Title: **Sony energy storage system using olivine type battery**

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Organization / Institution: Sony Energy Devices Corporation

Co-Author:

Type: Oral **Session:** O-302

Abstract Summary:

See PDF below

Masayuki Yasuda
Deputy Senior General Manager, Energy Division 2
Sony Energy Devices Corporation

1959	Born in Chiba Prefecture
1983	Entered Sony Corporation
	Electrical Engineer of Power Supply
1988	Sony Precision Engineering Center (Singapore) Manager
1993	Manager , Power Supply & Communication Division
1995	Sony Electric Devices (HK) Manager
1997	Manager , Power Supply & Communication Division
2004	General Manager, Power Supply & Communication Division
2007	Senior General Manager, Power Supply & Communication Division
2010	Senior General Manager, Energy Division 2
	Energy Storage Biz
2012	Deputy Senior General Manager, Energy Division 2
	In charge of Energy Storage Biz

秘 CONFIDENTIAL

Sony Energy Storage System using Olivine type Battery 'FORTELION'

Sony Energy Devices

Mar. 13th.2012

Outline

1. Sony’s Lithium ion battery overview
2. Sony’s LFP Battery ‘fORTELION’
3. Battey Module
4. Potential market

History of Li-ion Battery Business

Sony was the First Company to Succeed in Mass Producing Li-ion batteries and Now Expanding its Business Field of Energy Storage System

1991: World first! Sony has commercialized LIB

1995: Developed battery module for EV

2009: Launched olivine-type iron phosphate cell

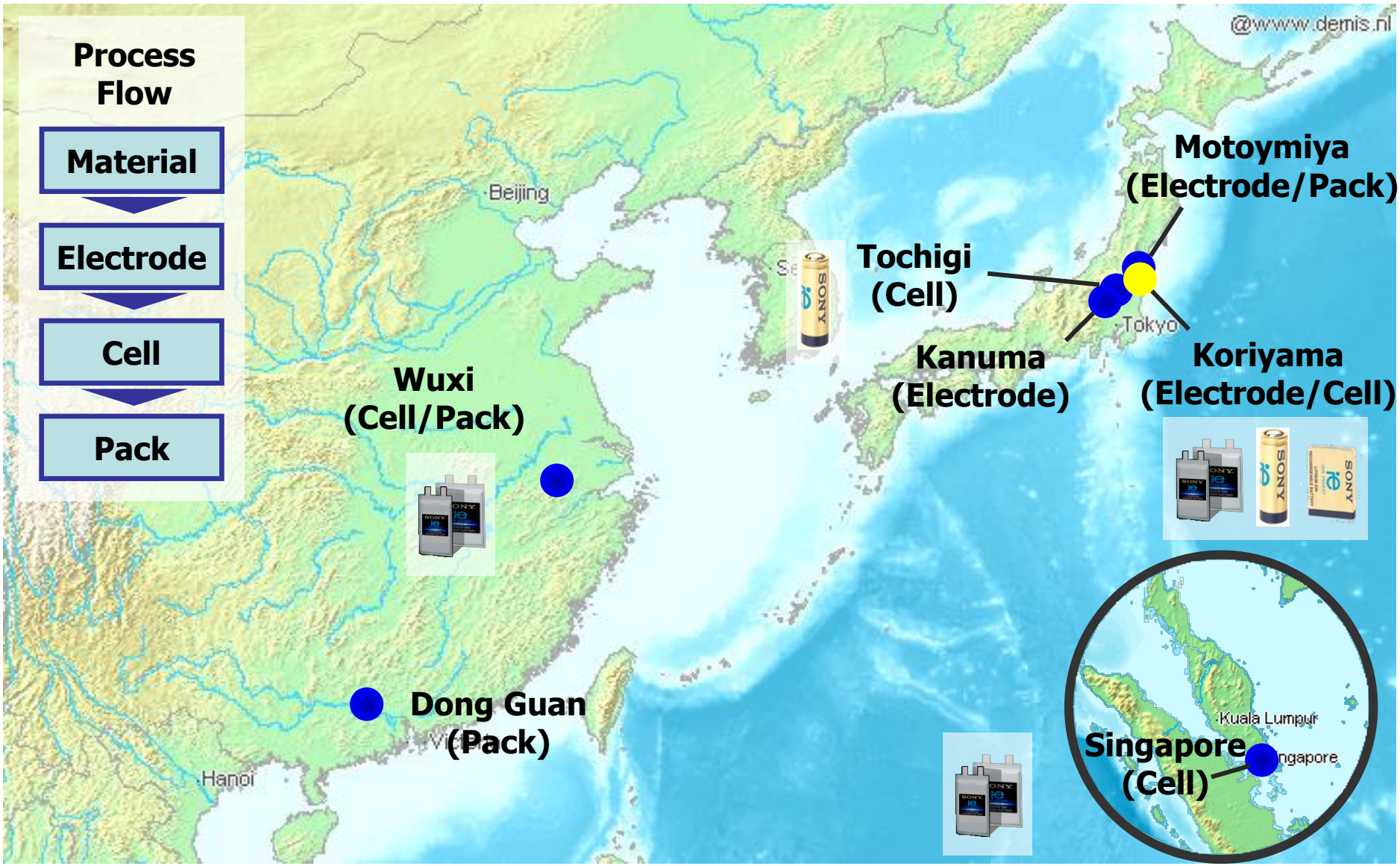
2011: Launched1.2kWh Energy Storage Module

2010 Feb: Cumulative of 3 billion cells shipment!

CY1990

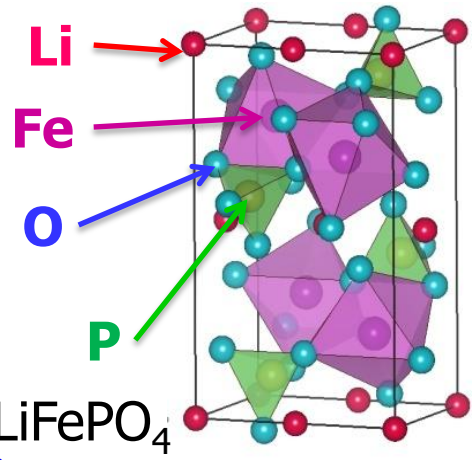
CY2011

Production Facilities



Sony's LFP Battery 'FORTELION'

