

Lithium Ion Cells For Satellites – Energy Optimized

GS Yuasa has manufactured space qualified lithium ion cells since 1998. GS Yuasa lithium ion cells have provided orbital vehicles more than 1,350,000 Wh of combined energy storage capacity without failure or anomaly.

More than 65 space missions have relied on GS Yuasa lithium ion cells. Customers include: Orbital Sciences Corporation, Johns Hopkins University APL, Space Systems Loral, Thales Alenia Space, and JAXA & ISRO.

LSE Gen III: Energy Type Cells Ideal for GEO Missions

The Gen III family of Li-ion cells retains the same physical configurations and manufacturing processes that have been proven through GS Yuasa's industry leading spaceflight heritage. These cells benefit from minor and well-understood adjustments to the Gen II heritage chemistry to deliver outstanding reliability, performance and service life.

Features

- High energy density
- Excellent discharge characteristics
- Predictable capacity retention
- Excellent cycle life
- Excellent calendar life
- Hermetically sealed
- Anodized aluminum case and cover
- Wound prismatic construction

LSE Gen III Overview:

- Evolution of the Gen II chemistry
- Same physical construction as Gen II
- Same manufacturing process as Gen II
- Uses GEN II heritage components

LSE Gen III Enhancements:

- Increased capacity
- Improved capacity retention
- Higher average discharge voltages
- Reduced DCR growth



Cell Specifications		LSE110	LSE145	LSE190
Chemistry		Lithium Cobalt Oxide		
Space Qualified		Yes	Yes	Yes
Cell Capacity				
Capacity (Ah)	Nameplate	110	145	190
	BOL	122	161	205
Energy (Wh)	Nameplate	407	536	703
	BOL	451	595	758
Specific Energy at BOL (Wh/kg)		163	168	165
Energy Density at BOL (Wh/L)		334	348	373
Cell Electrical Specifications				
Nominal Voltage (V)		3.7	3.7	3.7
End of Charge (V)		4.1	4.1	4.1
End of Discharge (V)		2.75	2.75	2.75
Max. Continuous Charge Current (A)		55	72.5	95
Max. Continuous Discharge Current (A)		110	145	190
Max. Pulse Discharge Current (A) (5 seconds)		330	435	570
Cell Mechanical Properties				
Dimensions (mm)	Width	130	130	165
	Thickness	50	50	50
	Height *	208	263	263
	Weight (kg)	2.77	3.55	4.59
	Volume (L)	1.35	1.71	2.03
Temperature range (°C)				
	Charge	10 ~ 35	10 ~ 35	10 ~ 35
	Discharge	-10 ~ 35	-10 ~ 35	-10 ~ 35
	Storage	-10 ~ 10	-10 ~ 10	-10 ~ 10

* Excluding terminals.

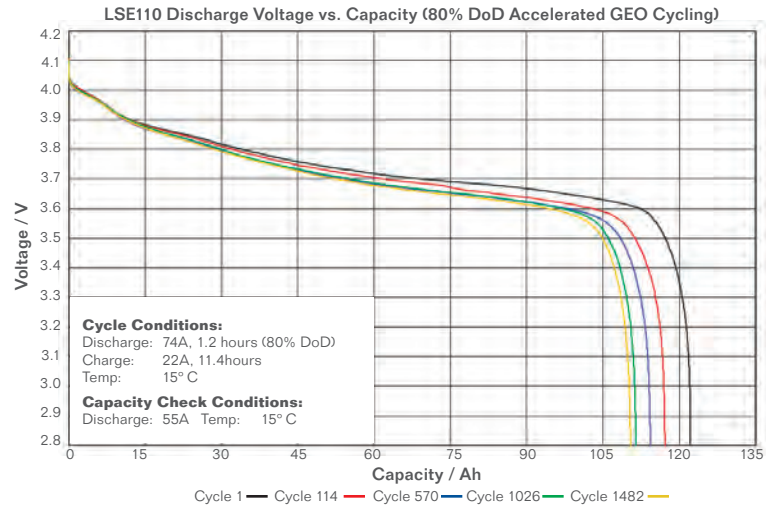


For information on other specialty cell sizes please contact GYLP. Cell design details and specifications are subject to change without notice.

