connector - Constructed as noted below:  
Polymer material employed on connector is with minimum flammability Class V-2, or R/C (ECBT2).
4. Insulation tape / foam - Insulation to prevent shorting of connections, between cells, and other parts within the battery pack are provided by the following:

Battery Pack Model Number	R/C Insulating Sheet Manufacturer	Insulation tape / foam	Illustration No.
GS-1907	Various	Various, R/C (OANZ2) marked "flame retardant" or evaluated for flammability Class V-2	Fig. 3, Fig4

5. Printed Wiring Board - R/C (ZPMV2), V-0, 105C, by various manufacturers of equivalent recognized component
6. Internal Wiring & Output wiring - R/C (AVLV2), rated min 22 AWG, 300V, 80 °C.



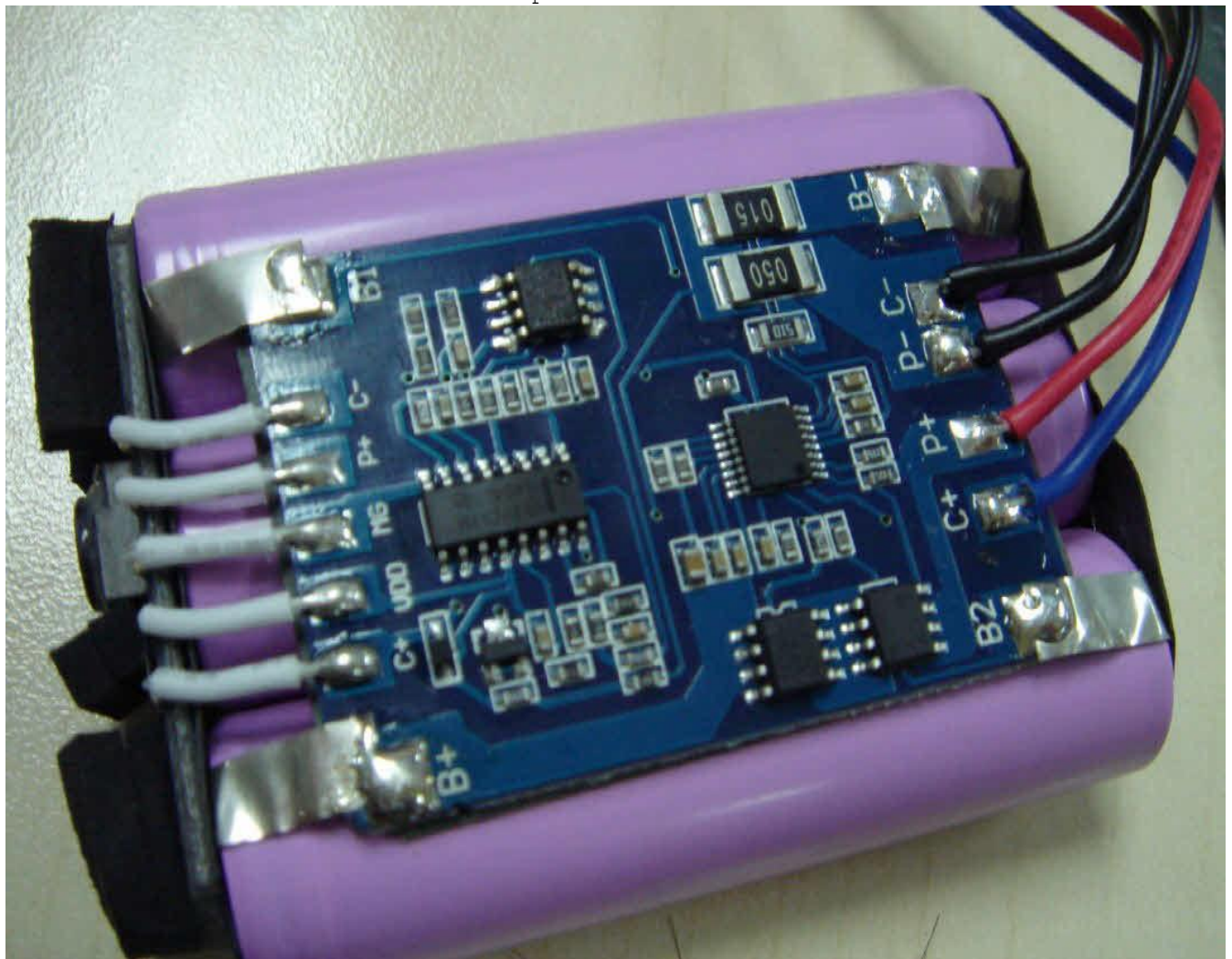
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N110733144

