Safety Data Sheet (SDS)

Lithium Ion Battery Pack
(Contained in ZLand® Node)

Part Number(s)	**221.6947.0001 / 0002 / 0004**	
	221.7529.0001 & 0002	
SDS Revision	**I**	**May be used to comply with OSHA's HAZCOM Standard; 29 CFR 1910.1200 must be consulted for specific requirements.**
Date	**August 23, 2016**	
Approved by	**FairfieldNodal**	
	HSE Department	

Important Note: *As a solid, manufactured article per 29 CFR 1910.1200 (b)(6)(v) and (c), user exposure to potentially hazardous battery cell ingredients is not expected with normal prescribed use under normal prescribed conditions.*

The information contained in this Safety Data Sheet (SDS) contains valuable information critical to the safe handling and proper use of the product. This SDS should be retained and available for employees and other users of this product.

Remark: The information and recommendations set forth in this document are made in good faith upon information received from our suppliers and believed to be accurate as of the date of preparation. FairfieldNodal accepts no liability for loss or damage resulting from changes, errors, omissions, or misinterpretations of these materials or guidance.

Section 1 – Chemical and Company Identification

Commercial Product Name:
Assy, Case Bottom ZL
Part Number(s): 221.6947.0001 & .0002 & .0004,
221.7529.0001 & .0002

Use of Product:
Lithium Ion Battery Pack contained in ZLand® Node
ZLand Nodes; 221.6906.0001 to 0004 and 221.6906.0007 to 0011
ZLand, Ext Conn Nodes; 221.7520.0001 to .0004
ZLand, Aux Nodes; 221.7484.0001 & .0002

Manufacturer:
FairfieldNodal
Division: Systems

Company Identification
FairfieldNodal
1111 Gillingham Lane
Sugar Land, Texas 77478, USA
281-275-7500
www.FairfieldNodal.com

Emergency Contact:
CHEMTREC
800-424-9300 **(US and Canada)**

+(703) 527-3887 **(International and Maritime Telephone Number)**

Section 2 – Hazards Identification

Lithium Ion Battery Pack contained in ZLand® Node

The battery encapsulated within fire retardant polyurethane (plastic) potting contained within the Zland® Node has been designed to withstand temperatures and pressures encountered under routine use for the unit's specific applications.

Under normal routine use there will be no contact with the batteries or potting by the user. There are no hazards present when proper methods for handling and storage of the Zland® Node are followed.

DO NOT attempt to open a Node and DO NOT utilize chargers or charging means other than those provided by FairfieldNodal.

Primary Routes of Entry	**Symptoms of Exposure** Under routine handling and use, there will be no effect from exposure
Skin contact - No effect under routine handling and use	**Skin contact -** No effect under routine handling and use
Skin absorption - No effect under routine handling and use	**Skin absorption -** No effect under routine handling and use
Eye contact - No effect under routine handling and use	**Eye contact -** No effect under routine handling and use
I**nhalation** - No effect under routine handling and use	I**nhalation -** No effect under routine handling and use
Ingestion - No effect under routine handling and use	**Ingestion -** No effect under routine handling and use

Reported as carcinogen - Not Applicable

Section 3 – Hazards Identification

Remark: *OSHA HAZCOM Standard – The Battery Pack contained within the ZLand® Node is not considered "hazardous" per 29 CFR 1910.1200.*

Assembly Case Housing	ABS Plastic	Not Hazardous
Printed Circuit Board Assembly	PCB	Not Hazardous
Lithium Ion Battery Pack	LiB	Not Hazardous
Polyurethane Enclosure	Potting	Not Hazardous

Zland® Node Battery Pack Information
Each ZLand® Node contains 20 Lithium Ion, 3.7 V, 2.6 Ah cells.
The watt hours (Wh) for the UN tested battery pack contained in the ZLand® Node: 192.4 Wh

Hazardous Ingredients	%	CAS Number	Hazardous Ingredients	%	CAS Number
Metal Oxide (proprietary)	20-50		Metal Oxide (proprietary)	20-50	
Carbon (proprietary)	10-30	7440-44-0	Carbon (proprietary)	10-30	7440-44-0
Electrolyte (proprietary)	10-20		Electrolyte (proprietary)	10-20	
Aluminum Foil	2-10	7429-90-5	Aluminum Foil	2-10	7429-90-5
Copper Foil	2-10	7440-50-8	Copper Foil	2-10	7440-50-8
Polyvinylidene Fluoride (PVDF)	<5	24937-79-9	Polyvinylidene Fluoride (PVDF)	<5	24937-79-9
Stylene-Butadiene-Rubber	<1		Stylene-Butadiene-Rubber	<5	9003-55-8
Stainless steel, Nickel and inert materials	Remainder	N/A	Alumunum and inert materials	Remainder	N/A

Section 4 – First Aid Measures

There are no hazards present when proper measures for handling, charging and storage of the ZLand® Nodes are followed. Under normal circumstances, the chemicals contained in the cells of the battery pack are contained in the sealed (potted) battery assembly.

