Panasonic

February 21, 2017
No. SDS-BAH-04290

Explanatory sheet about safety of product for transportation
(Safety Data Sheet for transportation)

1. Basic item

Product name	Lithium ion battery ("Lithium ion battery" includes lithium polymer battery in this document)
UN number	3480
Product code	Refer to Table 1.
Product model name	Refer to Table 1.
Manufacturer	SANYO Electric Co., Ltd., Panasonic group
Address	222-1 Kaminaizen, Sumoto, Hyogo, Japan
Department in charge	Technology Planning Department Rechargeable Battery Business Division
Phone number	+81-799-23-3931
E-mail	prb-bp-ta@ml.jp.panasonic.com

2. Product information

Basic composition of the product

This product is a battery which consists of such main component as core battery pack assembled with some Lithium ion cells. And it consists of any combination of plastic casing, tube casing, protection circuit boards, safety devices and interface terminals.

3. Safety Information

- SANYO certifies the battery has passed and satisfied the UN Manual of Tests and Criteria Part III, sub-section 38.3 testing in SANYO shipping.
- SANYO manufactured the battery under the quality management program required in UN Model regulations 2.9.4(e).

3-1) Component cell

The Watt-hour rating of the component Lithium ion cells is not more than 20Wh.
Refer to Appendix "SDS (SDS-IBH-00484)".

3-2) Battery pack

1. The Watt-hour rating of the battery is not more than 100Wh.
2. Packages of the battery satisfy the following conditions when SANYO ships.
   (1) The package has passed the drop test from the height of 1.2m.
   (2) The package net weight is not more than 10kg.
   (3) The package is marked and labeled according to requirement of Packing Instruction 965 Section IB stated in ICAO's and IATA's dangerous goods regulations.
3. The battery is not defective for safety reasons, not damaged. It is not collected battery for recycling or disposal.
4. The battery is not subject to the fully regulated requirements for Dangerous Goods in ocean and ground transportation.
5. The battery should be transported by Cargo aircraft as UN3480, Class 9 Dangerous Goods, and state of charge not exceeding 30%, according to Packing Instruction 965 Section IB stated in ICAO's and IATA's dangerous goods regulations.

H. Kuroda

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Table. 1 Model list of application

Battery Information			Cell	Battery Pack					
Lenovo ASM Part Number	Lenovo FRU Part Number	Lenovo Option Part Number	MSDS Type #	Nominal Voltage (V)	Rating Voltage (V)	Watt hour Rating (Wh)	Weight (grams)	Equivalent Lithium Content (grams)	UN38.3 report
42T4531	42T4644 42T4530		SDS-IBH-00484	3.6	10.8	85	516	7.02	42T4531_UN38.3
42T4537	42T4647 42T4536		SDS-IBH-00484	3.6	10.8	57	330	4.68	42T4537_UN38.3
42T4541	42T4649 42T4540		SDS-IBH-00484	3.6	10.8	85	496	7.02	42T4541_UN38.3
42T4555	42T4654 42T4554		SDS-IBH-00484	3.6	14.4	38	230	3.12	42T4555_UN38.3
42T4557	42T4655 42T4556		SDS-IBH-00484	3.6	10.8	85	498	7.02	42T4557_UN38.3
42T4561	42T4656 42T4560		SDS-IBH-00484	3.6	14.4	37.4	240	3.12	42T4561_UN38.3
42T4565	42T4564		SDS-IBH-00484	3.6	14.4	67	465	5.52	42T4565_UN38.3
42T4576	42T4575		SDS-IBH-00484	3.7	11.1V	57	341.5	4.68	42T4576_UN38.3
42T4582	42T4581		SDS-IBH-00484	3.7	11.1V	53	333.5	4.32	42T4582_UN38.3
42T4588	42T4587		SDS-IBH-00484	3.7	11.1V	28	184	2.34	42T4588_UN38.3
42T4590	42T4589		SDS-IBH-00484	3.7	11.1V	52	337	4.32	42T4590_UN38.3
42T4681	42T4680		SDS-IBH-00484	3.7	11.1V	28	184	2.34	42T4681_UN38.3
42T4683	42T4682		SDS-IBH-00484	3.7	11.1V	52	337	4.32	42T4683_UN38.3
42T4695	42T4694		SDS-IBH-00484	3.7	11.1	94	507	7.56	42T4695-U_UN38.3
42T4695	45N1170		SDS-IBH-00484	3.6	10.8	94	85	7.83	42T4695-N_UN38.3
42T4699	42T4698		SDS-IBH-00484	3.6	14.4	38	238	3.12	42T4699_UN38.3
42T4703	42T4702		SDS-IBH-00484	3.6	10.8	52	330	4.32	42T4703_UN38.3

