

Vitzrocap

Electric Double Layer Capacitor



VITZROCAP always with you

CEO MESSAGE

“Vitzrocell, a world-class portable power solution provider!”

Vitzrocell has been recognized as one of the best power providers and the most reliable manufactures of Lithium Primary Batteries in the world. We're proud of the full-fledged range of products suitable for various application.

And our teammates of R&D, Marketing & Sales, Factory, and so on is duly ready and resourceful enough to offer the added value which you have not had taste before. Based on more than 30 years of accumulated know-how, we are glad to have achieved a leading position in the world wide markets.

Considering the remarkable growing demand for portable power solutions and our continuous innovation activities, we're convinced Vitzrocell will be able to make our valuable customers, partners, and the stakeholders happy with the enduring profitable growth with Vitzrocell. We humbly would like to invite you to enjoy and share the promising business opportunity with us as a strategic Partner.

VITZROCELL

president Paul Jang



Core Value

Longing for happy and great workplace of Vitzrocell family and the stakeholders.

Mission

To Enhance Smart, Safe, and Green World as a dedicated power solution provider.

Golden rule(3C1I)

Creativity,
Change,
Challenge,
Innovation

COMPANY HISTORY



VITZROCELL's Past, Present and Future

- 1987~1991** 1987.10 Establishment Teckraf Co., Ltd. (at present Vitzrocell)
1988.05 Technical Adoption of Cell with Wilson Greatbatch USA
1990.04 Registration as a Supplier of Ministry of National Defense
1990.05 Establishment Factory Line in Hap-duk
1991.05 Establishment of R&D Center
- 1992~2000** 1993.10 Nominated as a Sole Manufacturer for Korean Military
1996.01 UL Approval
1998.01 Establishment Factory Line in Ye-san
1998.08 Acquired ISO 9001 Quality Certification
2000.05 Unification of CI and declaration of Vitzro Group
- 2001~2010** 2002.06 Changed Company Name to Vitzrocell from Teckraf
2004.06 Designated as Technology Company from KIBO
2004.11 Granted USD 10Million Exportation Prize
2005.05 Awarded "Advance Technology and R&D Center (ATC)"(MKE)
2006.03 Acquired Environment System Certification (ISO 14001)
2006.09 Started Research & Development of EDLC
2007.11 Acquired Defense Quality Management System Certification from DTaQ
2009.05 Grand Prix Prize of Excellent Corporate Management in Chungnam Province
2009.10 VITZROCELL Listed on KOSDAQ
2009.11 "The Technology Fast 500" by Deloitte
2010.07 Awarded "Excellent Labor-management Company" by Ministry of Labor
2010.11 Awarded a Prize of 20Million Export
2010.12 NEP Approval (Ministry of Knowledge & Economy)
- 2010~Now** 2011.11 Awarded "Excellent Create Employment Company" by Chungnam Province
2012.05 Awarded "World Class 300 Company" (Ministry of Knowledge & Economy)
2012.08 Acquisition of Exium Technologies., Inc.
2012.10 Establishment of 2nd factory and the expansion of 1st factory
2013.07 Awarded "Excellent Labor-Management Company" by Ministry of Labor
2013.10 Awarded "Global Specialized Company" by Ministry of Trade Industry and Energy
2013.11 Awarded a prize of USD 30 Million export (July, 2012 ~ June, 2013)
2014.11 Awarded a prize of USD 50 Million export (July, 2013 ~ June, 2014)
2015.08 Changed Company Name to Vitzrocell USA from Exium Technologies Inc.
2015.12 Awarded "Presidential Citation"

Electric Double Layer Capacitor

Vitzrocap

Part Number

VSCS 002R7 305 ■■■■■

>>> Internal Code

Special Code	S : Standard U : Unique, etc
Terminal Type	S : Snap in C : Screw L : Lead W : Welding, etc
Terminal Number	2 or 4 PIN
Internal Code 1	A, B, C given in case of make-to-order
Internal Code 2	A : Active Balance P : Passive Balance

