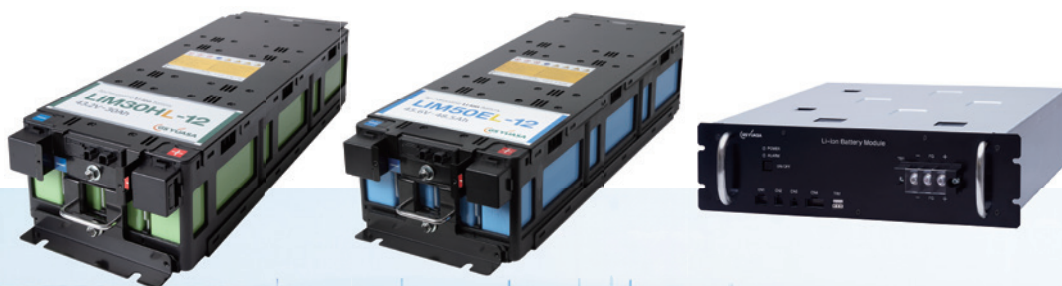


LIM Series: Industrial use Lithium Ion Battery:

LIM30HL

LIM50EL

LIM50EL-13



Creating the Future of Energy

INDEX

Line Up

LIM30HL Series 03



	Nominal Voltage(V)	Nominal Capacity(Ah)	The Number of Cells
LIM30HL-8	28.8	31.5	8
LIM30HL-12	43.2		12

LIM50EL Series 04



	Nominal Voltage(V)	Nominal Capacity(Ah)	The Number of Cells
LIM50EL-8	30.4	50	8
LIM50EL-12	45.6		12

LIBMII (Battery Management System) 05

LIM50EL Series 07



	Nominal Voltage(V)	Nominal Capacity(Ah)	The Number of Cells
LIM50EL-13	49.4	50	13

Installation Record 09

Telecom
Industrial Machinery
Energy Storage Systems

GS Yuasa lithium ion batteries are manufactured with high technical knowhow, have high reliability thus also used in the international space station. The industrial use lithium ion batteries (LIM series) are designed based on technology and knowhow achieved from over 20 years of manufacturing lithium ion batteries for space, airplane and vehicle applications. LIM series have been used in various applications since the start of mass production in 2002 and have continued to provide reliable battery power to customers all around the world.



Features of the LIM Series

1 Wide range applications

The LIM series is mainly divided into two types, the high energy type with large capacity and the high-power type which can do high current charge and discharge. The lineup has various module capacities thus making it possible to design suitable sizes for the various customer needs.

2 High Reliability

Excellent battery safety design.

High safety and reliability is realized by using a Battery Management System (BMS) and each battery module has a module monitoring PCB. This explains the rich installation record that has been achieved over more than 15 years since the start of mass production in 2002.

3 Long life

Designed to achieve long calendar life and high cycle life performance.

LIM30HL series have a cycle life performance of more than 30,000 cycle at DOD 100%.

4 High charge and discharge current performance

High power type battery has an industry top class of 600A (20C) charge and discharge performance. The high energy type battery also shows an excellent performance with maximum discharge current at 300A (6C).

5 PSOC (PARTIAL STATE OF CHARGE)

Not effected by partial state of charge (PSOC) operation. The formation of sulfate crystals that causes early failure in other battery chemistries is not a factor in this battery.

Product

High Power Modules

LIM30HL Series

Features

- Maximum charge and discharge rate of 20C
- High cycle life performance (More than 30,000 cycles*)
- Tolerance to cold temperatures of up to -20°C(-4°F)

*At DOD 100%, Temp 25°C

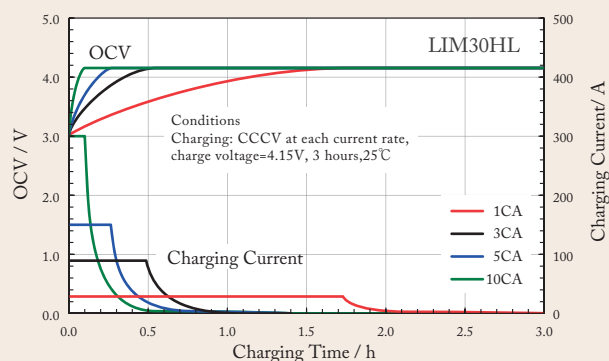
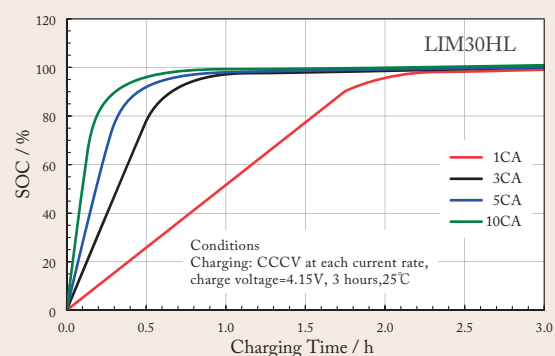