Battery Information			Cell	Battery Pack					
Lenovo ASM Part Number	Lenovo FRU Part Number	Lenovo Option Part Number	MSDS Type #	Nominal Voltage (V)	Rating Voltage (V)	Watt hour Rating (Wh)	Weight (grams)	Equivalent Lithium Content (grams)	UN38.3 report
42T4711	42T4710		SDS-IBH-00484	3.7	11.1	94	505	7.56	42T4711_UN38.3
42T4732	42T4731		SDS-IBH-00484	3.6	10.8	57	330	4.68	42T4732_UN38.3
42T4740	42T4739		SDS-IBH-00484	3.7	11.1	94	626	7.56	42T4740_UN38.3
42T4752	42T4751		SDS-IBH-00484	3.6	10.8	48	306	3.96	42T4752_UN38.3
42T4764	42T4763		SDS-IBH-00484	3.6	14.4	32	222	2.64	42T4764_UN38.3
42T4772	42T4771		SDS-IBH-00484	3.6	10.8	57	336	5.22	42T4772_UN38.3
42T4780	42T4781		SDS-IBH-00484	3.6	10.8	24	167	1.98	42T4780_UN38.3
42T4784	42T4785		SDS-IBH-00484	3.6	10.8	57	335	4.68	42T4784_UN38.3
42T4790	42T4791		SDS-IBH-00484	3.6	10.8	57	330	4.68	42T4790_UN38.3
42T4798	42T4799		SDS-IBH-00484	3.7	11.1	94	505	7.56	42T4798_UN38.3
42T4804	42T4805		SDS-IBH-00484	3.7	14.8	42	249	3.36	42T4804_UN38.3
42T4808	42T4809		SDS-IBH-00484	3.6	10.8	48	329	3.96	42T4808_UN38.3
42T4812	42T4813		SDS-IBH-00484	3.7	11.1	63	355	5.04	42T4812_UN38.3
42T4816	42T4817		SDS-IBH-00484	3.7	11.1	58	336	4.68	42T4816_UN38.3
42T4818	42T4819		SDS-IBH-00484	3.6	10.8	57	327	5.22	42T4818_UN38.3
42T4822	42T4823		SDS-IBH-00484	3.7	11.1	87	507	7.02	42T4822_UN38.3
42T4828	42T4829		SDS-IBH-00484	3.7	11.1	63	355	5.04	42T4828_UN38.3

Battery Information			Cell	Battery Pack					
Lenovo ASM Part Number	Lenovo FRU Part Number	Lenovo Option Part Number	MSDS Type #	Nominal Voltage (V)	Rating Voltage (V)	Watt hour Rating (Wh)	Weight (grams)	Equivalent Lithium Content (grams)	UN38.3 report
42T4834	42T4835		SDS-IBH-00484	3.7	11.1	63	340	5.04	42T4834-U_UN38.3
42T4834	45N1171		SDS-IBH-00484	3.6	10.8	63	320	5.22	42T4834-N_UN38.3
42T4840	42T4841		SDS-IBH-00484	3.7	11.1	32	181	2.52	42T4840_UN38.3
42T4862	42T4861		SDS-IBH-00484	3.7	11.1	63	334	5.04	42T4862_UN38.3
42T4868	42T4940		SDS-IBH-00484	3.7	11.1	94	504	7.56	42T4868_UN38.3
42T4874	42T4873		SDS-IBH-00484	3.6	10.8	57	334	4.68	42T4874_UN38.3
42T4876	42T4875		SDS-IBH-00484	3.6	10.8	57	320	5.22	42T4876_UN38.3
42T4880	42T4879		SDS-IBH-00484	3.7	11.1	63	382	5.04	42T4880_UN38.3
42T4884	42T4883		SDS-IBH-00484	3.6	14.4	32	222	2.64	42T4884_UN38.3
42T4890	42T4889		SDS-IBH-00484	3.7	11.1	32	181	2.52	42T4890_UN38.3
42T4894	42T4893		SDS-IBH-00484	3.6	10.8	57	335	4.68	42T4894_UN38.3
42T4902	42T4901		SDS-IBH-00484	3.7	14.8	29	200	2.34	42T4902_UN38.3
42T4906	42T4905		SDS-IBH-00484	3.7	11.1	32	505	2.52	42T4906_UN38.3
42T4914	42T4915		SDS-IBH-00484	3.7	11.1	100	505	8.10	42T4914_UN38.3
42T4920	42T4921		SDS-IBH-00484	3.6	10.8	48	306	3.96	42T4920_UN38.3

