

Messrs.:

Specification No. KU*****

Product Specification

Issued Date : Jan. 2019

Part Description : Cylindrical Lithium-ion Battery US26650FTC1A

Customer Part No. :

MURATA Part No. : US26650FTC1A

Acknowledgement of receipt We have accepted and received the attached specification Date: Company: Dept.: _____ _____	
Representative _____ (Signature) (Type)	Received by _____ (Signature) (Type)

Person responsible

Technical Dept.

Prepared by

_____ (Signature)
 (Type)
 Product Engineering Sect.
 Product Dept.2, Energy Device Div.
 Tohoku Murata Manufacturing Co., Ltd
 _____ (Company name/Dept.)
 (Type)

_____ (Signature)
 (Type)

Representative

_____ (Signature)
 (Type)
 Product Design Sect.5
 Product Dept.2, Energy Device Div.
 Tohoku Murata Manufacturing Co., Ltd
 _____ (Company name/Dept.)
 (Type)

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Lithium-Ion Battery Specifications

1 General

1.1 Scope

This product specification is applied to “Lithium-Ion Rechargeable Batteries” used for “xxxxxxxxxx”.

Please contact us when using this product for any other applications than described in the above.

1.2 Product Category

Lithium-Ion Rechargeable Battery

1.3 Cell Type

US26650FTC1A

1.4 Cell Designation based on IEC61960

IFR27/66

1.5 Acquired Safety Standard (Registration name : US26650FT)

UL1642 : File No.MH12566

IEC 62133 2nd Edition

IEC 62133-2 1st Edition

Taiwan Commodity Inspection Act (CNS 15364)

Indian Compulsory Registration Order, IS 16046:2015

1.6 Applicable Safety Standard

United Nations, Recommendations on the Transport of Dangerous Goods (UN38.3)

Japan, Electrical Appliance and Material Safety Law

Reference

In case of the energy density is more than 400Wh/l (see 3.4 Energy Density), it is possibility to be subject to regulation by object country. It is recommend to confirm the contents of regulation.

As of April 2018 Japan, Electrical Appliance and Material Safety Law

“<http://www.meti.go.jp/policy/consumer/seian/denan/index.htm>” (Japanese)

“<http://www.meti.go.jp/english/policy/economy/consumer/pse/index.html>” (English)

2 Cell Rating

Item	Rating	Note
2.1 Rated Capacity	2850mAh	Discharge at 0.2ItA, 2.0V cut-off 23±2deg.C, after Standard Charging.
2.2 Maximum Charging Voltage	3.65V	
2.3 Discharging Cut-off Voltage	2.0V	Recommended Voltage
	2.0V	Lower limited Voltage
2.4 Continuous Maximum Charging Current	2.85A	
2.5 Continuous Maximum Discharging Current	25.0A	
2.6 Allowable Environment Temperature	Charging	0~+60deg.C
	Discharging	-20~+60deg.C
2.7 Weight	84.0 ±3.0g	With tube

※ Cell condition at shipment SOC (State Of Charge) not exceed 30% of rated capacity.

※ In the case of air transportation, it corresponds to dangerous goods according to IATA's Dangerous Goods Regulations. Depending on the rated value of the products (pack) set by the customer, there would be possibility to interfere with the Air Transport Prohibited items in case of SOC ≥ 30%.

2.8 Cell Temperature Specification

2.8.1 Charging Conditions				
Temperature Range / Cell Surface Temperature Range			Upper Limited Charging Voltage	Maximum Charging Current
1	Low Charging Temperature Range	$0\text{deg.C} \leq T < 10\text{deg.C}$	3.65V	2.85A
2	Standard Charging Temperature Range	$10\text{deg.C} \leq T \leq 45\text{deg.C}$	3.65V	2.85A
3	High Charging Temperature Range	$45\text{deg.C} < T \leq 60\text{deg.C}$	3.65V	2.85A

2.8.2 Charging Conditions Recommendation					
Temperature Range / Cell Surface Temperature Range			Upper Limited Charging Voltage	Maximum Charging Current	
1	Low Charging Temperature Range	$0\text{deg.C} \leq T < 10\text{deg.C}$	A	3.60V	1.71A
			B	3.50V	0.855A
2	Standard Charging Temperature Range	$10\text{deg.C} \leq T \leq 45\text{deg.C}$	3.60V	2.85A	
3	High Charging Temperature Range	$45\text{deg.C} < T \leq 60\text{deg.C}$	3.60V	2.85A	

At Low Temperature range, condition A and B are both available. Recommended condition is B.