	LIM30HL-8	LIM30HL-12
The number of cells	8	12
Nominal Capacity (Ah)	31.5	
Nominal Voltage (V)	28.8	43.2
Maximum charge and discharge current (A)	600 (20C)	
Ambient Temperature (°C)	Charging: -10 Deg C ~ + 45 Deg C Discharging: -20 Deg C to 45 Deg C	
Weight (kg, lbs)	17.5kg 38.58Lbs.	27.0kg 59.52Lbs.
Dimension (L×W×H / mm, in)	440 × 219 × 128 mm 17.32 × 8.62 × 5.05 in	617 × 219 × 128 mm 24.29 × 8.62 × 5.04 in

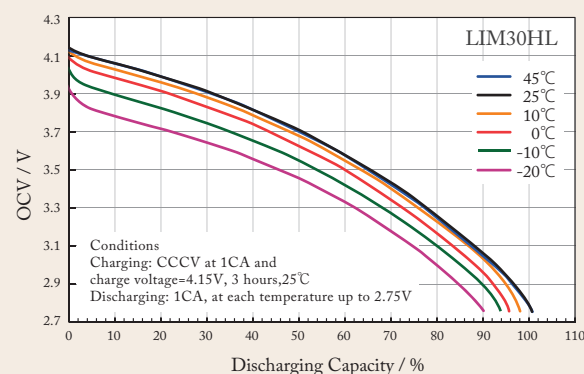
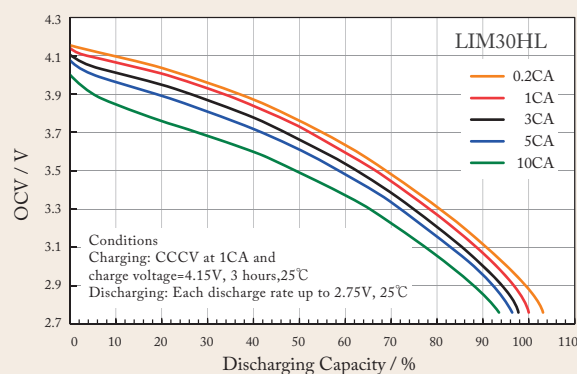
Applications

- AGV
*Automatic Guided Vehicle
- RTG
*Rubber Tired Gantry Crane
- Diesel Hybrid Train
- UPS

Charging Characteristics



Discharging Characteristics



The data is for reference purposes.
Actual performance varies by condition

High Energy Modules

LIM50EL Series

Features

- Maximum discharge rate of 6C,
Maximum charge rate of 2.5C
- Tolerance to cold temperatures of up to -20°C(-4°F)
- High cycle life performance (More than 11,000 cycles*)