Battery Information			Cell	Battery Pack					
Lenovo ASM Part Number	Lenovo FRU Part Number	Lenovo Option Part Number	MSDS Type #	Nominal Voltage (V)	Rating Voltage (V)	Watt hour Rating (Wh)	Weight (grams)	Equivalent Lithium Content (grams)	UN38.3 report
42T4944	42T4943		SDS-IBH-00484	3.7	11.1	32	190	2.52	42T4944_UN38.3
42T4948	42T4947		SDS-IBH-00484	3.7	11.1	63	331	5.04	42T4948_UN38.3
42T4954	42T4953		SDS-IBH-00484	3.7	11.1	32	190	2.52	42T4954_UN38.3
42T4958	42T4957		SDS-IBH-00484	3.7	11.1	63	331	5.04	42T4958_UN38.3
45N1000	45N1001		SDS-IBH-00484	3.6	10.8	57	330	4.68	45N1000_UN38.3
45N1006	45N1007		SDS-IBH-00484	3.7	11.1	94	505	7.56	45N1006-U_UN38.3
45N1006	45N1173		SDS-IBH-00484	3.6	10.8	94	483	7.83	45N1006-N_UN38.3
45N1012	45N1013		SDS-IBH-00484	3.7	11.1	58	336	5.04	45N1012_UN38.3
45N1022	45N1023		SDS-IBH-00484	3.7	11.1	63	334	5.04	45N1022-U_UN38.3
45N1022	45N1172		SDS-IBH-00484	3.6	10.8	63	314	5.22	45N1022-N_UN38.3
45N1026	45N1027		SDS-IBH-00484	3.7	11.1	94	504	7.56	45N1026-U_UN38.3
45N1026	45N1027 45N1175		SDS-IBH-00484	3.6	10.8	94	482	7.83	45N1026-N_UN38.3
45N1030	45N1031		SDS-IBH-00484	3.6	10.8	57	334	4.68	45N1030_UN38.3
45N1050	45N1051		SDS-IBH-00484	3.7	11.1	62	330	5.04	45N1050_UN38.3
45N1056	45N1057		SDS-IBH-00484	3.7	11.1	63	331	5.04	45N1056-U_UN38.3
45N1056	45N1174		SDS-IBH-00484	3.6	10.8	63	311	5.22	45N1056-N_UN38.3