Risk of exposure can occur if the cells are exposed or abused. The contents of the cells can cause respiratory / skin / eye irritation once they are exposed. In the event physical damages occur to the battery pack resulting in leakage of the cells' contents, individuals coming in contact with those materials should follow these steps:

Skin contact – Wash affected area thoroughly with soap and water and consult a physician.

Eye contact – **DO NOT RUB EYES …**Rinse eyes with water for 15 minutes and consult a physician.

Inhalation – If inhalation of burning materials occurs, leave the affected area immediately. Have the affected person blow his / her nose and gargle some water. Seek medical attention if necessary or consult a physician.

Ingestion – Ingestion of battery materials is highly unlikely, but in the event that it does occur, have the affected person drink plenty of water to dilute the chemicals. **Do NOT induce vomiting.**
Call the National Battery Ingestion Hotline at 202-625-3333 (24 hr. / day) for advice and procedures to treat the ingestion of battery chemicals.

Section 5 – Fire Fighting Measures

General Hazard
Cells within battery pack are not flammable but internal organic materials within the cells will burn if the cell is incinerated. Combustion products include, but are not limited to hydrogen fluoride, carbon monoxide and carbon dioxide.

Extinguishing Media
Use extinguishing media suitable for the materials that are burning. In the case of fire, water, sand, vermiculite or CO2 will extinguish an incipit stage fire.

Special Firefighting Instructions
If possible, remove cell(s) from firefighting area. If heated above 125°C, cell(s) may explode/vent.

Firefighting Equipment
Use NIOSH/MSHA approved full-face self-contained breathing apparatus (SCBA) with full protective gear.

In the case of a lithium ion battery fire, the extinguishing media may not entirely extinguish the burning battery pack, but it cools the adjacent batteries and controls the spread of the fire. Typically enclosed battery packs burn themselves out after they've depleted their charge. Virtually all fires involving lithium ion can be controlled with CO2 or water. When water is involved, however, hydrogen gas may be released which can form an explosive atmosphere.

Section 6– Accidental Release Measures

On Land
Place material into suitable containers and call local fire/police department.

In Water
If possible, remove from water and call local fire/police department.

Section 7 – Handling and Storage

DO NOT attempt to open a Node.
DO NOT utilize chargers or charging means not provided by FairfieldNodal.

Handling
No special protective clothing required for handling battery packs.
Use only FairfieldNodal supplied chargers and charging procedures
Do not disassemble a node unit without prior expressed permission from FairfieldNodal.
Do not bypass safety devices or equipment
Do not attempt to charge a known physically damaged unit.

Battery Storage
Improper storage of a Node may result in battery pack capacity reduction, reduction of calendar and cycle life, loss of function, or a possible safety hazard.
Do not allow ZLand® battery packs to be depleted for more than 30 days.
Idle Storage Mode: Fully charge battery pack prior to storage and ensure Node is in Idle Mode (single LED Flash). Maintain ambient temperature within the temperature range -20°C (-4°F) to 40°C (104°F). Recharge every 60 days.
Sleep Storage Mode: Fully charge battery pack prior to storage. Place Node in Sleep Mode by selecting the option from the RUM global screen and disconnecting the unit (no LED Flash). Maintain ambient temperature within the temperature range -20°C (-4°F) to 40°C (104°F). Recharge every 120 days.

Battery Charging
Charge ARU battery packs only in ambient temperatures between 3°C (37°F) to 40°C (104°F).
Charging should be done soon after Node retrieval, preferably before battery depletion. If a Node battery pack becomes depleted, it must be recharged within 30 days.
Charging can be started in any state of charge.

Attempting to charge outside the acceptable temperature range may lead to abnormal termination of the charge cycle. The operator should disconnect and reconnect the unit to the charging unit when the temperature, respectively, is outside and then comes within the acceptable range [see above].

Battery Discharging or Use
Discharge or use Nodes only between –40°C (–40°F) and 60°C (140°F).

A common mistake is to allow a battery pack to sit for weeks or months without recharging, as recommended. Self-discharge drains power and eventually discharges the battery pack beyond the normal depleted state, potentially leading to permanent damage.