*At DOD 100%, Temp 25°C

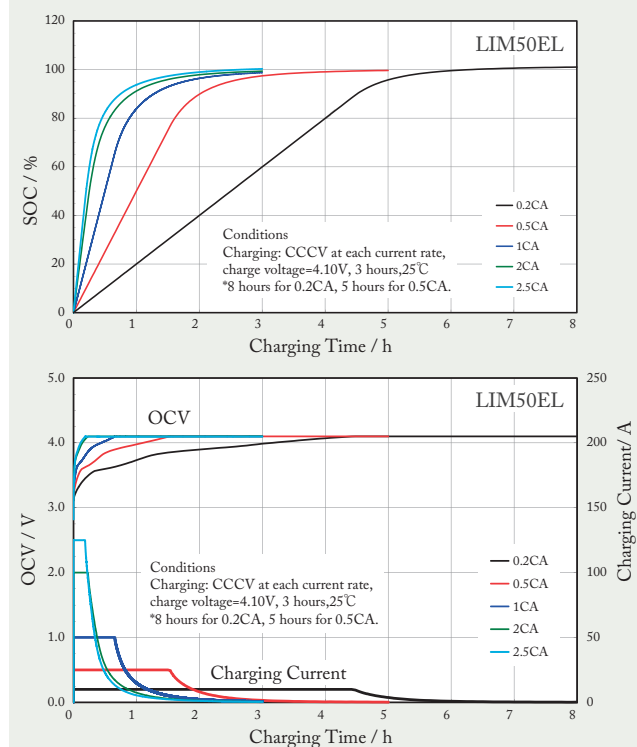


	LIM50EL-8	LIM50EL-12
The number of cells	8	12
Nominal Capacity (Ah)	50	
Nominal Voltage (V)	30.4	45.6
Maximum charge and discharge current (A)	Charge: 125 (2.5C), Discharge: 300 (6C)	
Ambient Temperature (C)	- 20 Deg C ~ + 45 Deg C	
Weight (kg, lbs)	18.0kg 39.68Lbs.	27.0kg 59.52Lbs.
Dimension (L×W×H / mm, in)	440 × 219 × 128 mm 17.32 × 8.62 × 5.05 in	617 × 219 × 128 mm 24.29 × 8.62 × 5.04 in

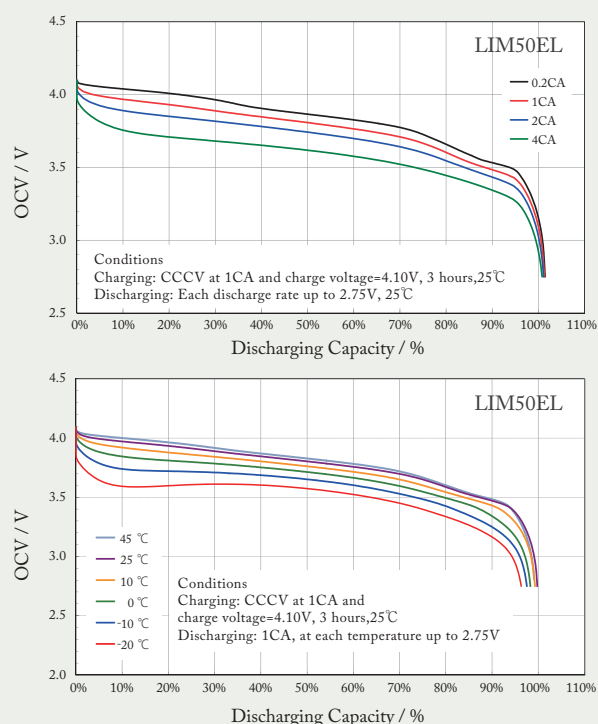
Applications

- UPS
*Uninterruptible Power System
- ESS
*Energy Storage System
- AGV
*Auto Guided Vehicle

Charging Characteristics



Discharging Characteristics



The data is for reference purposes.
Actual performance varies by condition

Product

Battery Management System (LIBM II)

The lithium ion battery requires appropriate battery management to protect the battery from over discharge, over charge, heat up etc. Each battery module is equipped with a battery monitoring PCB which measures and sends signals of cell voltage and module temperature to a battery management PCB (LIBMII) which protects the battery in case of overcharge, overdischarge, over heatup or over current.

Features

■ Balancing Function

Used to balance cell voltage of connected batteries.

■ State of Charge(SOC) Calculation

Automatically calculates SOC which can be monitored in real time via display.

■ Multiple Banks Batch Monitoring

Using a domain LIBMII which is master of LIBMIIs installed in each bank allows monitoring of large battery system.

■ High Voltage System Specification

Max DC1800V



LIBM II Specifications

	Standard Type	High Voltage Type
Input Voltage (V)	DC21~27	
Max Series Connection (Module)	26	53
Max Parallel Connection (Bank)	72	36
Ambient Temperature (°C)	-20 Deg C ~ + 65 Deg C	
Mass (g)	230 (Circuit Board), 800 (Touch Panel)	
Dimension (L×W×H/mm, in)	130×185×30(Circuit Board) mm, 59.5×169.5×137(Touch Panel) mm 5.12×7.28×1.18(Circuit Board) in, 2.34×6.67×5.39(Touch Panel) in	

■ Optional

Network card for monitoring Lithium ion battery
(Acroware-iGYnetworkAgent)

■ Web interface

Lithium ion battery charge and discharge status, battery voltage etc can be monitored via network.

■ Logging Function

Can record charging current, cell voltage, SOC and battery temperature. Recorded data can be downloaded by web interface or collected by using USB memory.