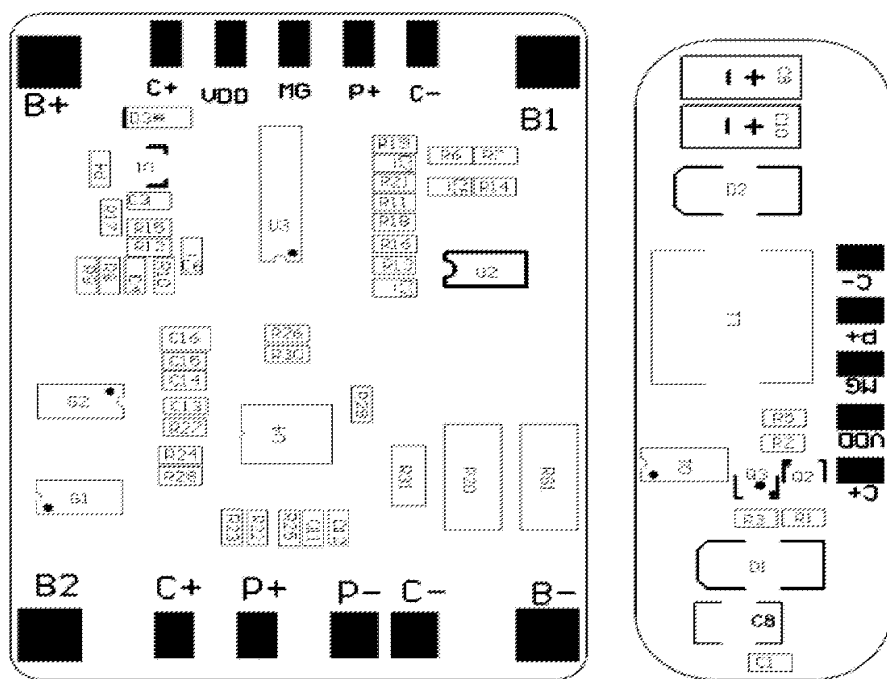


N110733145





N110733146



TEST RECORD NO. 1

## SAMPLES:

A sample of Model GS-1907 as indicated below and constructed as described herein, was submitted by the manufacturer for examination and test.

Model No.	Nominal Voltage, V dc	Capacity, mAh/Wh	Maximum Charging Voltage, V <sub>c</sub>	Maximum Charging Current, (I <sub>c</sub> ), mA	Discharge cutoff voltage, V	Maximum Discharging Current, (I), mA	Cell Configuration	Cell Mfg.	Cell Model Number
GS-1907	11.1	2600 mAh	12.6	1000	9.0	1300	3S/1P	SAMSUNG SDI CO LTD (MH21015)	ICR18650-26F

## GENERAL:

Test results relate only to the items tested.

The following tests were conducted.

Test Conducted	UL 2054 Section Reference	Compliant Results? Y, N, or N/A	Comments
Short Circuit, Room	9	Y	Comply
Short Circuit, 55 degree C	9	Y	Comply
Abnormal Charging	10	Y	Comply
Abusive Overcharge	11	Y	Comply
Forced Discharge	12	Y	Comply
Limited Power Source	13	N	Non-Comply, CoA added in description
Battery Pack Component Temp Test	13A	Y	Comply



Unless otherwise stated, the tests were conducted in accordance with the Standard for Household and Commercial Batteries, UL 2054, Second Edition, including revisions through revision date, November 11, 2009.

The test methods and results of the above tests, have been reviewed and found in accordance with the requirements in the Standard for Household and Commercial Batteries, UL 2054, Second Edition. Including revisions through revision date November 11, 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 U.S. Standard for Safety of Household and commercial Batteries, UL 2054 Second Edition, including revisions through revision date November 11, 2009, and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

## CONCLUSION

A sample of the component covered by this Report has been found to comply with the requirements covering the category and the components are found to comply with UL's applicable requirements covering the category for factory installed components for this Applicant's Listed, Classified or Recognized basic equipment. 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 specific identification marking described in the Follow-Up Service Procedure on such products which comply with said Procedure and any other applicable requirements of Underwriters Laboratories Inc. The specified marking on the product or on the smallest unit container in which the product is packaged, is the only method to identify products investigated by UL to published requirements.

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. Any information and documentation involving UL Mark services are provided on behalf of Underwriters Laboratories Inc. (UL) or any authorized licensee of UL.

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