2.8.3 Discharging Conditions	
Discharge at cell surface temperature below 80deg.C.	

3 Cell Nominal Value

Item	Nominal	Note
3.1 Nominal Capacity	3000mAh	Discharge at 0.2ItA, 2.0V cut-off after Standard Charging.
3.2 Nominal Voltage	3.2V	
3.3 Charging Voltage	3.60V	
3.4 Energy Density	257Wh/l	

4 Performance

4.1 Standard Test Conditions

Test condition shall be at $23 \pm 2\text{deg.C}$ and $(65 \pm 20)\%$ RH However, temperature range of $15 \sim 30\text{deg.C}$, humidity $25\% \sim 85\%$ is acceptable as far as the test reliability is assured.

4.2 Testing Instrument or Apparatus

4.2.1 Dimension Measuring Instrument

The dimension measurement shall be implemented by instruments with equal or more precision scale of 0.01mm specified by JIS B 7502(outside micrometer) or JIS B 7503(dial gauge).

4.2.2 Voltmeter and Ammeter

Voltmeters and ammeters shall be equal or more precision instruments specified by JIS C 1102 (Indication Electric Instrument Level 0.5).

4.3 Standard Charging definition

Charge at a constant voltage of 3.60V and a constant current of 2.85A for 2.5 hours in $23 \pm 2\text{deg.C}$ atmosphere.

4.4 Standard Discharging definition

Discharge at a constant current of 2.85A down to 2.0V in $23 \pm 2\text{deg.C}$ atmosphere.

4.5 Electrical Performance

Item	Condition	Specification										
4.5.1 Open-Circuit Voltage	Shipping condition Measuring condition Temperature : 27 ±3deg.C Accuracy : Within ±1mV	3.200~3.255V										
4.5.2 AC Impedance	After Standard Charging within 3 days.(1kHz)	9mΩ~15mΩ										
	Shipping Condition.(1kHz)	9mΩ~15mΩ										
4.5.3 Capacity	1 After Standard Charging. Discharge at 0.2ItA(570mA), Cut-off Voltage 2.0V.	2850mAh or more										
	2 After Standard Charging, Standard Discharging.	2800mAh or more										
	3 After Standard Charging. Discharge at 5A(5000mA), Cut-off Voltage 2.0V.	2740mAh or more										
	4 After Standard Charging. Discharge at 10A(10000mA), Cut-off Voltage 2.0V.	2740mAh or more										
4.5.4 Charge/Discharge Cycle	Charge at 3.6V, 2.85A, Cut-off current 100mA ↔Standard Discharging After 1000cycles.	2660mAh or more										
4.5.5 Storage Characteristic	After Standard Charging, Stored at 23deg.C for 28 days. Discharge at 2.85A, 2.0V Cut-off as Remaining Capacity.	2720mAh or more										
	After above Measurement, Discharge at 2.85A, 2.0V Cut-off after Standard Charging. Take this value as Recovery Capacity.	2750mAh or more										
	After Standard Charging, Stored at 45deg.C for 28 days. Discharge at 2.85A, 2.0V Cut-off as Remaining Capacity.	2690mAh or more										
	After above Measurement, Discharge at 2.85A, 2.0V Cut-off after Standard Charging. Take this value as Recovery Capacity.	2720mAh or more										
4.5.6 Long term Storage Characteristic	After Standard Charging, Stored at 23deg.C for 365days. Discharge at 2.85A, 2.0V Cut-off after Standard Charging. Take this value as Recovery Capacity.	2610mAh or more										
4.5.7 Shipping state Storage Characteristic	After store shipping state sample under the following table conditions, Standard Discharge. And then Discharge at 0.2ItA, 2.0V cut-off, 23±2deg.C, after Standard Charging. Take this value as Recovery Capacity.	2280mAh or more										
<table border="1"> <thead> <tr> <th>Storage Period</th> <th>Storage Temperature</th> </tr> </thead> <tbody> <tr> <td>365days</td> <td>-20deg.C ≤ T ≤ 25deg.C</td> </tr> <tr> <td>90days</td> <td>-20deg.C ≤ T ≤ 45deg.C</td> </tr> <tr> <td>28days</td> <td>-20deg.C ≤ T ≤ 60deg.C</td> </tr> </tbody> </table> <p>T: ambient temperature</p>		Storage Period	Storage Temperature	365days	-20deg.C ≤ T ≤ 25deg.C	90days	-20deg.C ≤ T ≤ 45deg.C	28days	-20deg.C ≤ T ≤ 60deg.C			
Storage Period	Storage Temperature											
365days	-20deg.C ≤ T ≤ 25deg.C											
90days	-20deg.C ≤ T ≤ 45deg.C											
28days	-20deg.C ≤ T ≤ 60deg.C											
4.5.8 Discharging Temperature Characteristic	Discharge at 2.85A, 2.0V Cut-off below Temperature after Standard Charging.	Refer to the left table										
<table border="1"> <thead> <tr> <th>Discharging Temperature</th> <th>Capacity</th> </tr> </thead> <tbody> <tr> <td>-10deg.C</td> <td>1960mAh or more</td> </tr> <tr> <td>0deg.C</td> <td>2380mAh or more</td> </tr> <tr> <td>23deg.C</td> <td>2800mAh or more</td> </tr> <tr> <td>45deg.C</td> <td>2800mAh or more</td> </tr> </tbody> </table>		Discharging Temperature	Capacity	-10deg.C	1960mAh or more	0deg.C	2380mAh or more	23deg.C	2800mAh or more	45deg.C	2800mAh or more	
Discharging Temperature	Capacity											
-10deg.C	1960mAh or more											
0deg.C	2380mAh or more											
23deg.C	2800mAh or more											
45deg.C	2800mAh or more											
4.5.9 Charging Temperature Characteristic	After Standard Discharge, Charge at 3.60V, 2.85A, 2.5h below Temperature, and then Standard Discharging.	Refer to the left table										
<table border="1"> <thead> <tr> <th>Charging Temperature</th> <th>Capacity</th> </tr> </thead> <tbody> <tr> <td>0deg.C</td> <td>2520mAh or more</td> </tr> <tr> <td>23deg.C</td> <td>2800mAh or more</td> </tr> <tr> <td>45deg.C</td> <td>2800mAh or more</td> </tr> </tbody> </table>		Charging Temperature	Capacity	0deg.C	2520mAh or more	23deg.C	2800mAh or more	45deg.C	2800mAh or more			
Charging Temperature	Capacity											
0deg.C	2520mAh or more											
23deg.C	2800mAh or more											
45deg.C	2800mAh or more											