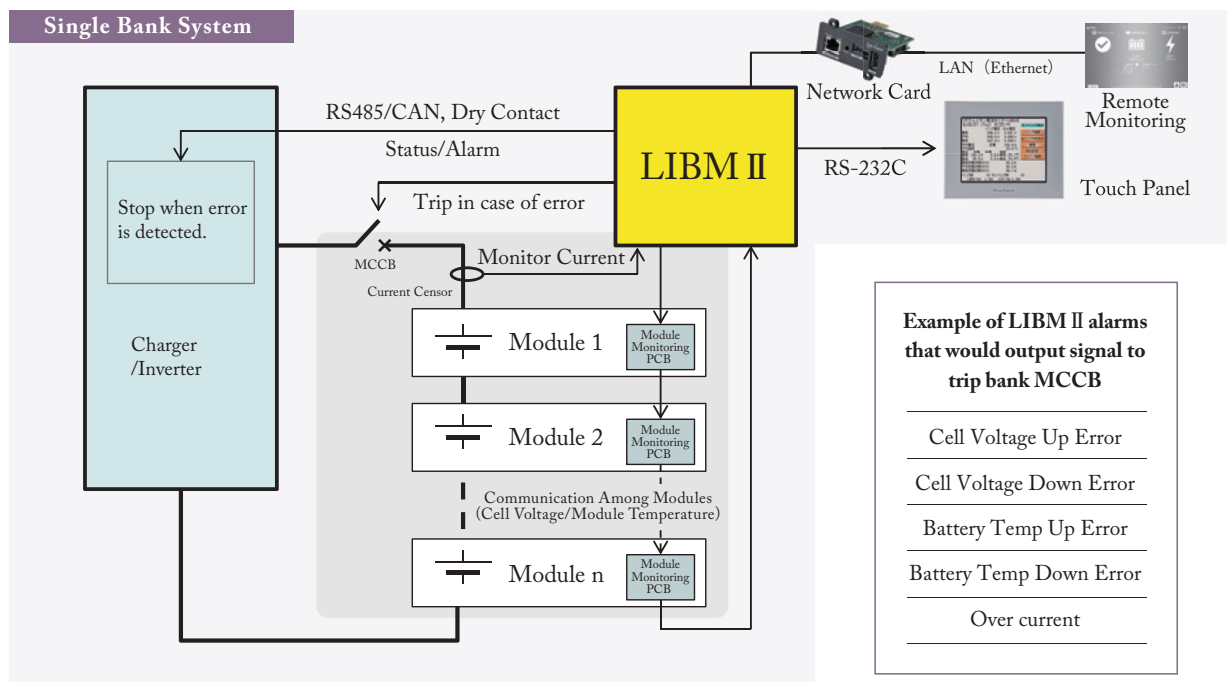
■ Modbus/TCP, SNMP Communication

Having multiple types of communication makes it possible to interface with various types of customer's device including remote monitoring systems.