>>> Nominal Capacitance

Capacitance	Symbol	Capacitance	Symbol
3F	305	50F	506
5F	505	100F	107
10F	106	120F	127
25F	256	350F	357

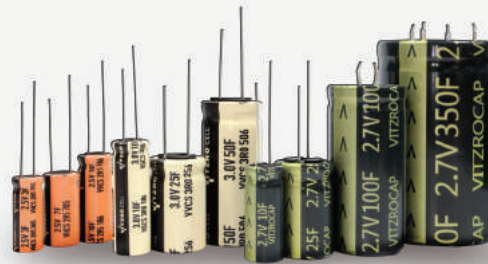
>>> Rated Voltage

Rated Voltage	2.7V	3.0V	5.4V
Symbol	002R7	003R0	005R4

>>> Serial Name

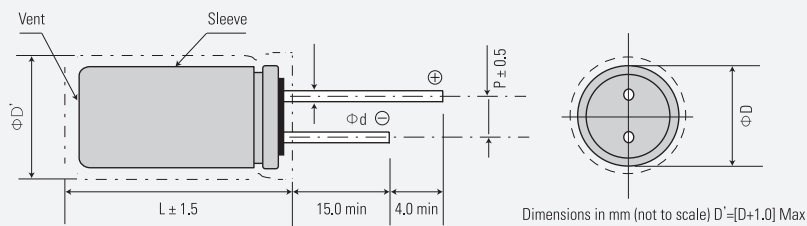
V	Simplified from of Vitzro
S	S : Standard H : High Temp. P : High Power L : Leakage Intension V : High Voltage
C	C : Cylindrical P : Prismatic H : Pouch N : Coin etc.
S	S : Single Cell M : Module

Electric Double Layer Capacitor Single Cell

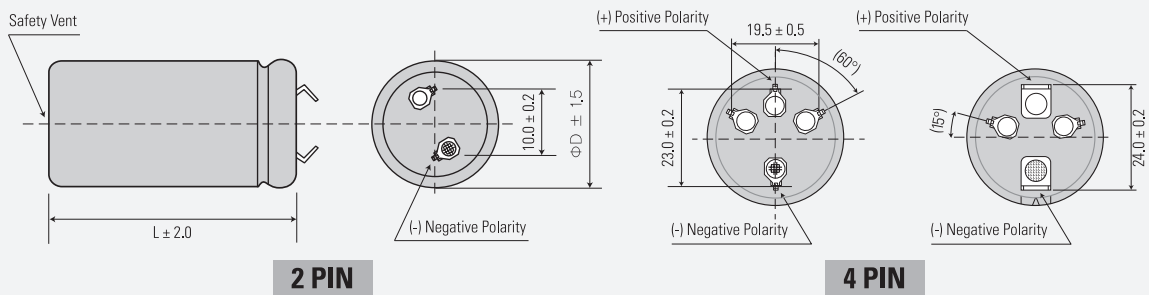


- >>> **Features**
- Cylindrical Cell
 - Radial Lead / Lug Terminals
 - Very Low ESR(High-power density)
 - Compliant with RoHS, UL, and REACH requirements

>>> **Lead Terminal**



>>> **Lug Terminal**



>>> **Standard Products**

Item		Performance		
Rated Voltage(V _r)		2.7 volts	3.0 volts	2.5 volts
Nominal Capacitance Range		3 to 500 F	3 to 500 F	3 to 350 F
Capacitance Tolerance		-10% to +30% (at 25°C)	-10% to +30% (at 25°C)	-10% to +30% (at 25°C)
Operating Temperature Range		-40°C to 65°C	-40°C to 65°C	-40°C to 85°C
Endurance		After 1,000 hours at rated voltage loaded under +65°C and +85°C the capacitor shall meet the specified endurance limits :		
		Capacitance change ≤30% of initial value		
		Internal resistance ≤2 times of specified value		
Temperature characteristics	Measurement	At -40°C, 25°C, 65°C	At -40°C, 25°C, 65°C	At -40°C, 25°C, 85°C
	ΔC	±5% of initial value		
	Internal resistance	2 times of specified value		
Cycle Life Characteristics	500,000 cycles	Capacitance change ≤30% of initial value		
		Internal resistance ≤2 times of specified value		
Shelf life		After 1,000 hours storage at +65°C(2.7V), +65°C(3.0V) and +85°C(2.5V) without load, the capacitor shall meet the specified endurance limits of endurance.		

