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Specification Approval Sheet

Name: Tenergy CR2 Lithium Manganese Dioxide Battery

Model: 30739

436 Kato Terrace, Fremont, CA 94539

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Revision Record

Version	Reviser	Revise page	Established Date	Revise reason
A0			2021.07.14	First edition
A1			2023.02.03	Revised nominal discharge current from 100Ω to 20mA; Add battery label information
A2			2023.02.23	Add Foxconn carton label
A3			2023.04.03	Add level 2 QR code
A4			2023.05.17	Update drawing and level 2 QR code
A5			2023.07.11	Update carton label design
A6			2023.09.18	Update battery label

1. Scope

The document applies to CR2(Li/MnO_2) battery supplied by Tenergy Corporation. Specify quality, test method, performance, quality assurance and matters need attention etc..

2. Nominal specification

2-1	Model	CR2
2-2	Nominal Voltage	3.0V
2-3	Nominal Capacity	850mAh（Nominal capacity is based on the standard discharge current and cut-off voltage 2.0V at 20±3℃.）
2-4	Standard Discharge Current	20mA
2-5	Max continuous Discharge Current	1.0A (Current value determined with 50% DOD, 2.0V cut-off voltage at 20±3 °C.）
2-6	Maximum Pulse Discharge Current	1.5A (Current value determined with 50% DOD, 2.0V cut-off voltage at 20±3°C when the pulse is 3 seconds on, 27 seconds off.)
2-7	Dimension	See attached drawing
2-8	Weight	Approximately 12g
2-9	Appearance	Free from flaw, stain, deformation, leakage and other defects.
2-10	Temperature	Operating: -40° C~+70° C (Note: Contact Tenergy in case continuous high- temperature over +40° C or low-temperature down to -10° C usage conditions.）
2-11	Recommendable Storage Condition	Temperature: 5° C~35°C Humidity: Less than 70%RH
2-12	Battery Composition	Lithium primary battery composed of cathode from manganese dioxide, anode from lithium, and electrolyte from organic solvent and lithium salt.

3. Battery characteristics

NO.	Item	Test Temperature	Value
3-1	Open circuit voltage	20±3℃.	3.0V~3.3V
3-2	Impedance	20±3℃.	0.1Ω~1Ω
3-3	Pulse Cycles	20±3℃	＞900cycles Pulse pattern:0.9A 3s ON 27s OFF, End Voltage:1.50V

4. Test

4.1 Test condition

The test normal condition is as follow (unless otherwise specified)

Temperature: 20±3℃, Relative Humidity：65±10%, Pressure: 1.0atm.

4.2 Test Instrument

4.2.1 Dimension measurement: Caliper with accuracy of ±0.02mm, or gauge with the same accuracy.

4.2.2 Voltmeter: The tolerance shall be ±0.01V and the input resistance rating shall be 10MΩ or more.

4.2.3 Exactitude resistance: accuracy of ±0.5%.

4.2.4 Impedance meter: accuracy of ±0.5%.

4.2.5 Constant temperature oven: accuracy of ±2℃.

4.2.6 Electronic scale: tolerance shall be ±0.01g.

4.3 Initial test

Batteries should be tested in the first 1 month after delivery

4.3.1 Outside dimensions

The gauge as specified in 4.2 is used. The result should meet the requirement of 2-7.

4.3.2 Weight

The gauge as specified in 4.2 is used. The result should meet the requirement of 2-8.

4.3.3 Open circuit voltage

Batteries should be stored for 12 hours at the normal conditions. Then at the same circumstance use voltmeter, specified in 4.2 to measure voltage between "+" and"-". Results should meet the requirement of 3-1.

4.3.4 Impedance

Batteries should be stored for 12 hours at the normal conditions. Then at the same circumstance, use impedance meter, specified in 4.2 to measure impedance between "+" and"-". Result should meet the requirement of 3-2.