4.6 Mechanical Performance

Item	Condition	Specification				
4.6.1 Shock Test	After Standard Charging, P-tile from height of 1.2m. Dropped in Each X, Y and Z for 3 time, with guide like as tube. Discharging 2.85A, Cut-off Voltage 2.0V Capacity of the 2nd time.	No leakage 2750mAh or more				
4.6.2 Vibration Test	After Standard Charging, Vibration is to be applied. Discharging 2.85A, Cut-off Voltage 2.0V Capacity of the 2nd time. Sinusoidal Oscillation	No leakage 2750mAh or more				
	Frequency(Hz)		10~60	60~80	80~100	100~125
	Acceleration(m/s ²)		20.6	13.7	6.9	3.9
5 min. Sweep Each XYZ for 1h.						

5 Identification and Marking (Lot Number Definition : Manufacturing Date of Cells)

The code is printed on a surface of the can, under the tube, at six lines.

5.1 Manufacturer Name (Trade name for UL standard)

MURATA (Trade name for Tohoku Murata Manufacturing Co., Ltd.)

5.2 Model Name(Fig.1 : USXXXXXXXX)

US26650FT

5.3 Factory(Fig.1 : A for factory code)

K : Tohoku Murata Manufacturing Co., Ltd. Koriyama Plant.

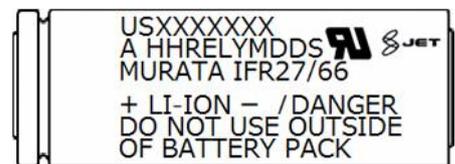


Fig.1

5.4 Specification(Fig.1 : HH for Cell Type)

1A : US26650FTC1A

5.5 Lot Number(Fig.1: YMDDS for Manufacturing Date of Cells)

Y : Year Supposing the year '15 as X, the year '16 as Y, the year '17 as Z, the year '18 as A, Every next year is counted as B, C, ... (Using an Alphabet letter)

M : Month January as A, the consecutive month as B, C, ... (Using an Alphabet letter)

D : Day 01, 02, ... 29, 30, 31 (Using figures)

S : Identification Code A, B, C, ... (Using an Alphabet letter)

5.6 Warning Message

DANGER DO NOT USE OUTSIDE OF BATTERY PACK

5.7 Cell Designation based on IEC61960

IFR27/66

5.8 Battery Type

LI-ION (Lithium-ion Battery)



Fig.2

5.9 Polarity

+ , -



Fig.3

5.10 UL Recognition Mark (Fig.2)

5.11 JET Recognition Mark (Fig.3)

5.12 2Dimensional Code (Fig.4)