Electric Double Layer Capacitor

Single Cell

>>> Lead Terminal

Part Number	Rated Voltage (V)	Operating Temperature Range	Capacitance (F)	Internal Resistance(mΩ)		Leakage Current (mA, 72hrs)	Size (mm)			Energy Density (Wh/kg)
				AC(1kHz)	DC		D x L	P	d	
VSCS 002R7 305	2.7	-40°C to 65°C	3	≤ 60	≤ 70	0.008	08 x 20	4	0.6	2.1
VSCS 002R7 505			5	≤ 40	≤ 50	0.012	10 x 20	5.5	0.6	2.4
VSCS 002R7 705			7	≤ 35	≤ 45	0.020	10 x 20	5.5	0.6	3.3
VSCS 002R7 106 U			10	≤ 30	≤ 35	0.030	10 x 25	5.5	0.6	3.7
VSCS 002R7 106			10	≤ 25	≤ 30	0.030	10 x 30	5.5	0.6	3.4
VSCS 002R7 156			15	≤ 30	≤ 33	0.060	13 x 25	5.5	0.6	3.3
VSCS 002R7 256			25	≤ 20	≤ 25	0.068	16 x 25	8	0.8	3.7
VSCS 002R7 506			50	≤ 15	≤ 20	0.105	18 x 40	8	0.8	4.5
VVCS 003R0 305	3.0	-40°C to 65°C	3	≤ 65	≤ 100	0.010	08 x 20	4	0.6	2.6
VVCS 003R0 505			5	≤ 60	≤ 95	0.015	10 x 20	5.5	0.6	2.9
VVCS 003R0 705			7	≤ 60	≤ 95	0.020	10 x 20	5.5	0.6	4.1
VVCS 003R0 106 U			10	≤ 30	≤ 55	0.030	10 x 25	5.5	0.6	4.6
VVCS 003R0 106			10	≤ 25	≤ 35	0.030	10 x 30	5.5	0.6	4.1
VVCS 003R0 156			15	≤ 30	≤ 45	0.045	13 x 25	5.5	0.6	4.1
VVCS 003R0 256			25	≤ 20	≤ 30	0.075	16 x 25	8	0.8	4.6
VVCS 003R0 506			50	≤ 12	≤ 20	0.150	18 x 40	8	0.8	5.5
VHCS 002R5 305	2.5	-40°C to 85°C	3	≤ 65	≤ 100	0.010	08 x 20	4	0.6	1.8
VHCS 002R5 505			5	≤ 60	≤ 95	0.015	10 x 20	5.5	0.6	2.0
VHCS 002R5 705			7	≤ 60	≤ 95	0.020	10 x 20	5.5	0.6	2.8
VHCS 002R5 106 U			10	≤ 30	≤ 55	0.030	10 x 25	5.5	0.6	3.2
VHCS 002R5 106			10	≤ 25	≤ 35	0.030	10 x 30	5.5	0.6	2.8
VHCS 002R5 156			15	≤ 30	≤ 45	0.045	13 x 25	5.5	0.6	2.8
VHCS 002R5 256			25	≤ 20	≤ 30	0.075	16 x 25	8	0.8	3.1
VHCS 002R5 506			50	≤ 12	≤ 20	0.150	18 x 40	8	0.8	3.8