Crystal Structure



$LiFePO_4$

+

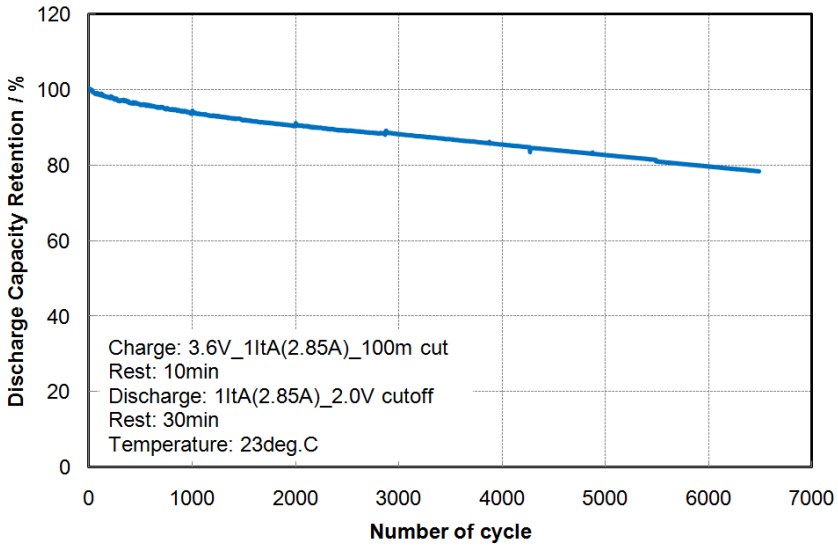
Sony's Technical Uniquenes

- **Material Knowhow**
- **Process Knowhow**

Sony's LFP Battery 'FORTELION'

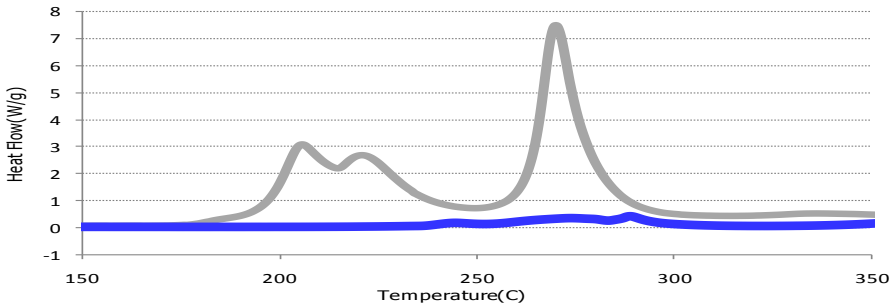
1. Long Life

Remain 80% capacity @6000cycles



2.Safety)

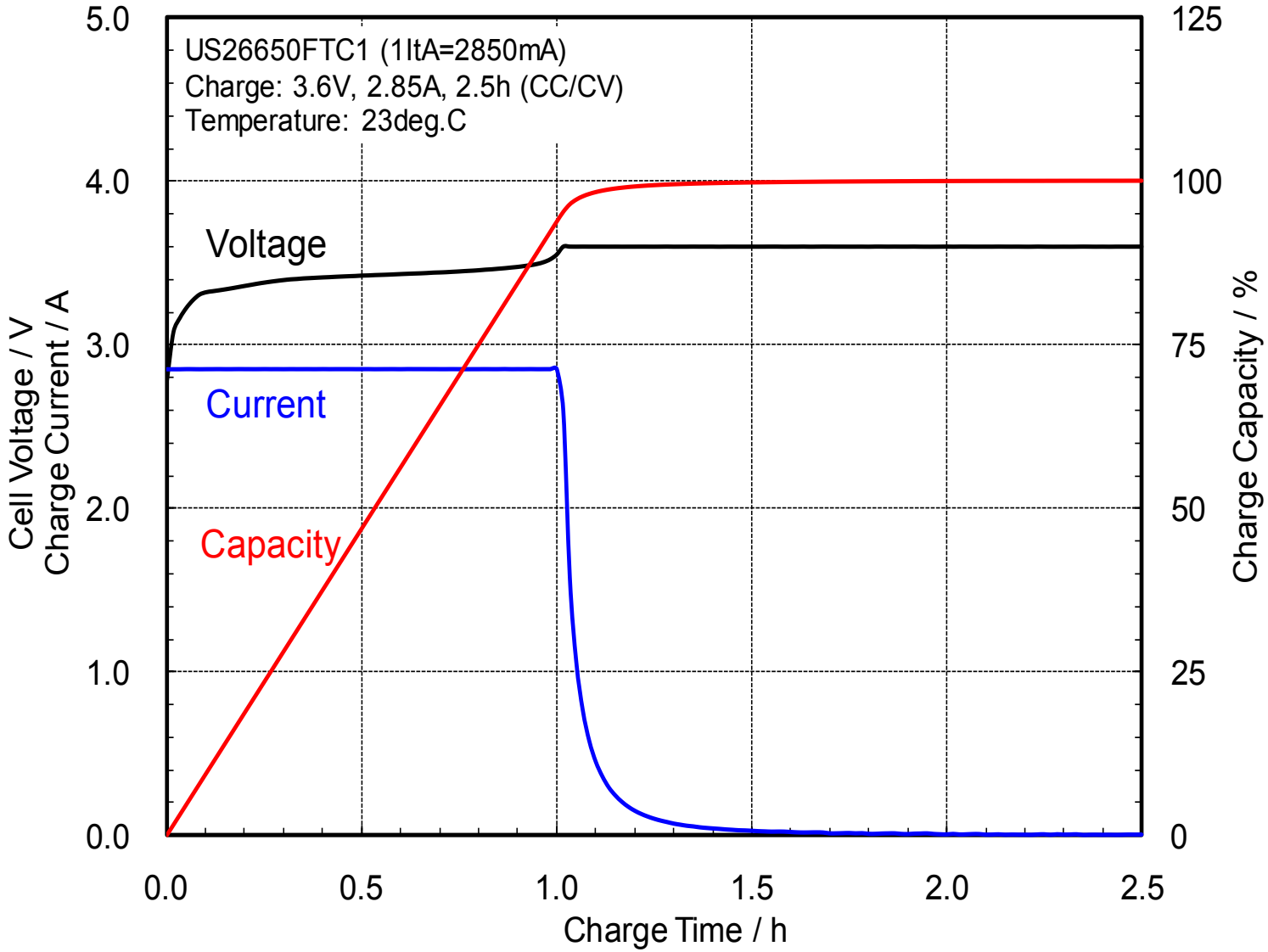
•Tightly Bonded Crystal Structure of Cathode leads to Uneasy to be sudden heat shock