The code is on the surface of the tube



Fig.4

6 Outline

6.1 Shape/Dimension

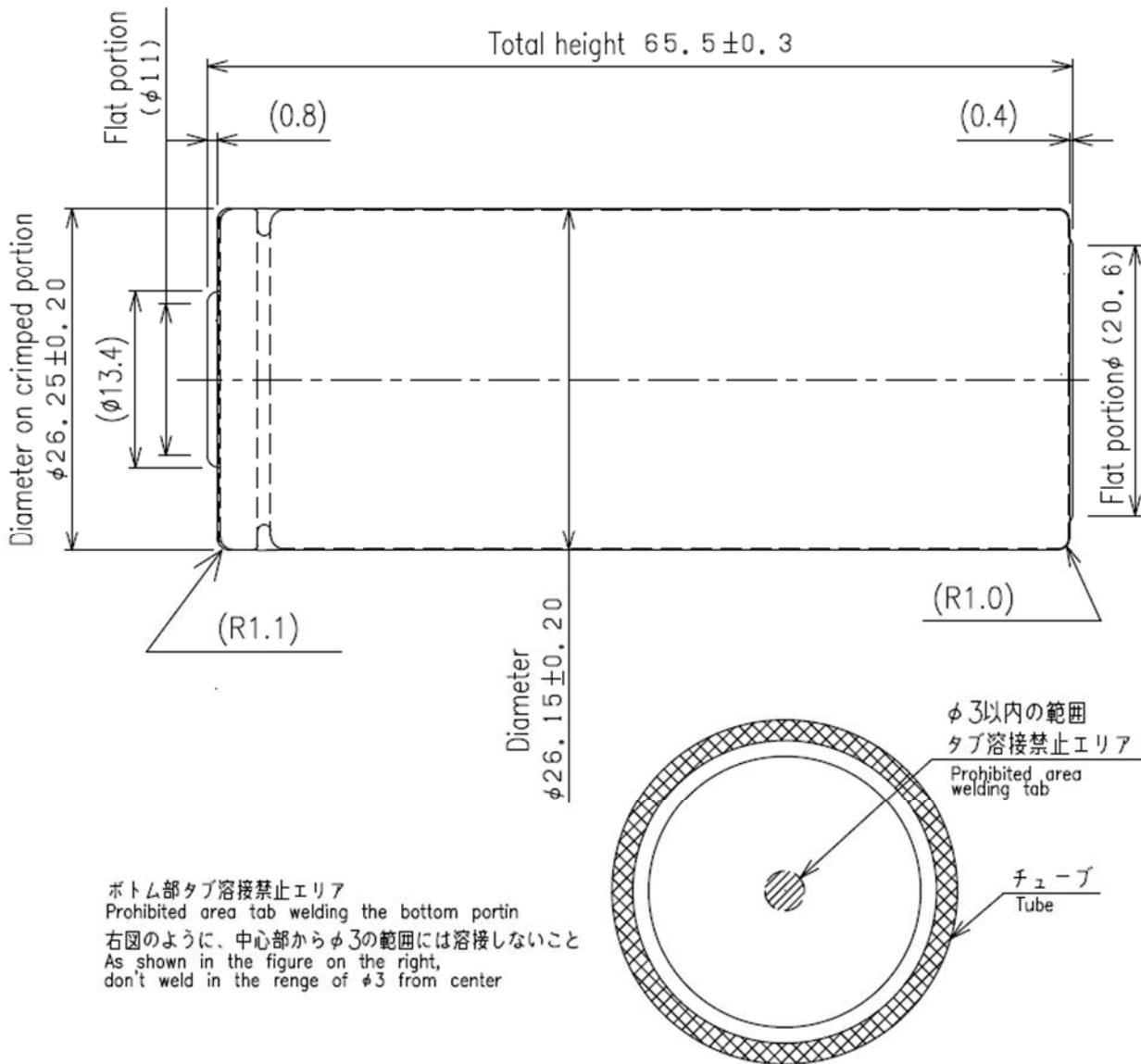
Diameter of crimp : $26.25 +0.20 / -0.20\text{mm}$ (excluding wrinkle on the tube)

Diameter of trunk : $26.15 +0.20 / -0.20\text{mm}$ (excluding wrinkle on the tube)

Total Height : $65.50 \pm 0.30\text{mm}$

6.2 Appearance

It shall be free from any defects such as remarkable scratches, breaks, cracks, discoloration, leakage, or deformation.



ボトム部タブ溶接禁止エリア
 Prohibited area tab welding the bottom portin
 右図のように、中心部からφ3の範囲には溶接しないこと
 As shown in the figure on the right,
 don't weld in the rengo of φ3 from center

7 Caution

Caution on usage of Lithium-Ion Rechargeable Battery

 **CAUTION**

7.1 Caution for installing the battery into the pack

*Do not combine the different Lot Number cell (the Last 5 letters and figure) into the pack.