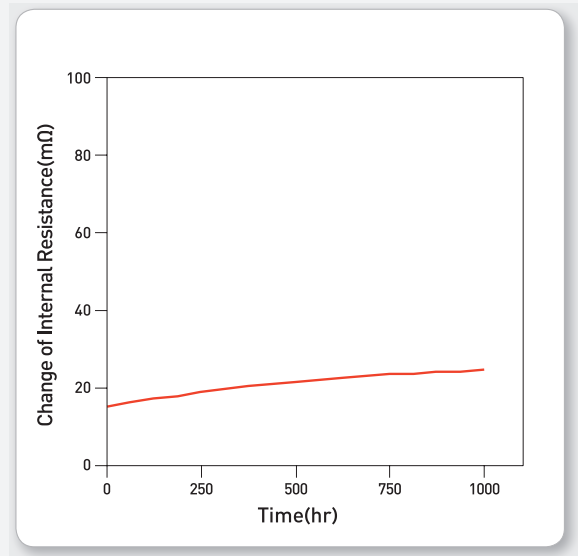
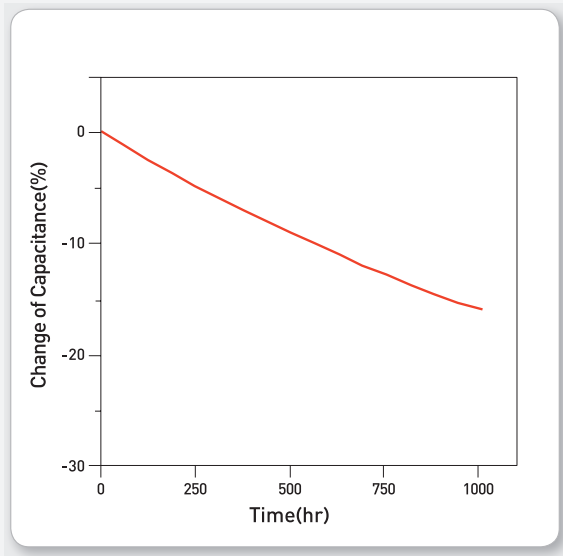
>>> Lug Terminal

Part Number	Rated Voltage (V)	Operating Temperature Range	Capacitance (F)	Internal Resistance(mΩ)		Leakage Current (mA, 72hrs)	Size (mm)	Energy Density (Wh/kg)	PIN
				AC(1kHz)	DC		D x L		
VSCS 002R7 107	2.7	-40°C to 65°C	100	≤ 9	≤ 10	0.550	22 x 45	4.8	2
VSCS 002R7 357			350	≤ 3.2	≤ 4.5	1.500	35 x 60	5.4	2, 4
VSCS 002R7 507			500	≤ 3.2	≤ 3.5	1.000	35 x 80	7.4	2, 4
VVCS 003R0 107	3.0	-40°C to 65°C	100	≤ 9	≤ 10	0.300	22 x 45	5.9	2
VVCS 003R0 357			350	≤ 3.2	≤ 4.5	1.000	35 x 60	6.7	2, 4
VVCS 003R0 507			500	≤ 3.2	≤ 3.5	1.000	35 x 80	8.2	2, 4
VHCS 002R5 107	2.5	-40°C to 85°C	100	≤ 9	≤ 10	0.300	22 x 45	4.1	2
VHCS 002R5 357			350	≤ 3.2	≤ 4.5	1.000	35 x 60	4.6	2, 4