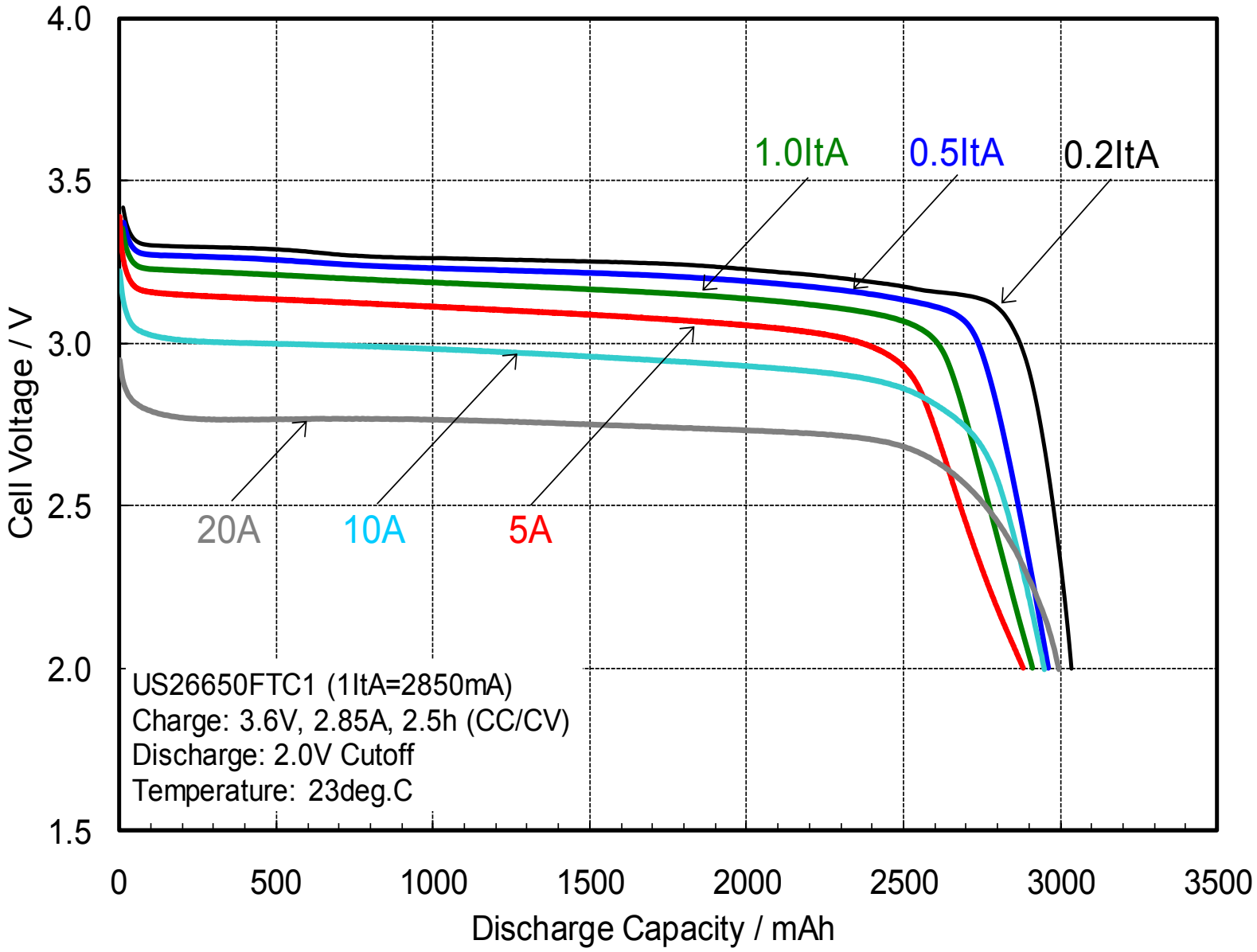
US26650FTC1 General Specification

Item	Detail	Value
Discharge Capacity	Typical Capacity	3.00Ah @0.2C Discharge
	Minimum Capacity	2.85Ah @0.2C Discharge
Charge Condition (Charge rates)	Constant Current Constant Voltage	3.6 ± 0.05V 2.85A 2.5h (1ItA)
Discharge Condition	Constant Current	2.85A 2.0V cut off
Nominal Voltage		3.2V
Maximum temperature		80deg.C
AC Impedance	AC1kHz	18mohm Typ.