Section 8 – Exposure Controls / Personal Protection

Engineering controls
Keep away from heat and open flames; store per Manufacture recommendations, See Section 7 concerning Handling and Storage.

Personal Protection Equipment

Respirator	Eye/face protection	Gloves	Foot protection
Not required during normal operations **Fire** - Use NIOSH/MSHA approved SCBA with full protective gear.	Not required beyond safety practices of employer. See ANSI Z87.1-2010	Not required for handling of battery packs Chemical resistant gloves should be used if handling damaged Nodes	Steel toed shoes recommended for ZLand® Node container handling. See ASTM F2413 or ANSI Z41

Section 9 – Physical and Chemical Properties

State	Solid	**Boiling point**	N/A
Odor	N/A	**Solubility in water**	Insoluble
PH	N/A	**Specific gravity**	N/A
Vapor pressure	N/A	**Density**	N/A
Vapor density	N/A	**Appearance and Odor**	Geometric, Solid

Section 10 – Stability and Reactivity

Reactivity	None	**Stability**	Stable under routine use
Incompatibilities	None during normal operation	**Hazardous Decomposition Products** None during normal operating conditions If cells are exposed to open flame, hydrogen fluoride and carbon monoxide may be released.	
Conditions to Avoid		Avoid exposure to heat, open flame, and corrosives. **Do not puncture, crush, or incinerate**.	

Section 11 – Toxicological Information

This product does not emit toxins during routine handling and use.

Sensitization No
Teratogenicity No
Reproductive Toxicity No
Acute Toxicity No

If the cells are opened or exposed through misuse or damage, isolate and make preparations for recycling or disposal of damaged units. Internal components of cell may be irritants and sensitizers.

Section 12 – Ecological Information

Some materials within the cell are bio-accumulative. Under normal conditions, these materials are contained within the cells which are contained within the potted battery pack, and pose no risk to persons or the surrounding environment.

Section 13 – Disposal Considerations

Disposal - Recommended methods for safe and environmentally preferred disposal:

- Undamaged Product
  - Undamaged nodes are not subject to regulations for disposal by the US EPA.
  - Undamaged nodes are classified as “non-hazardous” under OSHA 29 CFR 1910.1200
- Contaminated or Damaged Package
  - If internal materials leak, due to damages or exposure to fire, dispose of unit as industrial waste(s), which may be subject to special control depending on local regulations.
  - California regulated debris RCRA waste code: “Non-Regulated”

Note: It is not recommended by FairfieldNodal for users to throw any used equipment into the environment. Please make all reasonable attempts to recycle all FairfieldNodal products through a reputable and licensed recycling company. Always dispose of all products according to all federal, state, and local regulations

Damage(s) - If the node case or lid suffers visible cracks or damage to the vent occurs, then the node should not be shipped without taking additional precautions.* The integrity of the case as tested will have been compromised. Failure to obtain

approval from the appropriate authorities prior to shipment could be viewed as a 'willful' violation and can involve criminal prosecution and penalties, in particular if there should be an incident or injury.

- Domestic Transport - Approval by the DOT Associate Administrator will be required. See 49 CFR 173.85 (f)
- International Transport – Damaged nodes may not be transported by air. See IATA, Section 2, Limitations.

NOTE

If shipping batteries for disposal or recycling please refer to 49 CFR Part 173.185 Lithium cells and batteries; paragraph (d) Lithium cells or batteries shipped for disposal or recycling. See 49 CFR part 173.185 (d).

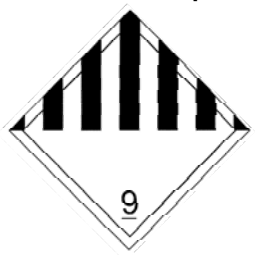
Section 14 – Transport Information

The ZLand® Node and Battery Pack have been designed, manufactured, and tested in accordance with the provisions of: the IATA Dangerous Goods Regulations (DGR); the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air; the UN Manual of Tests and Criteria (UN 38.3) as well as the US 49 CFR Part 178 Subpart M – Testing of Non Bulk Packagings and Packages. Copies of the testing results mentioned above are available by visiting http://www.fairfieldnodal.com/qhse/.

NOTE

Removing or attempting the removal of equipment contents and/or removal of the top cap form the case body or shipment without the top cap for any reason is prohibited.
If the node suffers visible damage that indicates there has been a compromise in the integrity of the construction case body or top cap, the node should not be shipped without taking additional precautions. Damaged Nodes may not be shipped by air.