7.2 Caution for the battery and the pack

7.2.1 Charge

*It should be Constant Current-Constant Voltage (CC-CV) charging method.

7.2.2 Design of battery pack

*It shall be the shape which cannot be connected easily to any charger other than the dedicated charger.

*It shall have the structure which cannot be connected easily for end user to apply for another purpose.

*It shall have terminals or function which cannot easily cause external short circuit. (such as chain short by necklace).

*It shall not short easily by effect of vibration or drop due to contact of internal wiring materials to battery.

*Mounted PWB which is assembled in battery pack shall perform the smoke and fire protection for the electrolyte adhesion.

*It should have the structure which protect electrolyte to outside of battery pack, in case of the electrolyte leakage from battery cell.

7.2.3 Protection Circuit for Safety

*The protection circuit shall be installed in the battery pack or the charger.

*The battery system must possess the following four types of protective circuits;

7.2.3.1 Over charging protective circuit by each block cell voltage monitoring

By each block cell voltage monitoring, 1st over charging protection shall operate at less than 3.65V/cell, 2nd over charging protective circuit shall operate at less than 3.80V/cell.

7.2.3.2 Over discharging protective circuit by each block cell voltage monitoring

By each block cell voltage monitoring, the over discharging protective circuit shall operate at 1.5V/cell to 2.0V/cell.

7.2.3.3 Over current protective circuit

The over current protective circuit shall operate charging at less than 2.85A.

The over current protective circuit or device shall operate discharging at less than 25A.

If the over 25A discharge occur, the allowable time of operating over current protection comply with the below table.

Discharge current 放電電流	25~30A	~40A	~50A	~70A	~100A
Time 時間	<60sec.	<25sec.	<10sec.	<5sec.	<1sec.

7.2.3.4 Temperature protective circuit

The over temperature protective circuit at high temperature side shall operate discharging until 80deg.C on the cell surface. (Including overshoot).

The over temperature protective circuit at high temperature side shall operate charging at until 60deg.C on the cell surface. (Including overshoot).

The over temperature protective circuit at low temperature side shall operate charging below 0degC on the cell surface.

7.2.4 Prohibition of Charging at over discharged state.

*In the situation that the battery becomes over discharged to the point where it becomes less than or equal to 1.0V, it is prohibited to charge such battery.

7.2.5 Cell Configuration

*The cell configuration in the battery pack is to 20 parallels 16 series at the maximum.

7.3 Storage

*Keep and Store the same package condition as shipping from Manufacturer.

*The recommendation is SOC 10~50% for long-term storage.

*Recommended condition is temperature 0~25deg.C and Humidity 75%RH or less.

*Do not store the battery near heat sources, nor in a place subject to direct sunlight.

7.4 Prohibition Clause

WARNING

*Do not use the battery for any purpose other than the application and the battery pack specified in the Pack Check Sheet for Li-ion Cell (Category; Power Technology) of such battery.

*Do not resell the battery.

DANGER

*Do not expose the batteries to water or moisture.

*Do not leave the battery in a place of high temperature (60deg.C or more).

*Do not use the battery in a place of high temperature (60deg.C or more).

*Do not throw the battery into fire, nor heat the battery.

*Do not disassemble nor modify the battery.

*Do not add strong shock, nor drop the battery.

*Do not solder leads directly to the battery body.

*Do not short (+) and (-) terminal of the battery with a kind of metal.

*Do not reverse charge the battery.

*Do not penetrate the battery with a nail etc., nor make a hole in the battery.

*Do not put the battery into a microwave oven or high pressure container.

7.5 Note

If any doubt or inconvenience regards this specification arises, modification and revision shall be only made per mutual agreement.

Depending upon circumstances such as E.O.L of raw material for cell component, we may not be able to keep the supply of the cell. In that case, we will notify you of this announcement by more than 6 months before production stop (before discontinuation).

When production location of the cell is planned to be changed or added, we'll inform and provide of necessary evaluation data beforehand to get customer's approval.

8 Packing

8.1 Packing Instruction

LBH, Class9 and CAO marks are printed on the surface on carton.
These marks are compliant with the specified design of ICAO and IATA.

8.2 Parts Name Marking

Part name is marked on the bar code label of master carton.
This bar code label is stuck onto one of the faces of the master carton.

8.3 Packing Instruction for Pallet

LBH, Class9 and CAO labels are affixed on the surface of the stretch film.
These labels are compliant with the specified design of ICAO and IATA.