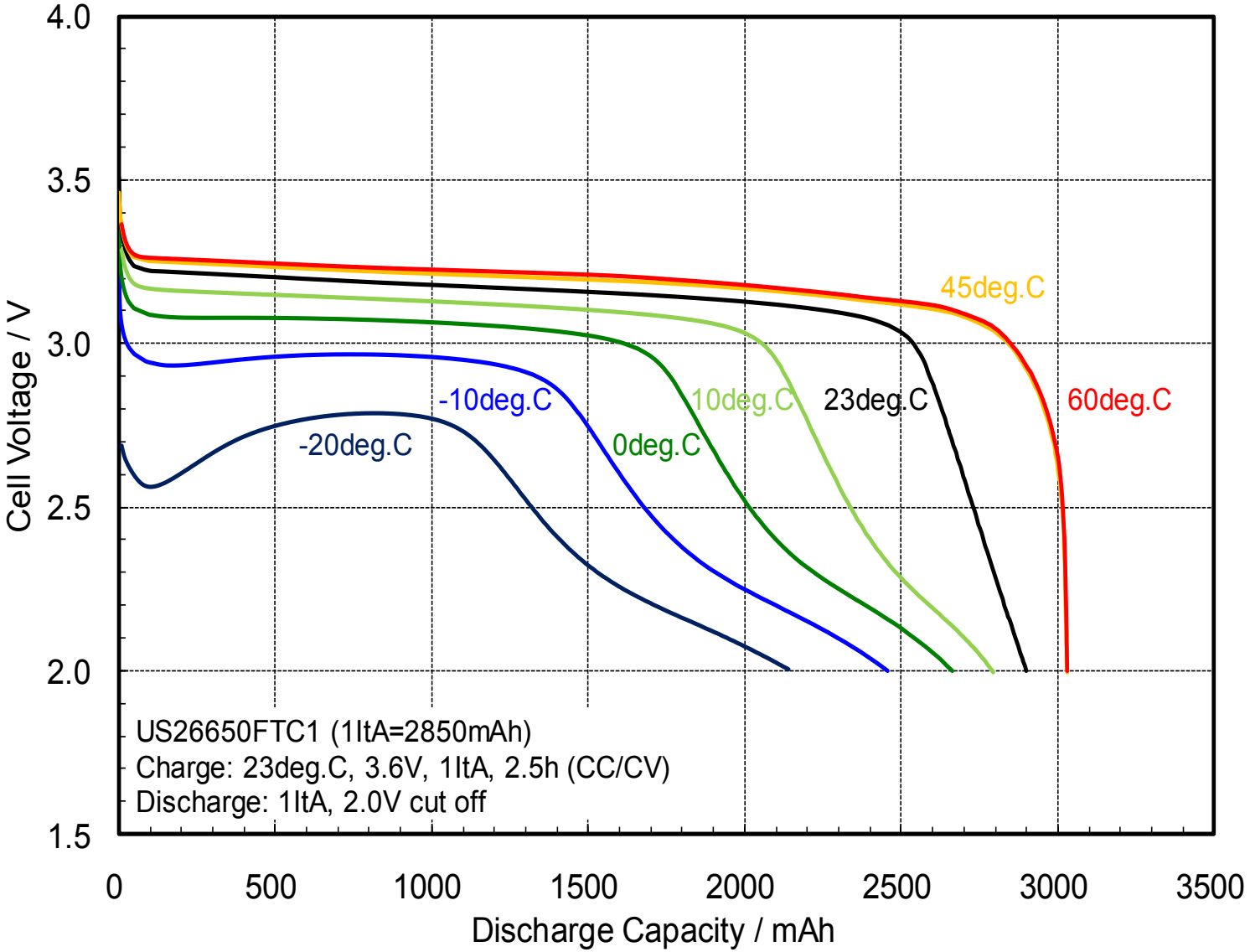
Charge Characteristics



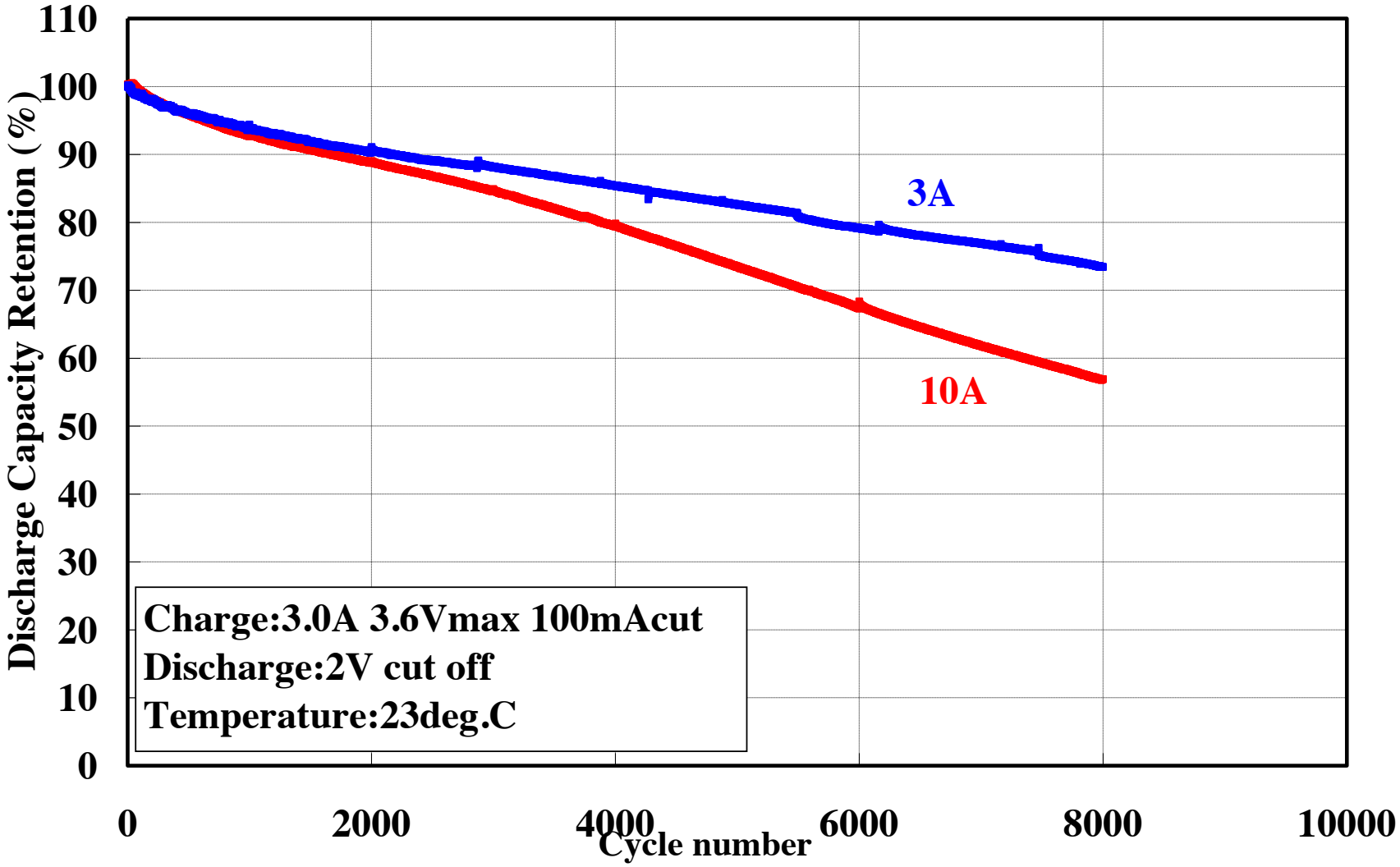