Battery Information			Cell	Battery Pack					
Lenovo ASM Part Number	Lenovo FRU Part Number	Lenovo Option Part Number	MSDS Type #	Nominal Voltage (V)	Rating Voltage (V)	Watt hour Rating (Wh)	Weight (grams)	Equivalent Lithium Content (grams)	UN38.3 report
45N1060	45N1061		SDS-IBH-00484	3.7	11.1	63	311	5.04	45N1060-U_UN38.3
45N1060	45N1176		SDS-IBH-00484	3.6	10.8	63	311	5.22	45N1060-N_UN38.3
45N1076	45N1077		SDS-IBH-00484	3.7	11.1	63	362	5.04	45N1076-U_UN38.3
45N1076	45N1177		SDS-IBH-00484	3.6	10.8	63	362	5.22	45N1076-N_UN38.3
45N1104	45N1105		SDS-IBH-00484	3.6	10.8	48	306	3.96	45N1104_UN38.3
45N1128	45N1129 45N1734 45N1767		SDS-IBH-00484	3.6	10.8	48	310	3.96	45N1128_UN38.3
45N1134	45N1135 45N1737 45N1777		SDS-IBH-00484	3.6	10.8	72	333	6.03	45N1134_UN38.3
45N1144	45N1145 45N1769		SDS-IBH-00484	3.6	10.8	57	317	4.68	45N1144_UN38.3
45N1150	45N1151 45N1779		SDS-IBH-00484	3.6	10.8	100	469	8.29	45N1150_UN38.3
45N1158	45N1159 45N1771		SDS-IBH-00484	3.6	10.8	48	298	3.96	45N1158_UN38.3
45N1178	45N1179		SDS-IBH-00484	3.7	14.8	32	200	2.64	45N1178_UN38.3
45N1182	45N1183		SDS-IBH-00484	3.6	14.4	41	222	3.48	45N1182_UN38.3
45N1758	45N1759		SDS-IBH-00484	3.6	10.8	48	316	3.96	45N1758_UN38.3
SB10H45073	00NY488		SDS-IBH-00484	3.6	10.8	48	310	3.96	SB10H45073_UN38.3
SB10H45074	00NY489		SDS-IBH-00484	3.6	10.8	48	310	3.96	SB10H45074_UN38.3
SB10F46471	00HW033		SDS-IBH-00484	3.6	10.8	72	329	6.03	SB10F46471_UN38.3
SB10J78995	00HW047		SDS-IBH-00484	3.6	7.2	24	116	2.01	SB10J78995_UN38.3
SB10K97582	01AV425		SDS-IBH-00484	3.6	10.8	48	306	3.96	SB10K97582_UN38.3
SB10K97584	01AV427		SDS-IBH-00484	3.6	10.8	72	334	6.03	SB10K97584_UN38.3

Safety data sheet for product

1. PRODUCT AND COMPANY IDENTIFICATION

- Product name: Lithium ion rechargeable battery cell
- Product code: None
  (All cylindrical models Sanyo manufactured and whose capacity is less than or equal to 5.4Ah,
  including the cell branded as Panasonic)
- Company name: Sanyo Electric Co., Ltd., Panasonic group
- Address: 222-1 , Kaminaizen, Sumoto City, Hyogo, Japan
- Telephone number: +81-799-24-4111
- Fax number: +81-799-23-2879
- Emergency telephone number: [Weekday] +81-799-23-3931 [Night and holiday] +81-799-24-4131

2. HAZARDS IDENTIFICATION

For the battery cell, chemical materials are stored in a hermetically sealed metal or metal laminated plastic case, designed to withstand temperatures and pressures encountered during normal use. As a result, during normal use, there is no physical danger of ignition or explosion and chemical danger of hazardous materials' leakage.

However, if exposed to a fire, added mechanical shocks, decomposed, added electric stress by miss-use, the gas release vent will be operated. The battery cell case will be breached at the extreme, hazardous materials may be released.

Moreover, if heated strongly by the surrounding fire, acrid gas may be emitted.

- GHS classification: Not available
  (This product is outside the scope of GHS system since it's considered as an "article".)

- Most important hazard and effects
  Human health effects:
  Inhalation: The steam of the electrolyte has an anesthesia action and stimulates a respiratory tract.
  Skin contact: The steam of the electrolyte stimulates a skin. The electrolyte skin contact causes a sore and stimulation on the skin.
  Eye contact: The steam of the electrolyte stimulates eyes. The electrolyte eye contact causes a sore and stimulation on the eye. Especially, substance that causes a strong inflammation of the eyes is contained.
  Environmental effects: Since a battery cell remains in the environment, do not throw out it into the environment.

- Specific hazards:
  If the electrolyte contacts with water, it will generate detrimental hydrogen fluoride.
  Since the leaked electrolyte is inflammable liquid, do not bring close to fire.