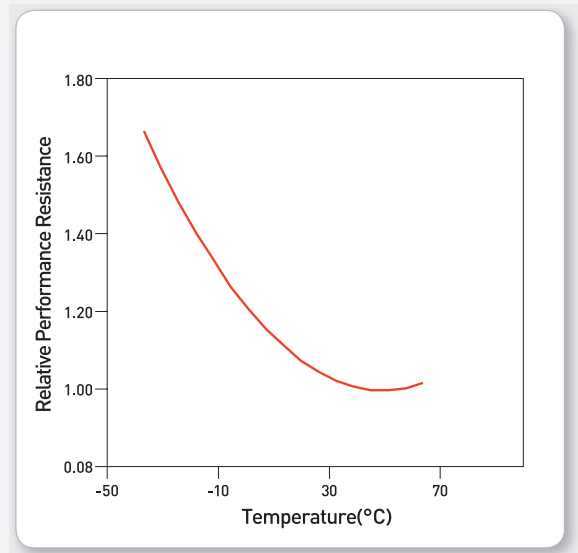
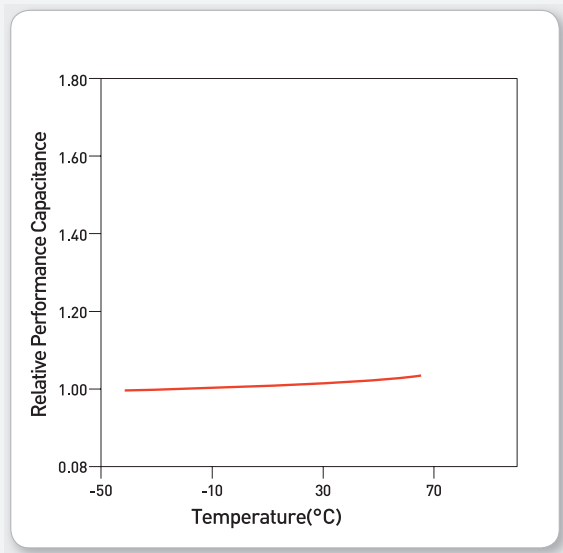
Electric Double Layer Capacitor Single Cell

Performance Data

>>> Endurance: 2.7V/10F, 65°C (10x25mm)



>>> Temperature Characteristic

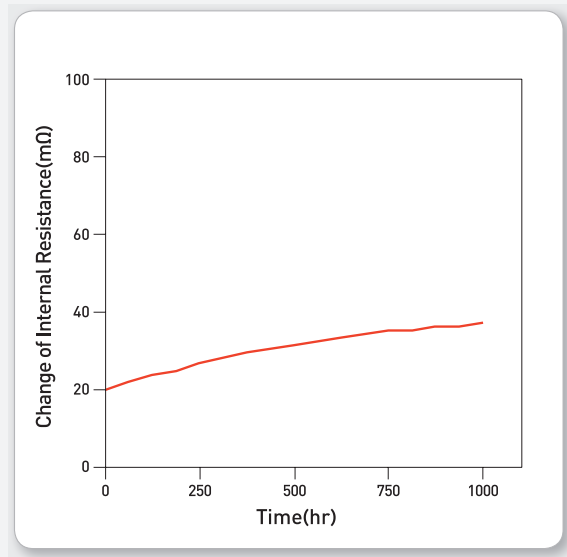
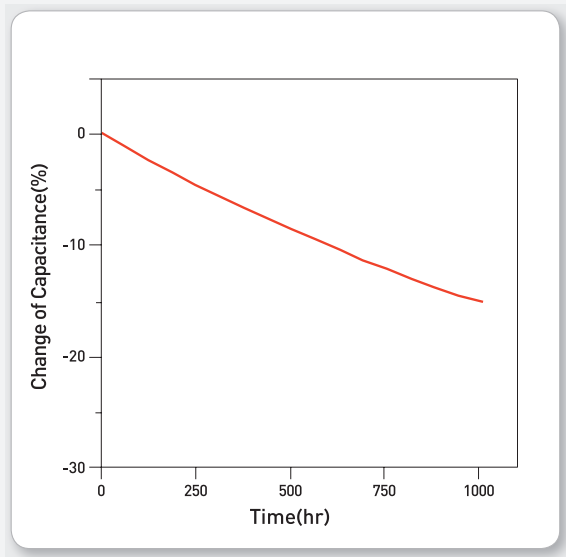