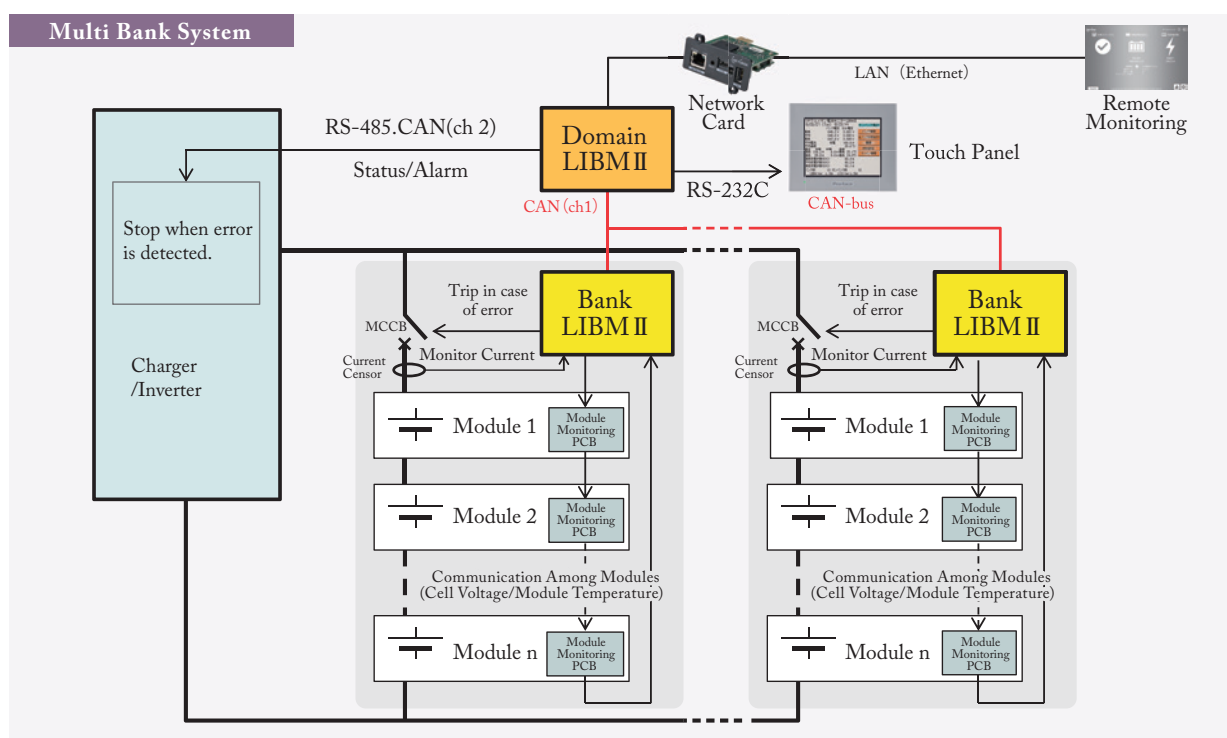


Battery Management System Overview

LIBMII collects data from the module monitoring PCB and outputs status of the battery to an external device. In case of an abnormality, LIBMII will independently send signal to bank MCCB to disconnect battery bank. For a single battery bank application, only one LIBMII is required. In case of multiple battery banks, one LIBMII for each bank and a domain LIBMII is required to monitor all banks.



LIBM II has two CAN Channels. Channel 1(ch1) is for monitoring battery status and Channel 2(ch2) is for communication with external device.



Product

High Energy type (DC 48V Applications)

LIM50EL-13

Features

- Maximum charge and discharge rate of 1C
- Tolerance to cold temperatures of up to -20°C(-4°F)
- High cycle life performance (More than 11,000 cycles*)
- Can be installed on 19-inch rack (3U)

*At DOD 100%, Temp 25°C

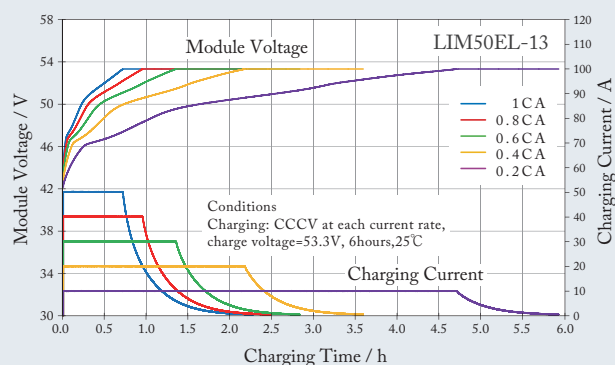
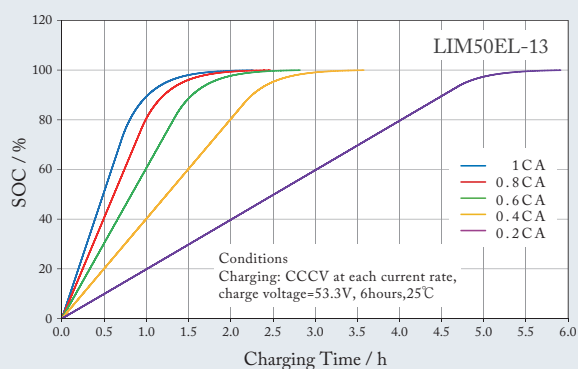


	LIM50EL-13
The number of cells	13
Nominal Capacity (Ah)	50
Nominal Voltage (V)	49.4
Maximum charge and discharge current (A)	50 (1C)
Ambient Temperature (C)	- 20 Deg C ~ + 50 Deg C
Weight (kg, lbs)	32.5kg 71.65lbs or under
Dimension (L×W×H / mm, in)	480×437×130mm 18.9×17.2×5.11 in *3U (Length: not including 32mm handles)
Multiple Connection	MAX 32 units
User Interface	
- dry contact	2 ch
- communication 1	CAN 2.0B 1ch
- communication 2	RS-485 1ch