4.3.5 Temperature cycling test

The batteries are to be placed in a test chamber and subjected to the following cycles: raising the chamber temperature to 70±3℃ within 30min and maintaining for 4h, then reducing the chamber temperature to 20±3℃ and maintaining for 2h, then reducing to -40±3℃ and keep it for 4h, at last, raising to 20±3℃ with 30min. Repeat the sequence for a further 9 cycles. Then check appearance at normal condition with naked eyes. Batteries should be of no leakage.

4.3.6 Vibration Test

This test shall be carried out by the following condition according to UN Manual of test and Criteria, Part Ⅲ, sub-section 38.3.4.5. Amplitude: 0.8mm; Frequency: 7 Hz to 200 Hz; Duration: 15 minutes; Directions: X Y Z; Duration: 15 minutes, 12 times (each direction).

4.3.7 Appearance

Deformation or tarnish shall be visually checked. The result should meet the requirement of 2-9.

5. Security

Through America UL1642 security certification testing, certification number is MH48285

6. Incoming inspection

Before shipping, Tenergy will 100% check open circuit voltage of the battery (OCV) and the load voltage. Also Tenergy will sampling tests the battery capacity, visual appearance and size.

As for the customer's incoming inspection, Tenergy recommended sampling according to GB2828.1-2003, GB2829-2002 standard.

Table 1 Acceptability quality level

No	Item	Technical request	Check level	AQL
1	Dimension	2-7	S-2	0.65
2	Appearance	2-9	II	1.0
3	Open circuit voltage	3-1	II	0.4

Table 2 Sampling amount

Lot size	Sampling amount
≤3200	32
3200~10 000	50
＞10 000	80

7. Package

The batteries are packed as the agreement of the customer and supplier. The box should have the eligible identifiers and QC PASS mark.

8. Transportation

The battery out of factory is full of electric power, so avoid fierce shake, strike and squeeze. Avoid the direct sunshine and raining.

9. Warnings and Cautions

Lithium batteries contain volatile materials such as lithium, organic solvents and other chemical ingredients. Incorrect handling of lithium batteries may result in heat generation, fire or explosion, with the risk of personal injury or damage. To prevent accidents when handling batteries, be sure to follow the following precautions.

- Do not short circuit, charge or make the anode and the cathode reversed.
- Do not force-discharge, squeeze, puncture or burn the battery

- Do not dissemble the battery
- The battery should be taken off from instrument when it is consumed to cut-off voltage, and dispose according to local laws, or hand it to professional recycle institution.
- Do not mix different types of batteries.
- Do not expose the battery in the environment of over 100℃.
- Do not solder directly onto battery, please use wire or nickel sheet by spot welding.
- Store the battery by original pack to avoid any possibility of external short circuit.
- Don't store the battery in ESD bag and foam.
- Don't store battery in electric metal surface.
- Do not stack or jumble batteries.
- Don't pack battery connected with any kinds of lead random in paper box or pack belt.
- Batteries shall be far away from children, and take measures to prevent the swallow as much as possible

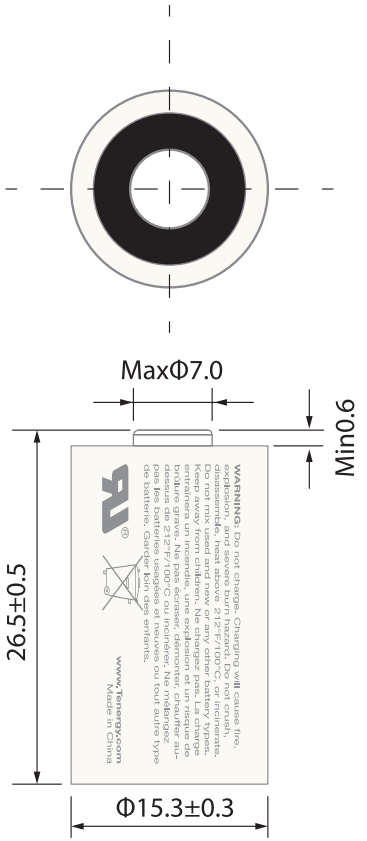
10. Modification of this specification

Modification must be carried out after the prior mutual agreement. All accident or issues caused by any events that are neither defined nor described in this specification, mutual discussion shall take place for the resolution.