Electric Double Layer Capacitor

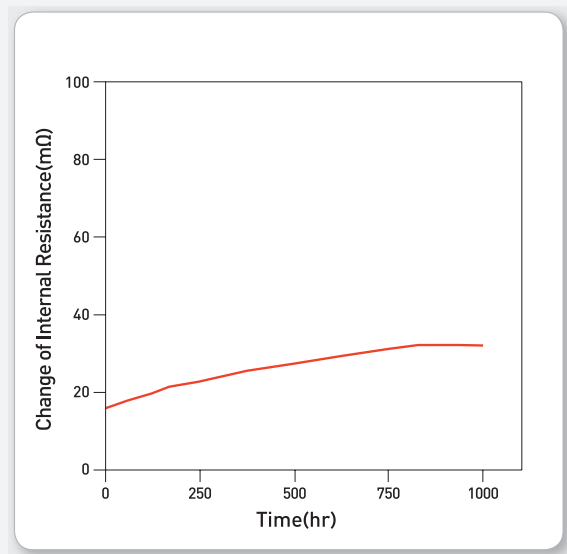
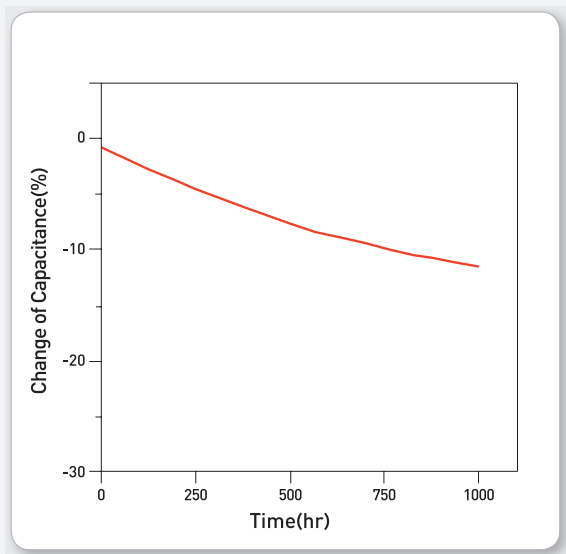
Single Cell

Performance Data

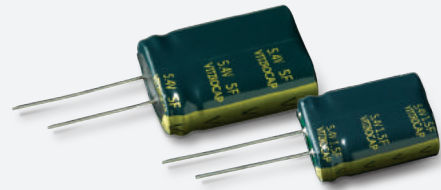
>>> Endurance: 3.0V/10F, 65°C (10x25mm)



>>> Endurance: 2.5V/10F, 85°C (10x25mm)



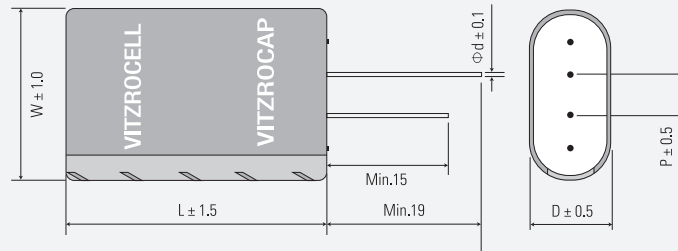
Electric Double Layer Capacitor Module



>>> Features

- Two Lead Terminals and Cylindrical Cell
- A serial combination of 2 single cells
- High Capacitance
- Very Low ESR(High-power density)
- Compliant with RoHS, UL, and REACH requirements

>>> Drawing



>>> Standard Products

Item		Performance		
Rated Voltage(V _R)		5.4 volts	6.0 volts	5.0 volts
Nominal Capacitance Range		1.5 to 25 F	1.5 to 25 F	1.5 to 25 F
Capacitance Tolerance		-10% to +30% (at 25°C)	-10% to +30% (at 25°C)	-10% to +30% (at 25°C)
Operating Temperature Range		-40°C to 65°C	-40°C to 65°C	-40°C to 85°C
Endurance		After 1,000 hours at rated voltage loaded under +65°C and +85°C the capacitor shall meet the specified endurance limits :		
		Capacitance change ≤ 30% of initial value		
		Internal resistance ≤ 2 times of specified value		
Temperature characteristics	Measurement	At -40°C, 25°C, 65°C	At -40°C, 25°C, 65°C	At -40°C, 25°C, 85°C
	ΔC	±5% of initial value		
	Internal resistance	2 times of specified value		
Cycle Life Characteristics	500,000 cycles	Capacitance change ≤ 30% of initial value		
		Internal resistance ≤ 2 times of specified value		
Shelf life		After 1,000 hours storage at +65°C(5.4V), +65°C(6.0V) and +85°C(5.0V) without load, the capacitor shall meet the specified endurance limits of endurance.		