LSE Gen III Cell Performance Characteristics

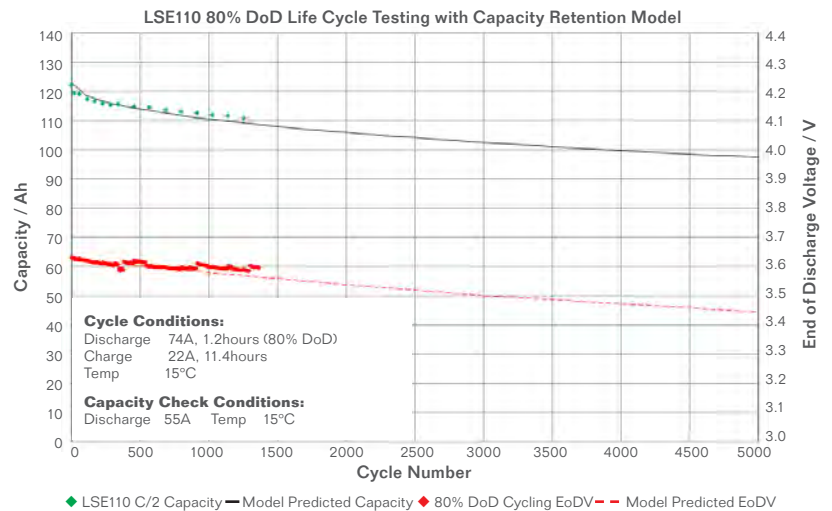
Gen III Chemistry Demonstrates:

1. Superior voltage stability
2. Excellent capacity retention through cycling
3. Suppressed DCR growth through cycling
4. Greater watt-hour retention through cycling



80% DoD Life Cycle Test and Model Validation

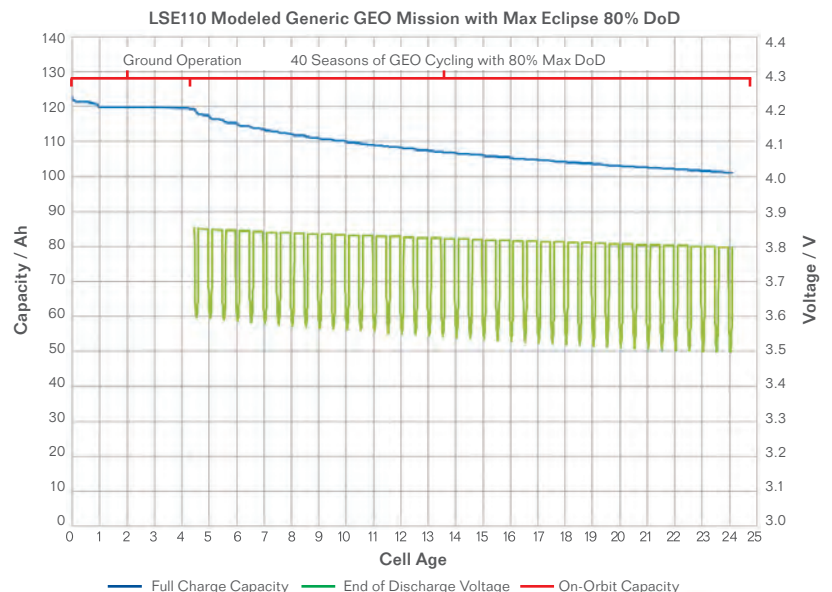
1. LiCoO₂ based cell technology has well-understood cycling parameters and ages predictably.
2. GS Yuasa's Life model can accurately predict capacity and EoDV retention.
3. GS Yuasa's life model has been validated against a database of more than 700 cell years of test data.



Simulated GEO Mission

1. Modeling of cell performance in profiles with frequently changing orbital parameters is possible with GS Yuasa's advanced modeling software as demonstrated by the simulated 40 season GEO mission.

GS Yuasa's advanced life and performance modeling capability supports the selection of optimal cell and battery configuration for a given use case.



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GS YUASA LITHIUM POWER
QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
 = ISO 9001:2008 AND EN/JISQ/AS9100:2009 =

