





Test Report issued under the responsibility of:



<b>TEST REPORT</b> <b>IEC 62133, Second Edition</b> <b>Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications</b>	
<b>Report Number</b> .....	BA-4786340737-A-1 Am2
<b>Date of issue</b> .....	2015-12-28
<b>Total number of pages</b> .....	12
<b>Applicant's name</b> .....	E-ONE MOLI ENERGY CORP
<b>Address</b> .....	10 DALI 2ND RD, SHANHUA DISTRICT, TAINAN, 74144 TAIWAN
<b>Test specification:</b>	
<b>Standard</b> .....	IEC 62133: 2012 (Second Edition)
<b>Test procedure</b> .....	CB Scheme
<b>Non-standard test method</b> .....	N/A
<b>Test Report Form No.</b> .....	IEC62133B
<b>Test Report Form(s) Originator</b> .....	UL(Demko)
<b>Master TRF</b> .....	Dated 2013-03
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<b>Test item description</b> .....	Rechargeable Li-ion Battery
<b>Trade Mark</b> .....	MOLICEL
<b>Manufacturer</b> .....	E-ONE MOLI ENERGY CORP No.10, Dali 2nd Rd., Shanhua Dist., Tainan City 74144, Taiwan
<b>Model/Type reference</b> .....	ME202EK, 3ICR19/66-3
<b>Ratings</b> .....	11.1V dc, 7.8Ah/86.58Wh

<b>Testing procedure and testing location:</b>		
<input checked="" type="checkbox"/>	<b>CB Testing Laboratory:</b>	
<b>Testing location/ address .....</b> :		Underwriters Laboratories Taiwan Co., Ltd. 260 Da-Yeh Road, 112 Peitou Taipei City, Chinese Taipei
<input type="checkbox"/>	<b>Associated CB Testing Laboratory:</b>	
<b>Testing location/ address .....</b> :		
<b>Tested by (name + signature) .....</b> :		Eric Hsu 
<b>Approved by (name + signature) .....</b> :		Joy Shen 
<input type="checkbox"/>	<b>Testing procedure: TMP</b>	
<b>Testing location/ address .....</b> :		
<b>Tested by (name + signature) .....</b> :		
<b>Approved by (name + signature) .....</b> :		
<input type="checkbox"/>	<b>Testing procedure: WMT</b>	
<b>Testing location/ address .....</b> :		
<b>Tested by (name + signature) .....</b> :		
<b>Witnessed by (name + signature) .....</b> :		
<b>Approved by (name + signature) .....</b> :		
<input type="checkbox"/>	<b>Testing procedure: SMT</b>	
<b>Testing location/ address .....</b> :		
<b>Tested by (name + signature) .....</b> :		
<b>Approved by (name + signature) .....</b> :		
<b>Supervised by (name + signature) ..</b> :		

<p><b>List of Attachments (including a total number of pages in each attachment):</b>  National Differences ( 0 pages)  Enclosures (0 pages)</p>	
<p><b>Summary of testing:</b></p>	
<p><b>Tests performed (name of test and test clause):</b>  For Rechargeable Li-ion Battery, Model ME202EK, 3ICR19/66-3 by E-One Moli Energy Corp.:</p> <p>8.1.2 – Charge (procedure 2)  8.3.2 – External short circuit  8.3.6 – Overcharge</p> <p>Model ME202EK employing the alternate MOSFET type: AP9420GM and IRF8788PbF.</p> <p>Only limited tests were performed on Model ME202EK employing the alternate MOSFET type: AP9420GM and IRF8788PbF due to testing previously performed on the subject unit.</p> <p>The Thermal-link was be passed during test.</p>	<p><b>Testing location:</b>  Underwriters Laboratories Taiwan Co., Ltd.  260 Da-Yeh Road, 112 Peitou Taipei City, Chinese Taipei</p>
<p><b>Summary of compliance with National Differences</b>  <b>List of countries addressed:</b>  No difference for EN 62133: 2013.</p> <p><input checked="" type="checkbox"/> <b>The product fulfils the requirements of IEC 62133:2012</b></p>	