Discharge Characteristics



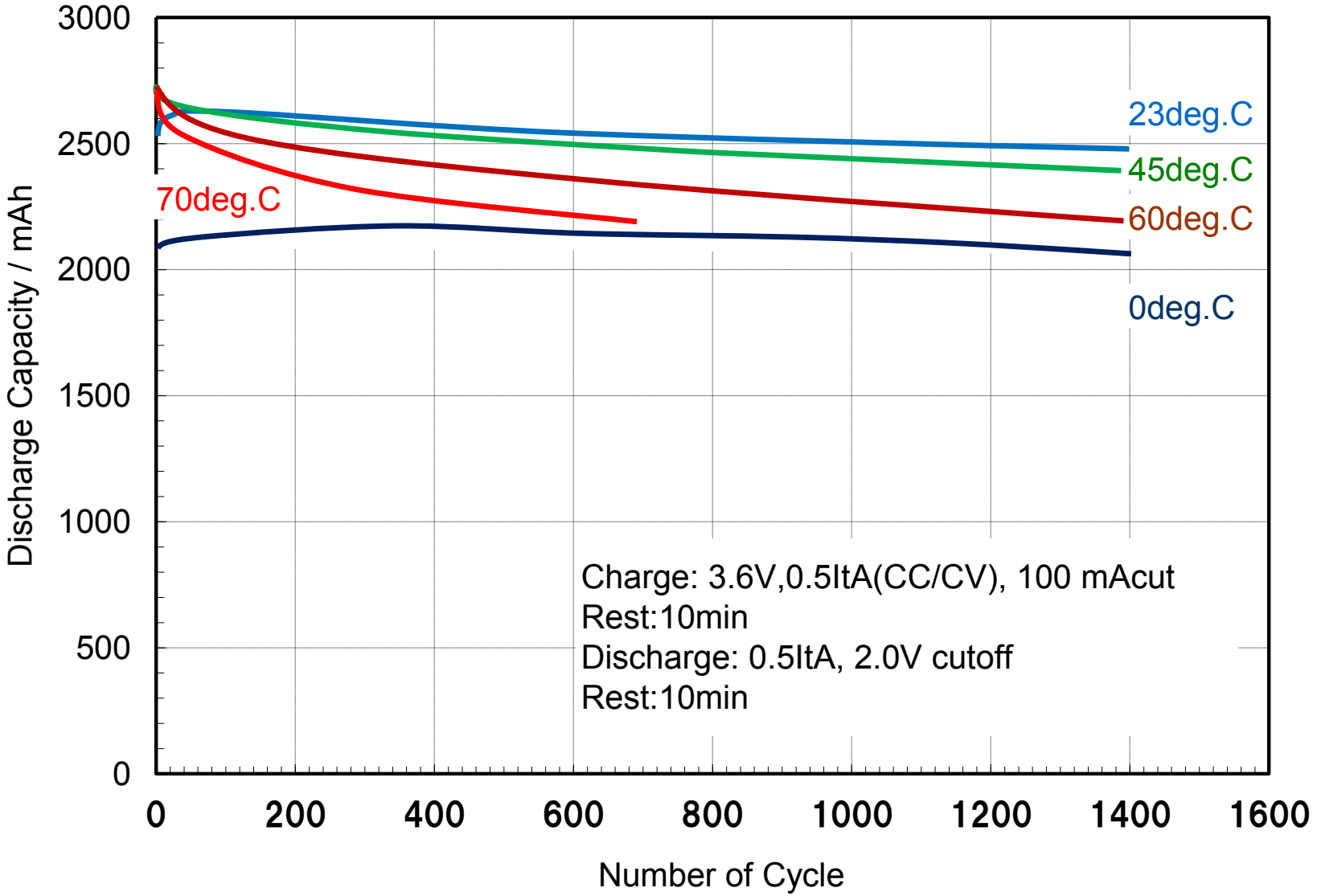
Temperature Dependence of Discharge Capacity