11. Remark of production duty

Customers must strictly operate according to specification and advises of Tenergy Corporation. Operation at temperature different from ambient may lead to reduced capacity and lower voltage reading at the beginning of pulses. Tenergy will be exemption from liability if the batteries are improper used or abused and then cause fire, explosion, the human body or property damage.

Undeclared tolerance		sign	Date	Description of changes	to bear
Basic dimensions	Tolerance range				
0.0-5.0	±0.05	*1			
5.0-10.0	±0.08	*2			
＞10.0	±0.13	*3			
		*4			







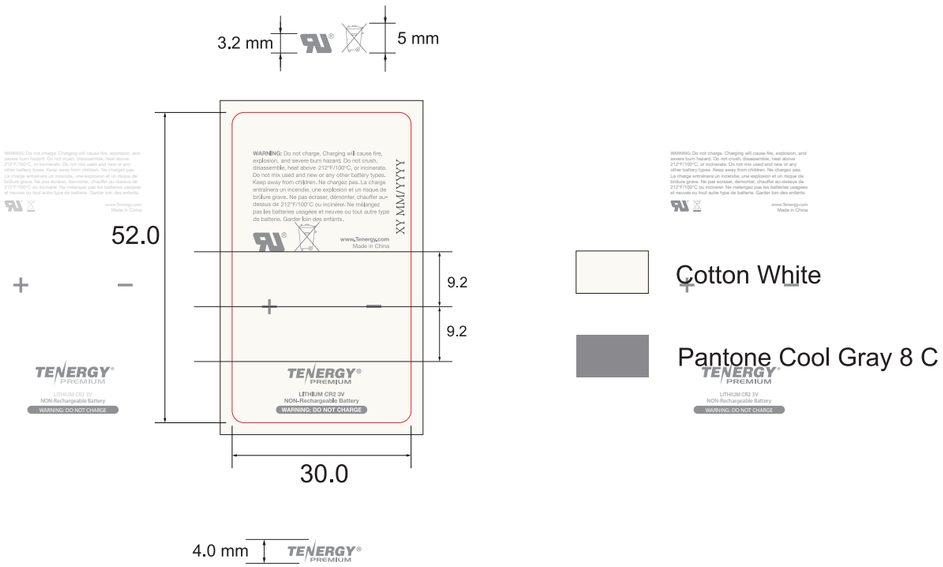
1	Cell	CR2	1	TEN商标
NO.	MATERIAL	SPECIFICATION	QTY	MARK

Technical requirements:
1.Inspection standard for finished product delivery:
(1)23±3°C,Open circuit voltage:3.15-3.33V.
(2)23±3°C,internal resistance:100-800mΩ.
2.The battery shall be clean and tidy without leakage, damage or dirt. The heat shrink sleeve is flat and smooth.
3.Packaging method
Blister tray (50pcs/tray), outer box (900pcs/box)
4.Tenergy P/N: 30739