Electric Double Layer Capacitor Module

>>> Dimensions

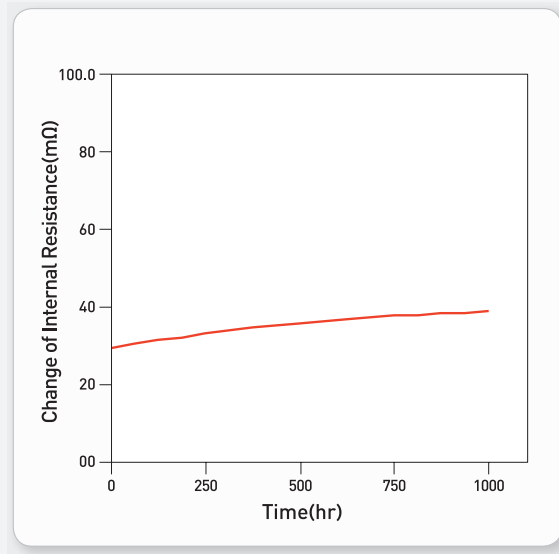
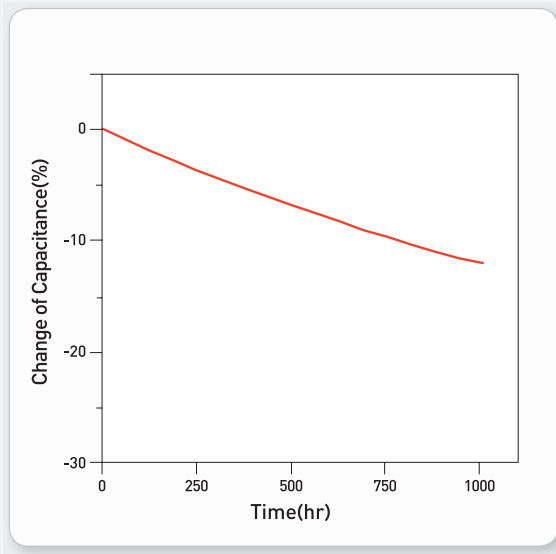
Part Number	Rated Voltage (V)	Operating Temperature Range	Capacitance (F)	Internal Resistance(mΩ)	Leakage Current (mA, 72hrs)	Size (mm)		
				AC(1kHz)		D x L x W	P	d
VSCM 005R4 155	5.4	-40°C to 65°C	1.5	≤ 130	0.020	9 x 22 x 17	5	0.6
VSCM 005R4 255			2.5	≤ 90	0.030	11 x 22 x 21	5	0.6
VSCM 005R4 355			3.5	≤ 70	0.040	11 x 27 x 21	5	0.6
VSCM 005R4 505 U			5	≤ 70	0.050	11 x 27 x 21	5	0.6
VSCM 005R4 505			5	≤ 60	0.050	11 x 32 x 21	5	0.6
VSCM 005R4 755			7.5	≤ 60	0.110	14 x 27 x 27	5	0.6
VSCM 005R4 126			12.5	≤ 40	0.120	17 x 27 x 33	9.5	0.8
VSCM 005R4 256			25	≤ 30	0.200	19 x 42 x 38	11.5	0.8
VVCM 006R0 155	6.0	-40°C to 65°C	1.5	≤ 130	0.020	9 x 22 x 17	5	0.6
VVCM 006R0 255			2.5	≤ 120	0.030	11 x 22 x 21	5	0.6
VVCM 006R0 355			3.5	≤ 120	0.040	11 x 27 x 21	5	0.6
VVCM 006R0 505 U			5	≤ 60	0.050	11 x 27 x 21	5	0.6
VVCM 006R0 505			5	≤ 50	0.050	11 x 32 x 21	5	0.6
VVCM 006R0 755			7.5	≤ 60	0.080	14 x 27 x 27	5	0.6
VVCM 006R0 126			12.5	≤ 40	0.140	17 x 27 x 33	9.5	0.8
VVCM 006R0 256			25	≤ 24	0.290	19 x 42 x 38	11.5	0.8
VHCM 005R0 155	5.0	-40°C to 85°C	1.5	≤ 130	0.020	9 x 22 x 17	5	0.6
VHCM 005R0 255			2.5	≤ 120	0.030	11 x 22 x 21	5	0.6
VHCM 005R0 355			3.5	≤ 120	0.040	11 x 27 x 21	5	0.6
VHCM 005R0 505 U			5	≤ 60	0.050	11 x 27 x 21	5	0.6
VHCM 005R0 505			5	≤ 50	0.050	11 x 32 x 21	5	0.6
VHCM 005R0 755			7.5	≤ 60	0.080	14 x 27 x 27	5	0.6
VHCM 005R0 126			12.5	≤ 40	0.140	17 x 27 x 33	9.5	0.8
VHCM 005R0 256			25	≤ 24	0.290	19 x 42 x 38	11.5	0.8