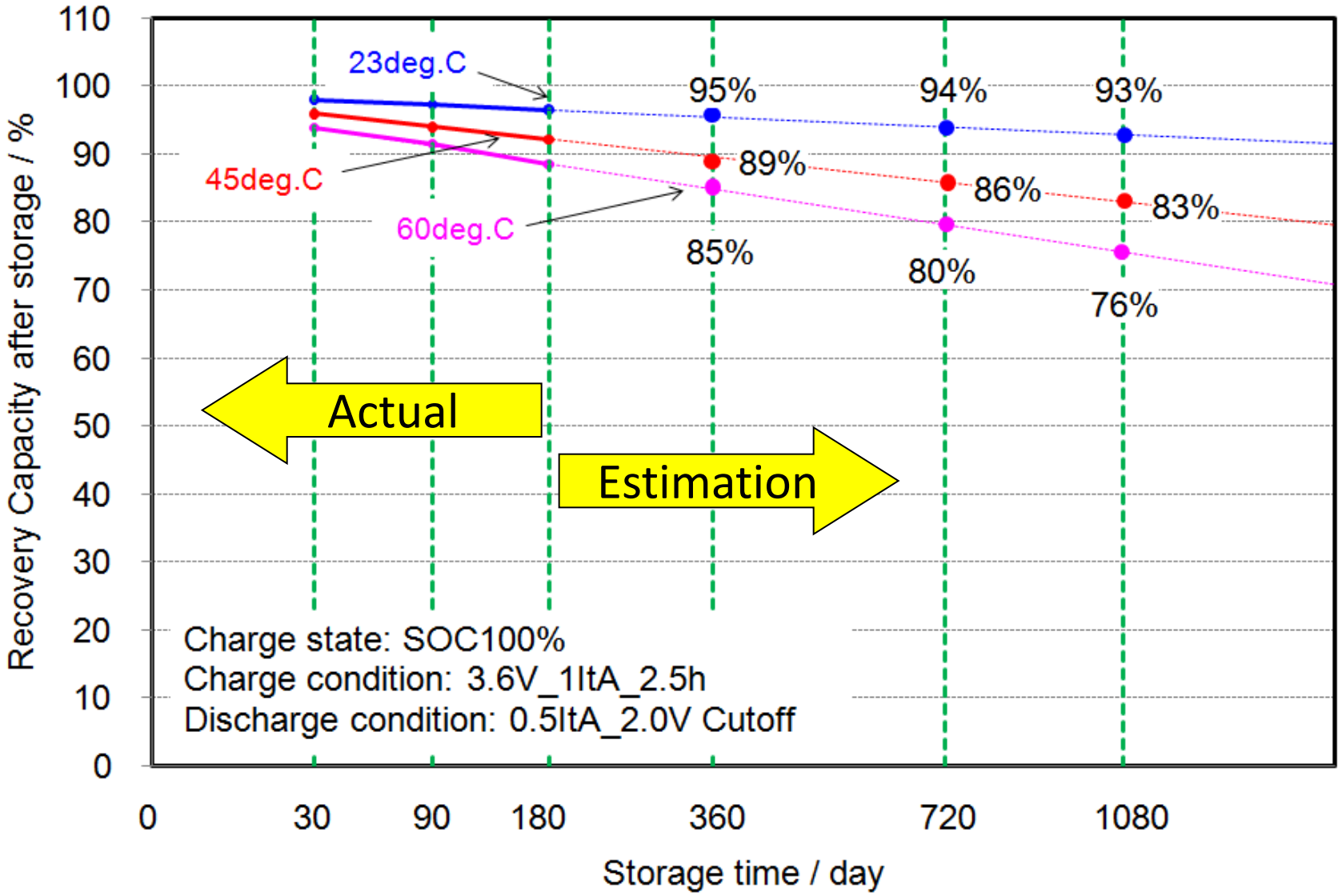
Cycle life



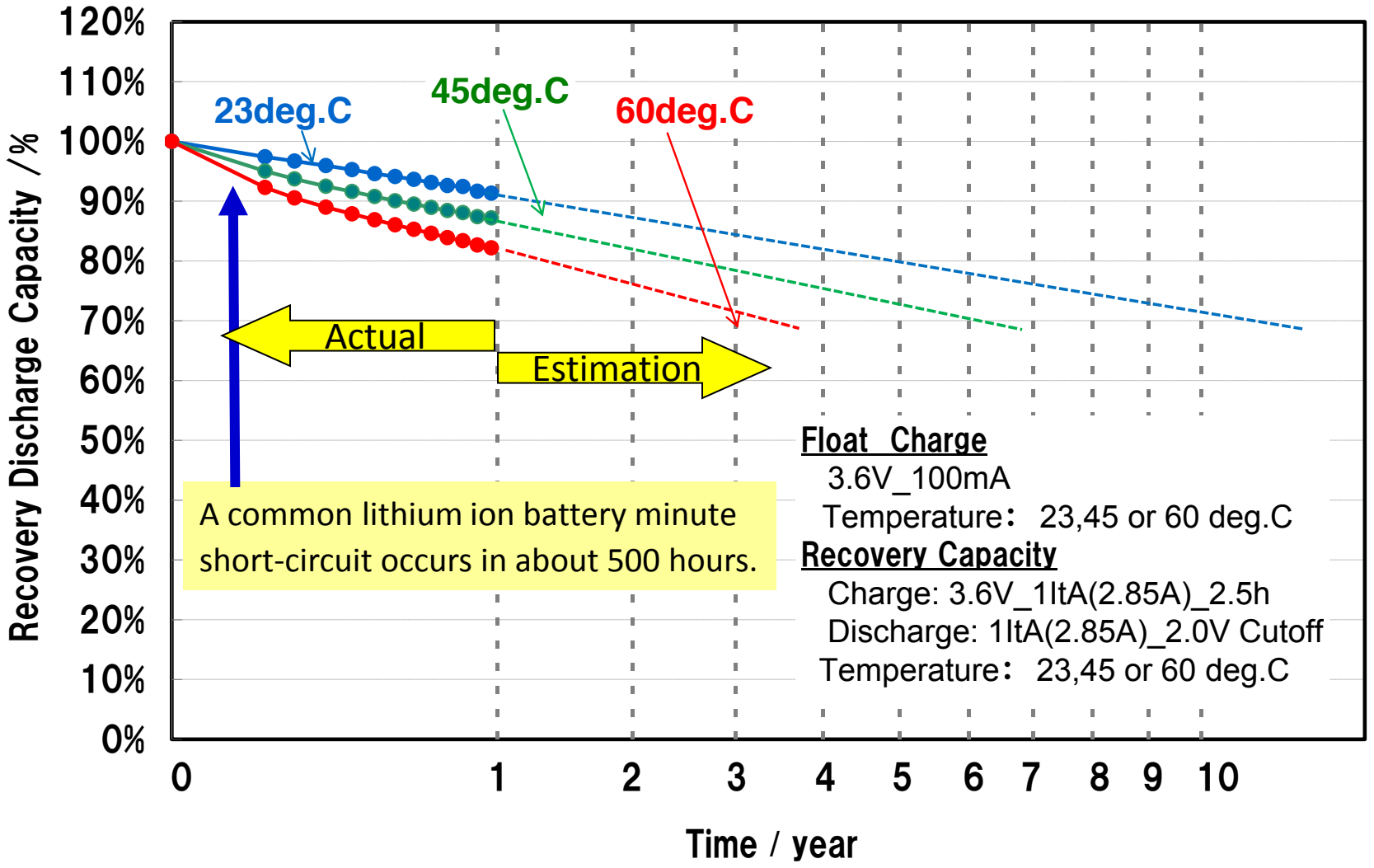
Cycle life （Limit test）



Storage Characteristics



Capacity loss vs. Operating Temperature (Float Charge)



Battery Module IJ1001M

Sony started production 1.2kWh-class energy storage module using lithium-ion rechargeable batteries made from olivine-type lithium iron phosphate

Tokyo, Japan, June22, 2010 - Sony today announced the development of an energy storage module using lithium-ion rechargeable batteries made with olivine-type lithium iron phosphate as the cathode material (hereafter referred to as 'olivine-type lithium-ion iron phosphate cell'). Key features of olivine-type lithium iron phosphate cell include high power output, long-life performance and excellent thermal stability. Sample shipments of the new module are scheduled to begin from June, 2010.

