

## 12Ah/45Wh Lithium-ion Cell for Space

- *High Power*
- *Long Cycle Life*
- *Configuration Controlled*

Inspired by GS Yuasa's mature aviation and automotive cell designs, the LSE12x Li-ion cell is specially designed and qualified for space applications. Incorporating GS Yuasa's industry leading Generation 4 Lithium Cobalt Dioxide chemistry for space with electrode optimizations focused on high power delivery, this cell will provide manufacturers of launch vehicles and small to medium power class spacecraft unprecedented access to GS Yuasa's best in class Li-ion cells for space. For over 20 years GS Yuasa has manufactured ultra high reliability Li-ion cells for commercial, national defense and human rated space missions, including the main battery of the International Space Station.

### Features

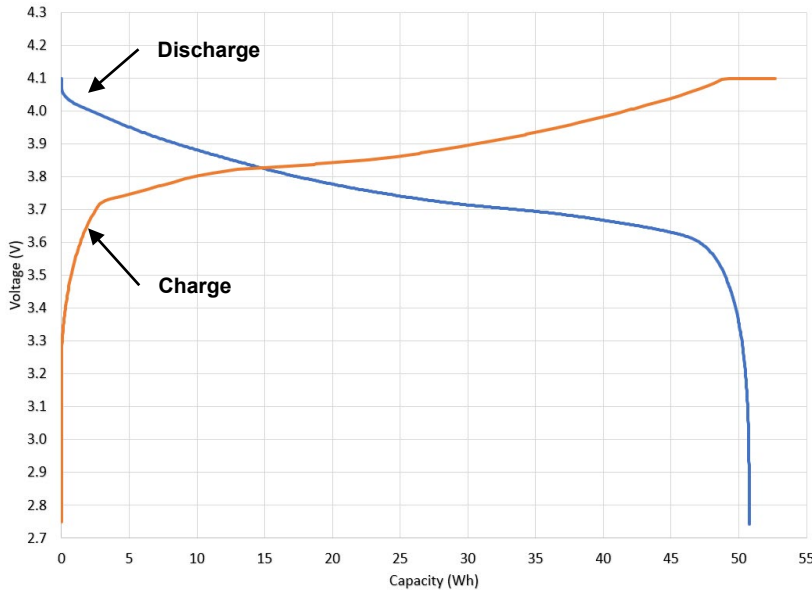
- GS Yuasa's Generation IV Lithium Cobalt Dioxide Chemistry
- Extremely Low DCR
- Excellent Discharge Characteristics
- Excellent Cycle & Calendar Life
- High Discharge Voltage – Ideal For "Battery On Bus" Applications
- Case Neutral Design
- Wound Prismatic Construction
- Hermetically Sealed
- Suitable For All Spacecraft Types

### Specifications

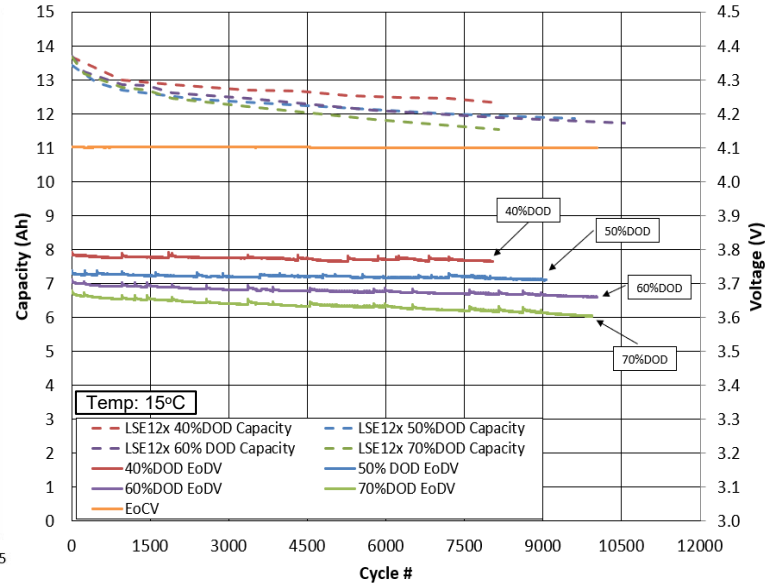
BOL Capacity	4.1V-2.75V	13.6 Ah, 51.0Wh
	*4.2V-2.75V	15.0 Ah, 56.3Wh
Nameplate Capacity		12 Ah, 45Wh
Nominal Discharge Voltage		3.75 V
Continuous Charge Rate		6A
Continuous Discharge Rate		12A
Pulse Discharge Rate		120+A
DCR @ 50% Discharge 15deg.C		<6 mΩ
Nominal Cell Impedance		1.1mΩ
Mass		0.390 kg

The LCO chemistry and low DCR electrode design combine to produce an exceptionally high discharge voltage under load. This makes the LSE12x an ideal choice for battery on bus applications or high power payloads which require stable power delivery under demanding loads.

## Characteristic Charge/Discharge



## High DOD LEO Cycle Performance



### 15°C Charge and Discharge Performance

CC/CV Charge Conditions:

Constant Current at 0.5C rate (6A) then Constant Voltage at 4.1V  
Total charge time 4 hours

Discharge Conditions:

1C rate (12A) to 2.75V termination

### Cycle

40%DOD  
50%DOD  
60%DOD  
70%DOD

### Charge

CC/CV 0.5CA, 4.1V 1hr  
CC/CV 0.6CA, 4.1V 1hr  
CC/CV 0.7CA, 4.1V 1hr  
CC/CV 0.8CA, 4.1V 1h

### Discharge

0.8CA for 0.5hr  
1.0CA for 0.5hr  
1.2CA for 0.5hr  
1.4CA for 0.5hr

## Qualification Environmental Test Levels

### Sine Vibration Levels

Frequency / Hz	Level
5 to 27.9	6.4 mm (Single amplitude)
27.9 to 100	196 m/s <sup>2</sup> (20g)

Sweep rate: 2 oct/min

### Random Vibration Levels

Frequency / Hz	Level	Grms
20 to 58	+6 dB/oct	23.63
58 to 700	48.02 (m <sup>2</sup> /s <sup>4</sup> )/Hz (0.5 g <sup>2</sup> /Hz)	(231.57 m/s <sup>2</sup> rms)
700 to 2000	-6 dB/oct	

Period: 3 minutes

### Shock Levels

Frequency / Hz	Level
200	392 m/s <sup>2</sup> (40 g)
200 to 2000	+9.296 dB/octave
2000 to 7000	13,720 m/s <sup>2</sup> (1400 g)