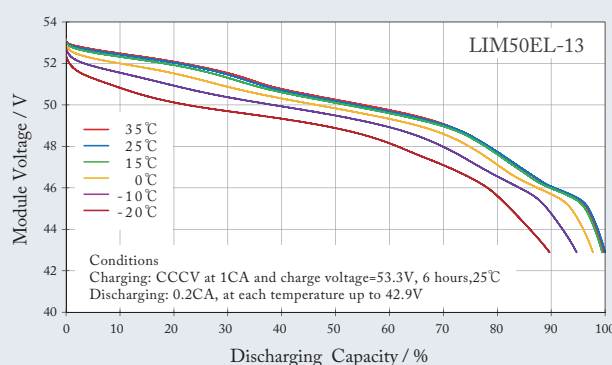
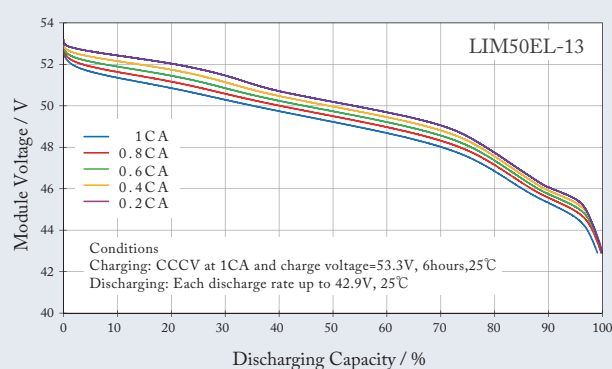
Applications