Copy of marking plate

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



<b>Test item particulars.....:</b>	
<b>Classification of installation and use.....:</b>	N/A
<b>Supply connection.....:</b>	N/A
<b>Recommend charging method declared by the manufacturer.....:</b>	CC / CV
<b>Discharge current (0,2 I<sub>l</sub>, A) .....</b>	1560 mA
<b>Specified final voltage .....</b>	9.0 Vdc
<b>Chemistry .....</b>	<input type="checkbox"/> nickel systems ..... <input checked="" type="checkbox"/> lithium systems
<b>Recommend of charging limit for lithium system</b>	
<b>Upper limit charging voltage per cell.....:</b>	4.2 V for cell, 12.6 V for pack.
<b>Maximum charging current .....</b>	4000 mA
<b>Charging temperature upper limit .....</b>	50°C
<b>Charging temperature lower limit.....:</b>	1°C
<b>Polymer cell electrolyte type .....</b>	<input type="checkbox"/> gel polymer ..... <input type="checkbox"/> solid polymer
<b>Possible test case verdicts:</b>	
<b>- test case does not apply to the test object.....:</b>	N/A
<b>- test object does meet the requirement.....:</b>	P (Pass)
<b>- test object does not meet the requirement.....:</b>	F (Fail)
<b>Testing.....:</b>	
<b>Date of receipt of test item .....</b>	2015-10-27
<b>Date (s) of performance of tests .....</b>	2015-11-04 to 2015-11-11
<b>General remarks:</b>	
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. "(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.	
<b>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</b>	

**Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:**

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided .....

- Yes  
 Not applicable

**When differences exist; they shall be identified in the General product information section.**

**Name and address of factory (ies)..... :** E-ONE MOLI ENERGY CORP  
 No.10, Dali 2nd Rd., Shanhua Dist., Tainan City  
 74144, Taiwan

**General product information:****Product Description:**

- Electronic components mounted on PWB, 3S/3P cells, plastic enclosure, and secured together by snap-fit and solvent.
- Model 3ICR19/66-3 is the marking of IEC 62133 requirement for the model, ME202EK.
- The battery pack is also investigated to EN 62133:2013.

**Report Summary:**

- This test Report should be read in conjunction with the original report No.:  
 BA-4786340737-A-1, issued 2014-04-25, with CB Certificate No. (DK-38422-UL) issued 2014-04-25.  
 BA-4786340737-A-1 Amendment 1, issued 2015-02-10, with CB Certificate No. (DK-38422-A1-UL) issued 2015-02-16.  
 BA-4786340737-A-1 Correction 1, issued 2015-05-21, with CB Certificate No. (DK-38422-M1-UL) issued 2015-05-22.

-This Test Report were deemed to amend, due to:

1. Employing the alternate MOSFET type: AP9420GM by Advanced Power and IFR8788PbF by International Rectifier Corporation;
2. Delete Thermal-links;
3. Correct Applicant Address to: 10 DALI 2ND RD, SHANHUA DISTRICT, TAINAN, 74144 TAIWAN;

Only the following tests were considered necessary:

- 8.3.2 – External short circuit
- 8.3.6 – Overcharge

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
<b>4</b>	<b>Parameter measurement tolerances</b>		<b>P</b>
	Parameter measurement tolerances		P
<b>8</b>	<b>Specific requirements and tests (lithium systems)</b>		<b>P</b>
8.1	Charging procedures for test purposes		P
8.1.1	First procedure: This charging procedure applied to tests other than those specified in 8.1.2		P
8.1.2	Second procedure: This charging procedure applied to the tests of 8.3.1, 8.3.2, 8.3.4, 8.3.5, and 8.3.9	For battery pack, clause 8.3.2 was considered.	P
	If a cell's specified upper and/or lower charging temperature exceeds values for the upper and/or lower limit test temperatures of Table 4, the cells were charged at the specified values plus 5 °C for the upper limit and minus 5 °C for the lower limit		P
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1) .....		P
	For a different upper limit charging voltage (i.e. other than for lithium cobalt oxide systems at 4,25 V), the applied upper limit charging voltage and upper limit charging temperatures were adjusted accordingly		P
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1) .....		P
8.3.2	External short circuit (battery)		P
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		N/A
	In case of rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reached a low end steady state condition		P
	Results: No fire. No explosion.....	(See Table 8.3.2)	P
8.3.6	Over-charging of battery		P
	Test was continued until the temperature of the outer casing: - Reached steady state conditions (less than 10°C change in 30-minute period); or		N/A
	- Returned to ambient		P

<b>IEC 62133</b>			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire. No explosion..... :	(See Table 8.3.6)	P



IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE: Critical components information					P
Object/part no.	Manufacturer/ trademark	Type/model	Technical data	Standard	Mark(s) of conformity <sup>1)</sup>
01-1. Plastic Enclosure	SABIC JAPAN L L C	BPL1000	V-0, 0.8 mm thickness, Overall 149mm by 89mm by 19.5mm.	UL 94	UL
01-2. Solvent	TAIWAN CEMEDINE CO., LTD.	G-485	--	--	--
01-2a. Solvent (Alternate)	TAIWAN CEMEDINE CO., LTD.	LN-2250	--	--	--
02-1. Plastic Label Material	SABIC INNOVATIVE PLASTICS CHINA CO, LTD	FR65	VTM-0, 0.3 mm thickness. Covered on enclosure openings.	UL 94 UL 746C	UL
02-2. Label Adhesive	3M Company	467MP	Rated 100 degree C.	--	--
03. Battery cell (9 cells provided, 3-parallel, 3-series)	E-ONE MOLI ENERGY CORP	ICR-18650K	3.7V, 2600mAh.	IEC NO.FR 650271	CB
04. PWB	Interchangeable	Interchangeable	V-1 minimum, 105 °C	UL 796	UL
05. Thermal Fuse (F1)	NEC Schott Components Corp.	D6X	Rated 12 A, 32 Vdc, 139 degree C	UL60691	UL
06. Protective IC (U1)	Texas Instruments Inc.	bq20z95	--	--	--
07. Protective IC (U2)	Seiko Instruments Inc.	S-8244AAA	--	--	--
08. MOSFET (M1, M2)	ANPEC Electronics Corp	APM4340K	VDSS: 30V ID: 17A max. RDS(on): 5m ohm max.	--	--
08a. MOSFET (M1, M2) (Alternate)	Advanced Power Electronics Corp	AP9420GM	--	--	--
08b. MOSFET (M1, M2) (Alternate)	International Rectifier Corporation	IRF8788PbF	--	--	--
09. Current Sensing Resistor (R41)	--	--	5 mohm and 2 W	--	--

IEC 62133					
Clause	Requirement + Test			Result - Remark	Verdict
10. Connectors and Receptacles (secondary SELV circuits)	Interchangeable	Metal/Plastic	Copper alloy pins housed in bodies of plastic rated V-2 min	UL 94 UL 746C	UL
10a. Connectors and Receptacles (secondary SELV circuits)	Interchangeable	Interchangeable	--	UL 498, UL 1977.	UL
11. Internal Plastic Part Materials(for parts greater than 2cm <sup>3</sup> )	Interchangeable	Interchangeable	Min. V-2	UL 94 UL 746C	UL
12. Wiring, internal secondary ELV/SELV circuits	Interchangeable	Interchangeable	Rated minimum 80 degree C, FEP, PTFE, PVC, TFE, neoprene or polyimide; or surface marked VW-1 or FT-1 or better.	UL 758	UL
<b>Supplementary information:</b> <b>None.</b>					