Battery Packs Contained in Node

UN ID Number	UN3481	**Hazard Label Required**
DOT Proper Shipping Name	Lithium Ion Batteries Contained in Equipment	
Hazard Class	Class 9	
Packing Group	N/A	
Marine Pollutant	NO	

Dangerous Goods Regulations Lithium Ion Battery Shipping Criteria Detail
The watt hours (Wh) for the UN tested ZLand® Node battery pack: 192.4 Wh.

Net Weight per Package – Lithium Ion Batteries Contained in Equipment
The total weight of the battery packs contained in the ZLand® Node: 1.70 kg – Net per Package

NOTE

The node case housing the battery pack and its control technology has been designed and tested as a UN approved performance orientated shipping package for the transportation of dangerous goods in all modes of transportation. Copies of testing are available at http://www.fairfieldnodal.com/qhse/..

Air Freight

DGR Classification:	UN3481, Lithium Ion Batteries Contained In Equipment, Class 9, PI 967, Section I.
NOTE	Air Freight - Net Weight Limits per package: Passenger (PAX) = 5 kg Net per package or less Cargo(CAO) = 35 kg Net per package or less Carriage of lithium ion batteries is based on **net** kilograms of lithium ion battery packs **per** shipping package. Listing the net or gross weight of either the external node or shipping crate is incorrect. o If Shipper designates ZLand® Node(s) as the individual shipping package(s), transportation by **Passenger and/or Cargo Aircraft is allowed** with a proper Shippers Declaration for Dangerous Goods ▪ ZLand® Node: 1.70 kg – Net per Package o If Shipper designates the compartmentalized carry bag (node bag) as the shipping package ***then the package shall only be permitted on*** **Cargo Aircraft Only** with a proper Shippers Declaration for Dangerous Goods (greater than 5 kg but below 35 kg net) – ▪ Carry Bag @ 6 nodes per bag – 10.2 kg Net per package

Ground Transport (USA)

- Driver Qualification - A Commercial Driver's License (CDL) or CDL with a Hazmat Endorsement are *NOT* required to transport FairfieldNodal products over the highway within the United States. Consult Federal and State regulations to determine if your vehicle or combination vehicle (truck and trailer) requires a driver with a CDL, the type of CDL, or any specialized permits. Requirements can vary from State to State in the USA.
- Placarding (Class 9) is not required. [2]. Consult local regulation when transporting outside of the USA by ground.
- Shipping Papers - Nodes must be declared on all ground shipping papers as "HM" or 'Hazardous Materials' per U.S. regulations and must be available in the driver side pocket of the vehicle to the authorities during transit. Consult the regulations for the mandated retention time.

[1] See 49 CFR 383.93 (b) (4); 49 CFR 383.5, definitions: "Hazardous Materials"; 49 CFR 172.504 table 2 "class 9"
[2] See 49 CFR172.504 (f) additional placarding exceptions.

NOTE

If returning batteries for warranty work please refer to 49 CFR Part 173.185 Lithium cells and batteries; paragraph (f) Damaged, defective, or recalled cells or batteries.

Emergency Response

Refer to current Emergency Response Guides for; DOT (Land/Rail), IMGD (Ocean Transport), IATA-ICAO (Air Transport).

Fire - Refer to PHMSA Emergency Response Guide Book (ERG), Guide Section 147.
http://phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/Hazmat/ERG2016.pdf

Section 15 – Regulatory Information

The transport of rechargeable Lithium Ion batteries is regulated by various bodies, (IATA, IMDG, US-DOT) that follow the United Nations "Recommendations on the Transport of Dangerous Goods.

Regulations specifically applicable to the product:
ICAO Technical Instructions for the Safety Transport of Dangerous Goods by Air
IMO IMDG
IATA Dangerous Goods Regulations (DGR)
US Department of Transportation DOT (49 CFR 100-185), (USA)

OSHA hazard communication standard (29 CFR 1910.1200)
_____Hazardous ___✓___Non-hazardous

Safety The ZLand® battery pack has been designed and manufactured under a quality management program as described under the regulations, equipped with a means to prevent accidental activation and short circuits, incorporates a safety venting device, and does not allow reverse current flow.

Section 16 – Other Information

The information contained in the Safety Data Sheet is based on the present knowledge and current legislation.

The Safety Data Sheet provides guidance on health, safely, and environmental aspects for the product and should not be understood as any guarantee of technical performance or suitability for particular applications.

NOTE

Removing or attempting the removal of equipment contents and/or removal of the top cap from the bottom unit or shipment without the top cap for any reason is prohibited.