3. COMPOSITION / INFORMATION ON INGREDIENTS

・Substance or preparation: Preparation
・Information about the chemical nature of product: *1

Portion	Material name	CAS No.	Concentration range (wt %)
Positive electrode	Lithium transition metal oxide ($Li[M]_m[O]_n$ *2)	12190-79-3 12057-17-9 182442-95-1	20~60
Positive electrode's base	Aluminum	7429-90-5	1~10
Negative electrode	Carbon	7782-42-5 7440-44-0	10~30
Negative electrode's base	Copper	7440-50-8	1~15
Electrolyte	Ethyl methyl carbonate Diethyl carbonate Ethylene carbonate	623-53-0 105-58-8 96-49-1	5~25
Outer case	Iron	7439-89-6	1~30

*1 Not every product includes all of these materials.
*2 The letter M means transition metal and candidates of M are Co, Mn, Ni and Al. One compound includes one or more of these metals and one product includes one or more of the compounds. The letter m and n means the number of atoms.

4. FIRST-AID MEASURES

Spilled internal cell materials

・Inhalation:
Make the victim blow his/her nose, gargle. Seek medical attention if necessary.
・Skin contact:
Remove contaminated clothes and shoes immediately. Wash extraneous matter or contact region with soap and plenty of water immediately.
・Eye contact:
Do not rub one's eyes. Immediately flush eyes with water continuously for at least 15 minutes. Seek medical attention immediately.

A battery cell and spilled internal cell materials

・Ingestion:
Make the victim vomit. When it is impossible or the feeling is not well after vomiting, seek medical attention.

5. FIRE-FIGHTING MEASURES

・Suitable extinguishing media: Plenty of water, carbon dioxide gas, nitrogen gas, chemical powder fire extinguishing medium and fire foam.
・Specific hazards: Corrosive gas may be emitted during fire.
・Specific methods of fire-fighting: When the battery burns with other combustibles simultaneously, take fire-extinguishing method which correspond to the combustibles. Extinguish a fire from the windward as much as possible.
・Special protective equipment for firefighters:
Respiratory protection: Respiratory equipment of a gas cylinder style or protection-against-dust mask
Hand protection: Protective gloves
Eye protection: Goggle or protective glasses designed to protect against liquid splashes
Skin and body protection: Protective cloth

6. ACCIDENTAL RELEASE MEASURES

Spilled internal cell materials, such as electrolyte leaked from a battery cell, are carefully dealt with according to the followings.

・Precautions for human body:
Remove spilled materials with protective equipment (protective glasses and protective gloves). Do not inhale the gas as much as possible. Moreover, avoid touching with as much as possible.
・Environmental precautions: Do not throw out into the environment.
・Method of cleaning up: The spilled solids are put into a container. The leaked place is wiped off with dry cloth.
・Prevention of secondary hazards: Avoid re-scattering. Do not bring the collected materials close to fire.

7. HANDLING AND STORAGE
- Handling suggestions
  - Do not connect the positive terminal to the negative terminal with electrical wire or chain.
  - Avoid polarity reverse connection when installing the battery to an instrument.
  - Do not wet the battery with water, seawater, drink or acid; or expose to strong oxidizer.
  - Do not damage or remove the external tube.
  - Keep the battery away from heat and fire.
  - Do not disassemble or reconstruct the battery; or solder the battery directly.
  - Do not give a mechanical shock or deform.
  - Do not use unauthorized charger or other charging method. Terminate charging when the charging process doesn't end within specified time.
- Storage
  - Do not store the battery with metalware, water, seawater, strong acid or strong oxidizer.
  - Make the charge amount 30~50% then store at room temperature or less (temperature= -20~35 degree C) in a dry (humidity: 45~85%) place. Avoid direct sunlight, high temperature, and high humidity.
  - Use insulative and adequately strong packaging material to prevent short circuit between positive and negative terminal when the packaging breaks during normal handling. Do not use conductive or easy to break packaging material.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION (WHEN THE ELECTROLYTE LEAKS)
- Control parameters
  ACGIH has not been mentioned control parameter of electrolyte.
- Personal protective equipment
  Respiratory protection: Respirator with air cylinder, dust mask
  Hand protection: Protective gloves
  Eye protection: Goggles or protective glasses designed to protect against liquid splashes
  Skin and body protection: Working clothes with long sleeve and long trousers