- Telecom
- CATV
*Community Antenna Television
- BTS
*Base Transceiver Station

Charging Characteristics



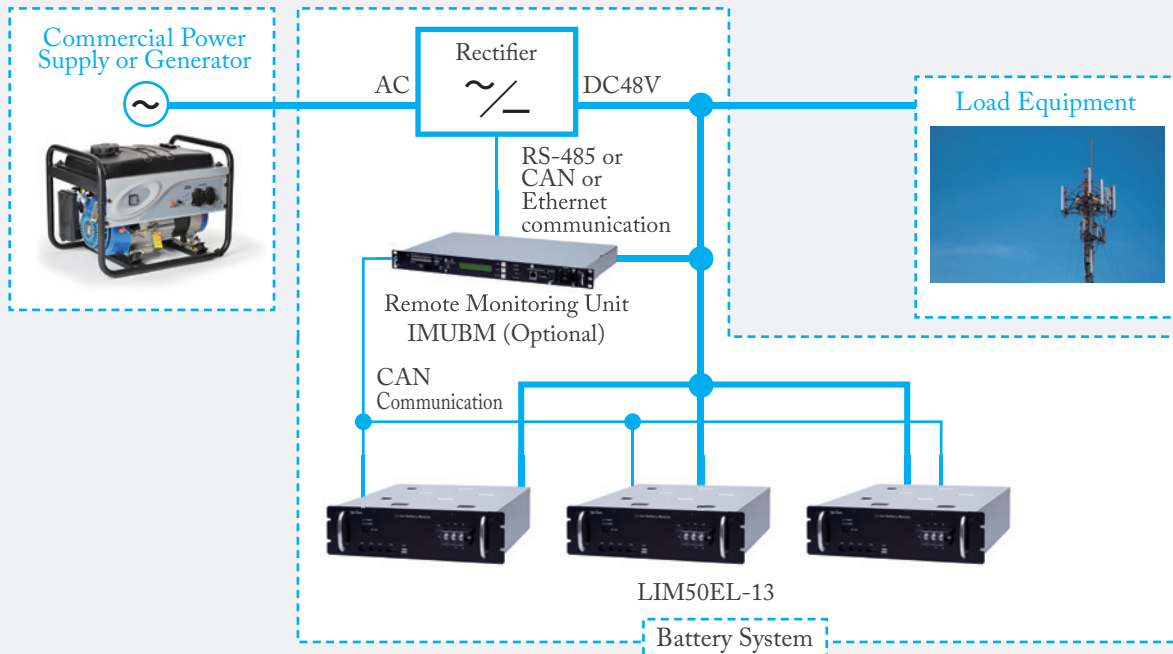
Discharging Characteristics



The data is for reference purposes.
Actual performance varies by condition

System Design

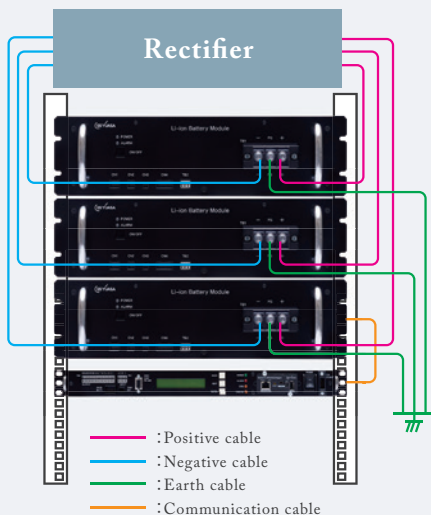
The LIM50EL-13 is a high-performance lithium ion battery module designed for telecom and other DC48V applications. It has an in-built BMS (Battery Management System) thus does not require an external BMS (LIBMII). An optional Remote Monitoring Unit (IMUBM) can also be installed to allow remote monitoring of the lithium ion battery status. LIM50EL-13 has excellent cycle life performance and can charge at 1C thus reducing the Total Cost of Ownership (TCO) in regions with unstable or unavailable grid



Installation image

LIM50EL-13 can be mounted onto a 19 inch rack making installation and maintenance easy. In addition, using LIM50EL-13 will save space and have less weight compared to lead acid batteries. Battery capacity can be flexibly increased to match customer needs by connecting multiple modules in parallel.

Wiring example



An example of Implementation in 19 inch Rack



Remote Monitoring Unit IMUBM (Optional)

IMUBM is a battery monitoring unit which can combine output signals and information from multiple modules connected in parallel.

The size is only 1U, therefore this unit can be installed in same rack/cabinet as modules.

Product name	Battery Monitoring Unit
Input Voltage	DC38 ~ 60V
Dimensions (W×D×H)	W439 × D282 × H42mm (not including protruding part)
Weight	4kg
Ambient Temperature	- 20 ~ 50°C
external signal output Interface	Input signals : 2ch Out put signals : 7ch CAN, RS485, Ethernet (SNMP, Modbus TCP, Web Monitoring), USB1.1X1(TypeA)
Mutiple Connections	Max. 32 units

Installation Record

Telecom

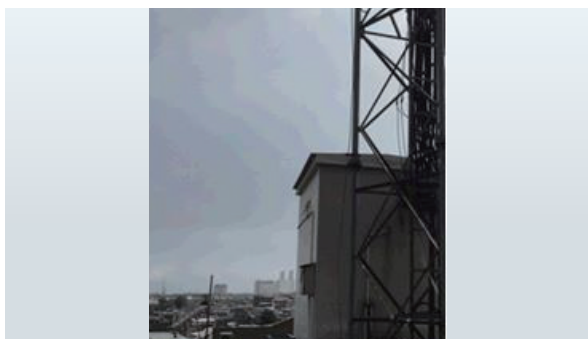
True Corporation Group

Application : Backup for Cable TV
Capacity : 2kWh
Operation Start Date : October, 2015



Axiata Group

Application : Backup for Base Station
Capacity : 12kWh
Operation Start Date : September, 2016



Industrial Equipment

ZPMC

Application : Automatic Guided Vehicle
Capacity : 316kWh/vehicle
Operation Start Date : Jan, 2017



Japan Freight Railway Company

Application : Train
Capacity : 67kWh
Operation Start Date : February, 2012



Sumitomo Heavy Industries Material Handling Systems. Co.,Ltd.

Application : Transfer Crane
Capacity : 14kWh/crane
Operation Start Date : July, 2008



Energy Storage

Tokyo Tama Intercity Monorail Co.,Ltd.

Application : Regenerative Power Absorption/
Emergency Running

Capacity : 75kWh(Power Absorption),
203kWh(Emergency Running)

Operation Start Date : July, 2016



Parker Hannifin Corp.

Application : Energy Storage

Capacity : 5MWh

Operation Start Date : Oct, 2016



Chugoku Electric Power Co.,Inc.

Application : Output Fluctuation Regulation
for Renewable Energy

Capacity : 1,350kWh

Operation Start Date : September, 2015



TOBU Railway co.,Ltd.

Application : Regenerative Power Absorption

Capacity : 104kWh

Operation Start Date : October, 2012





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