TENERGY®

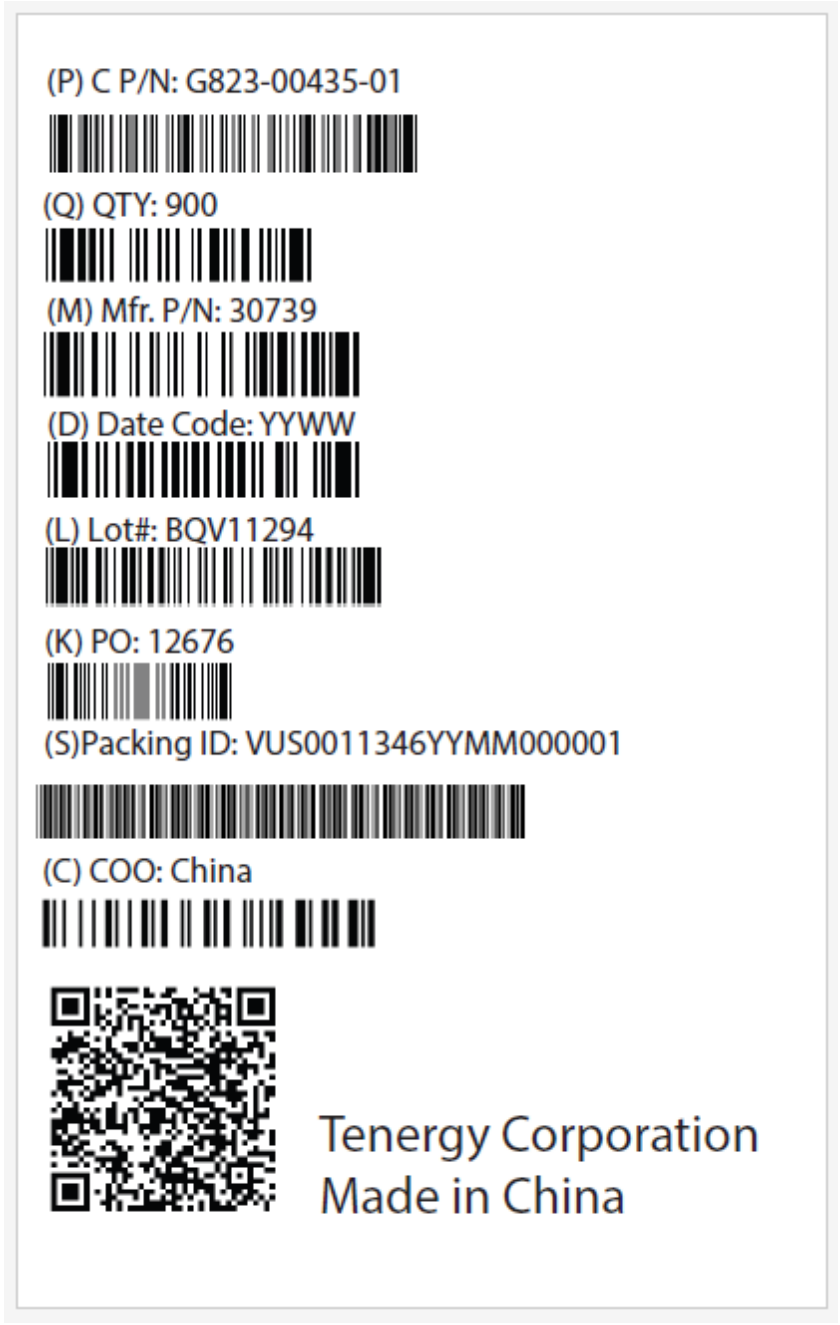
Design	Kang changzhou	workmanship		Machine model	N0948K			Part Name		finished product	
drafting		quality		Drawing No	FAT/JF-BZCR-08948K			Item No	91027048		
to examine		approval		Material Science				edition	A/0	View direction	
Standardization		Issue Date	2023-04-14	Stage marker	F	C	Z	D	S		
				Date						Company	
				Page 1 of 1		weight		proportion		Size	A4

Battery label



Finish: glossy
Date code: X=Manufacture code (Huizhou: H; Wuhan: E)
Y=Version of datasheet (for example, for A6 verion, Y=6)
MM=Month
YYYY=Year

Carton label



Level 2 QR code



VUS
G8230043501
A6
YMD
XXSSSSS
G8230043501

Y = YEAR (Year where parts are produced at part vendor. 1 character, numeric. Last digit of the year)
M = MONTH (Month where parts are produced at part vendor. 1 character, alphanumeric. 1 - 9 for JAN - SEPT, A= OCT, B = NOV, C= DEC)
D = DAY (Date where parts are produced at part vendor. 1 character alphanumeric. 1 - 9 for 1st - 9th, A = 10th, B = 11th, ...X = 31st. Skip letter "I" and letter "O")
MM = TOOLING/CAVITY NUMBER (2 characters, alphanumeric), MOULD/STAMP NUMBER (2 characters, alphanumeric). Replace MM with XX when the 2 characters are not in use.
SSSSS = SERIAL NUMBER (5 characters, hexadecimal) (for example 00001, 00002, 00003.....)