9. PHYSICAL AND CHEMICAL PROPERTIES
- Appearance
  Physical state: Solid
  Form: Cylindrical
  Color: Metallic color (without tube if it has tube)
  Odor: No odor

10. STABILITY AND REACTIVITY
- Stability: Stable under normal use
- Hazardous reactions occurring under specific conditions
  - Conditions to avoid: When a battery cell is exposed to an external short-circuit, crushes, deformation, high temperature above 100 degree C, it will be the cause of heat generation and ignition. Direct sunlight and high humidity.
  - Materials to avoid: Conductive materials, water, seawater, strong oxidizers and strong acids.
  - Hazardous decomposition products: Acrid or harmful gas is emitted during fire.

11. TOXICOLOGICAL INFORMATION
Organic Electrolyte
- Acute toxicity:
  LD_{50}, oral - Rat 2,000mg/kg or more
- Irritating nature: Irritative to skin and eye

12. ECOLOGICAL INFORMATION

・Persistence/degradability:
Since a battery cell and the internal materials remain in the environment, do not bury or throw out into the environment.

13. DISPOSAL CONSIDERATIONS

・Recommended methods for safe and environmentally preferred disposal:

Product (waste from residues)

Specified collection or disposal of lithium ion battery is required by the law like as "battery control law" in several nations. Collection or recycle of the battery is mainly imposed on battery's manufacturer or importer in the nations recycle is required.

Contaminated packaging

Neither a container nor packing is contaminated during normal use. When internal materials leaked from a battery cell contaminates, dispose as industrial wastes subject to special control.

14. TRANSPORT INFORMATION

In the case of transportation, avoid exposure to high temperature and prevent the formation of any condensation. Take in a cargo of them without falling, dropping and breakage. Prevent collapse of cargo piles and wet by rain. The container must be handled carefully. Do not give shocks that result in a mark of hitting on a cell. Please refer to Section 7-HANDLING AND STORAGE also.

UN regulation

・UN number: 3480 (3481 when the battery is contained in equipment or packed with equipment)
・Proper shipping name:
Lithium ion batteries (“lithium ion batteries contained in equipment” or “lithium ion batteries packed with equipment”)
・Class: 9 *

* Although this product meets the criteria of “dangerous goods” and are classified as “lithium ion batteries”, depending on the battery’s total capacity in the packaging, etc., they may not be subject to the fully regulated provisions.

Regulation depends on region and transportation mode

・Worldwide - Air transportation:
ICAO/IATA-DGR [packing instruction 965 section IB or II]
(When shipping batteries “packed with” or “contained in” equipment, use packing instruction 966 or 967 as appropriate.)
・Worldwide - Ocean transportation:
IMO-IMDG Code [special provision 188]
・Europe - Ground transportation:
ADR [special provision 188]

* Instructions or provisions in the box brackets are conditions to make the battery cell exempted from full regulation.

15. REGULATORY INFORMATION

・Regulations specifically applicable to the product:
Wastes Disposal and Public Cleaning Law [Japan]
Law for Promotion of Effective Utilization of resources [Japan]
US Department of Transportation 49 Code of Federal Regulations [USA]

* About overlapping regulations, please refer to Section 14-TRANSPORT INFOMATION.

16. OTHER INFORMATION

- This safety data sheet is offered an agency who handles this product to handle it safely.
- The agency should utilize this safety data sheet effectively (put it up, educate person in charge) and take proper measures.
- The information contained in this Safety data sheet is based on the present state of knowledge and current legislation.
- This safety data sheet provides guidance on health, safety and environmental aspects of the product and should not be construed as any guarantee of technical performance or suitability for particular applications.

Reference

Dangerous Goods Regulations – 58th Edition Effective 1 January 2017: International Air Transport Association (IATA)
IMDG Code – 2016 Edition: International Maritime Organization (IMO)
The European Agreement concerning the International Carriage of Dangerous Goods by Road – 2017: The United Nations Economic Commission for Europe (UNECE)

First edition: Apr. 28, 2010
Prepared and approved by: Technology Planning Department
Rechargeable Battery Business Division
Sanyo Electric Co., Ltd.
Panasonic group