The newly-developed module is an energy storage module with 1.2kWh-class capacity. Multiple modules can be connected either in series or in parallel to easily expand to a higher voltage or capacity. Furthermore, the new module is compatible with stationary power supplies such as UPS (uninterruptible power supply) for data servers or as a backup power supply for mobile phone wireless base stations.

Battery Module IJ1001M

IJ1001M

Powered by New Li-Ion Battery
Iron Phosphate Cell 'FORTELION'

Appeal Points

1. FORTELION Cell ($LiFePO_4$)

A) Long Life

- 80% capacity @6000 cycles w/100% DOD

B) Safety

- Tightly Bonded Crystal Structure of Cathode
- Uneasy to be sudden heated

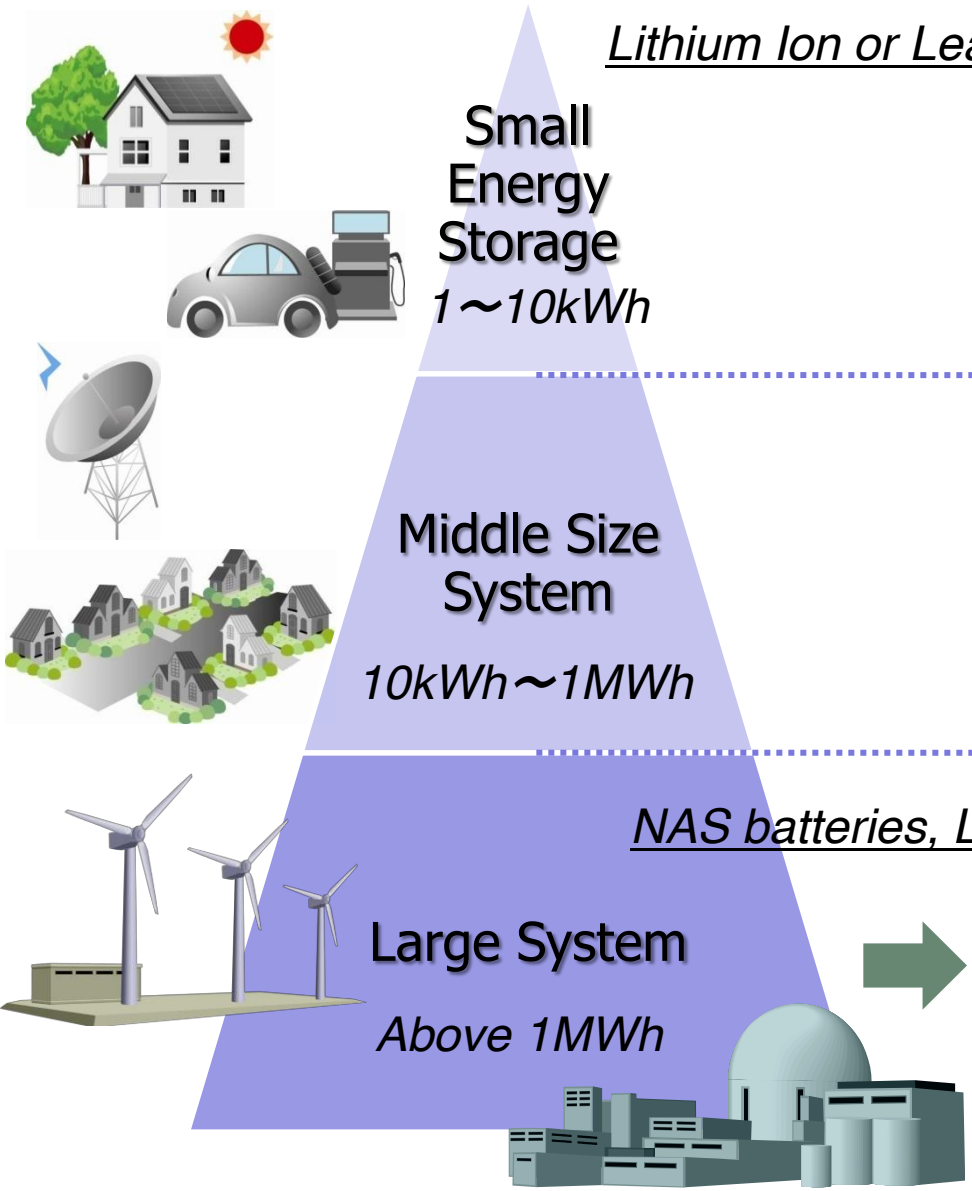
2. High Expandability and Flexibility

- Capable of multiple series / parallel connection to design system voltage / capacity
- 19 inch / 2U size