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

8.3.2	TABLE: External short circuit (battery)					Pass
Model	Ambient, (°C)	OCV at start of test, (Vdc)	Resistance of circuit, (mΩ)	Maximum case temperature rise ΔT, (°C)	Results	
<b>Model ME202EK with MOSFET type: AP9420GM</b>						
<b>Samples charged at charging temperature lower limit: 55°C</b>						
ME202EK	55.8	12.1255	82.5m	0.0	A, F, #	
ME202EK	55.8	12.1225	79.8m	0.0	A, F, #	
ME202EK	55.8	12.1515	80.1m	-0.1	A, F, #	
ME202EK	55.8	12.1360	82.5m	-0.2	A, F, #	
ME202EK	55.8	12.1330	84.7m	-0.3	A, F, #	
<b>Samples charged at charging temperature lower limit: -5°C</b>						
ME202EK	55.8	11.9720	80.1m	-0.4	A, F, #	
ME202EK	55.8	11.9715	81.9m	-0.4	A, F, #	
ME202EK	55.8	12.0875	80.5m	-0.4	A, F, #	
ME202EK	55.8	12.0040	85.1m	-0.7	A, F, #	
ME202EK	55.8	11.9825	79.6m	-0.8	A, F, #	
<b>Model ME202EK with MOSFET type: IRF8788PbF</b>						
<b>Samples charged at charging temperature lower limit: 55°C</b>						
ME202EK	56.3	12.1360	81.9m	-0.2	A, F, #	
ME202EK	56.3	12.1445	80.6m	-0.2	A, F, #	
ME202EK	56.3	12.1020	77.8m	-0.2	A, F, #	
ME202EK	56.3	12.1350	84.1m	-0.2	A, F, #	
ME202EK	56.3	12.1275	85.6m	-0.3	A, F, #	
<b>Samples charged at charging temperature lower limit: -5°C</b>						
ME202EK	56.3	11.8870	79.4m	0.0	A, F, #	
ME202EK	56.3	11.8605	80.9m	0.1	A, F, #	
ME202EK	56.3	11.9260	82.3m	0.2	A, F, #	
ME202EK	56.3	11.9465	84.7m	0.3	A, F, #	
ME202EK	56.3	12.0305	80.0m	0.2	A, F, #	

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

**Supplementary information:**

A – No fire or Explosion

B – Fire

C – Explosion

D – The test was completed after 24 h

E – The test was completed after the pack casing cooled to 20% of the maximum temperature rise.

F – The battery pack remain on test for an additional one hour after the current reaches a low end steady state condition.

#: The sample shut down instantly.

8.3.6	TABLE: Over-charging of battery				P
Constant charging current (A) .....		15.6 A/15A			—
Supply voltage (Vdc) .....		12.6 V			—
Model	OCV before charging, (Vdc)	Resistance of circuit, ( $\Omega$ )	Maximum outer casing temperature, ( $^{\circ}$ C)	Results	
<b>Model ME202EK with MOSFET type: AP9420GM</b>					
ME202EK	9.2800	-	26.7	A	
ME202EK	9.2885	-	28.2	A	
ME202EK	9.3395	-	27.1	A	
ME202EK	9.3185	-	29.1	A	
ME202EK	9.3260	-	26.6	A	
<b>Model ME202EK with MOSFET type: IRF8788PbF</b>					
ME202EK	9.3190	-	25.8	A	
ME202EK	9.2990	-	26.0	A	
ME202EK	9.2995	-	26.2	A	
ME202EK	9.3005	-	26.5	A	
ME202EK	9.3025	-	25.4	A	
<b>Supplementary information:</b>					
A - No fire or explosion					
B - No leakage					
C - Leakage					
D - Fire					
E - Explosion					
F - Bulge					