1.2kWh Module IJ1001M Spec

	Spec	Remarks
Capacity	1.2kWh (24Ah)	
Nominal Voltage	51.2V	
Max Output	2.5kW	
Max Current	50A	
Standard Charge Condition	57.6V_24A_2.5hrs	
Storage Temperature	-40℃～65℃	
Operating Temperature	Discharge: -20℃～60℃ Charge: 0～45℃	
Weight	Approx. 17Kg	
Dimensions	W：432 * D：421 *H：80	Excluding fittings, connectors

ESS for Energy Sector



Lithium Ion or Lead Acid

- **Residential Use, Charge Stations**
- Purpose: Increase local consumption of electricity from decentralized PS, off-grid solution, emergency PS etc.

- **Buildings, commercial facilities, communities, Base Transceiver Stations**
- Purpose: load leveling, peak shift, solution for non-electrified region etc.

NAS batteries, Li-Ion etc.

- **Large power plants including renewable e.g. Mega-Solar, Wind, etc.**
- Purpose: load leveling, peak shift, optimization of energy generation, ancillary services and so on.

ESS Potential Market

New Energy Storage System for Multiple Types of Applications

LFP Cell

Energy Storage Modules

Energy Storage System

Residential ESS

Community Energy Storage

Base Stations

Back Up Power Systems

Charging Stations

Lightings (Solar LED)

Recent Topics

APR: Launch of 1.2kWh Class Energy Storage

…l 18, 2011

Sony to ship 1.2kWh energy storage modules using rechargeable lithium-ion batteries made from olivine-type phosphate

-Module has lifespan of over 10 years*1 with a wide range of applications including as a backup power source or for load-leveling during peak electricity periods-

*1 When charged/discharged once daily at room temperature (23°C)

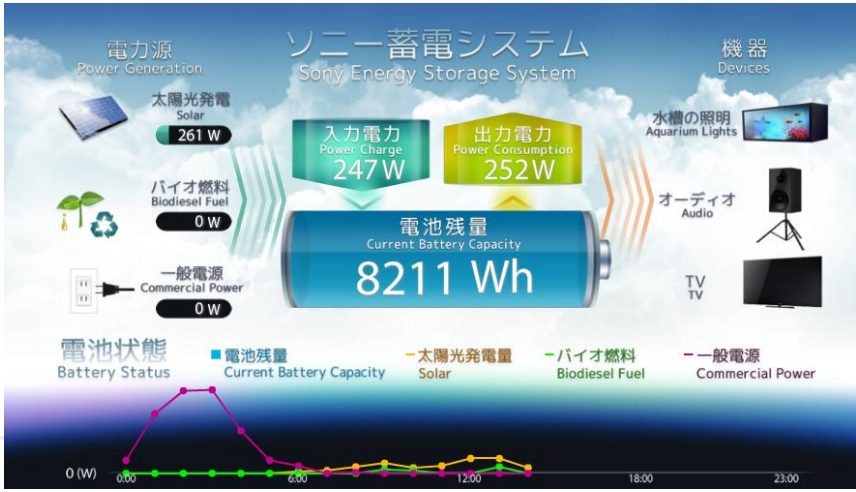
April 18, 2011
(revised on May 10, 2011)

Starting in the end of April 2011, Sony will begin volume shipments of energy storage modules that use rechargeable lithium-ion batteries made with olivine-type lithium-ion iron phosphate as the cathode material (hereafter referred to as 'olivine-type lithium-ion iron phosphate cell'). These energy storage modules have a lifespan of over 10 years, excellent safety performance, rapid recharging capabilities and high scalability. Sample shipments of the new module began in June last year and Sony decided to begin volume shipments after rigorous testing and experimentation with various applications.

ION ENERGY

業務用一体型リチウムイオン蓄電池を発売
～10年以上※1の期待寿命を持つ蓄電モジュールを搭載～

JUL: Off-Grid Energy System for Aquarium in Sony Building (Tokyo)



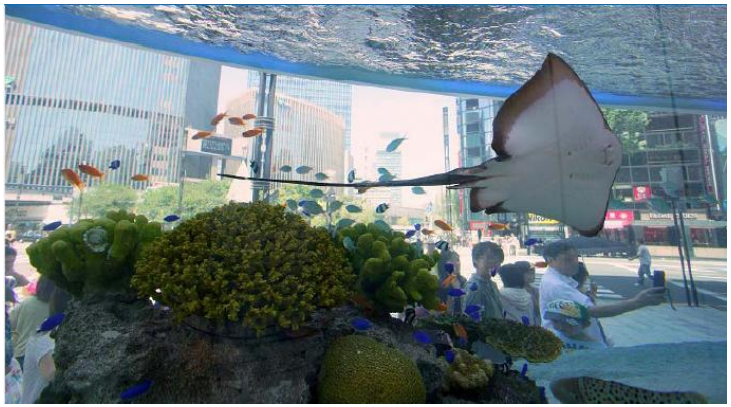
AUG: Release of 2.4kWh Back Up Energy Storage (exclusive in JPN)

型名	発売時期	希望小売価格
業務用蓄電池 『ESSP-2000』	2011年9月	オープン価格

Recent Topics

Sony Building 「44th Sony Aquarium」 （2011.7.18-8.31）

8.4kWh ESS



ESS Products Lineup

fORTELION (New Lithium Ion Battery Iron Phosphate Cell)

LIB Module

300W ESS for Home

2.4kWh ESS for Office

8.4kWh ESS for Custom Use

【 Feature 】

1.Long Life — More than 6000cycle

2.Safety — Lithium Ion Battery Iron Phosphate Cell

3.Fast Charge — 90% charge @ 1H

4.Extendibility — Multiple series / parallel connection

Sony Energy Devices Corporation

Thank You