Electric Double Layer Capacitor

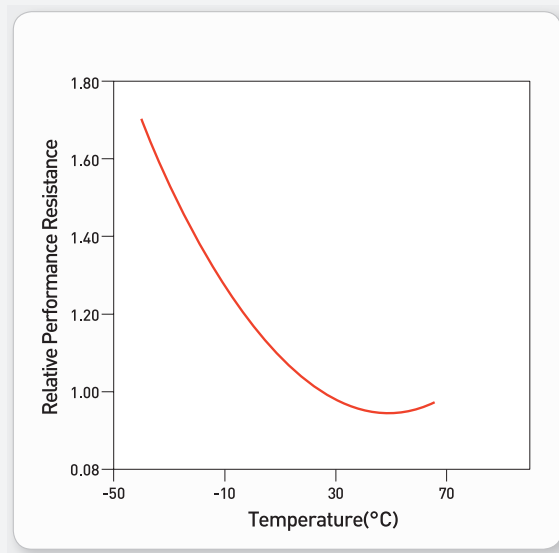
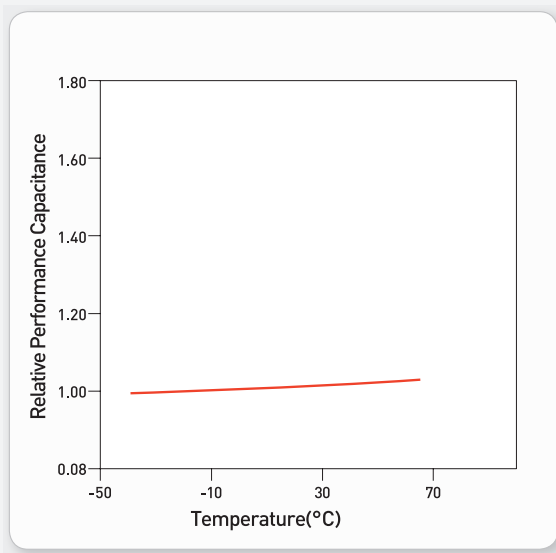
Module

Performance Data

>>> Endurance: 5.4V/5F, 65°C (10x25mm * 2EA)



>>> Temperature Characteristic



Electric Double Layer Capacitor Vitzrocap

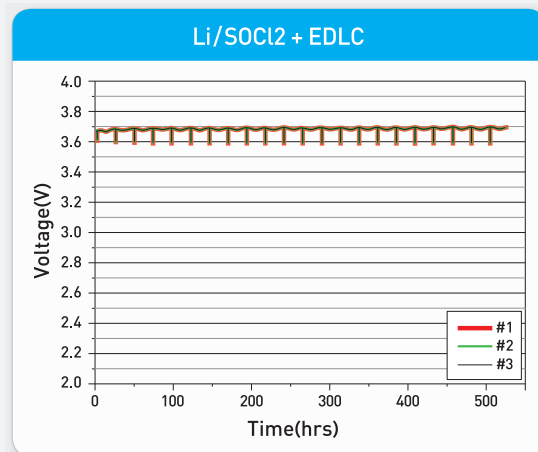
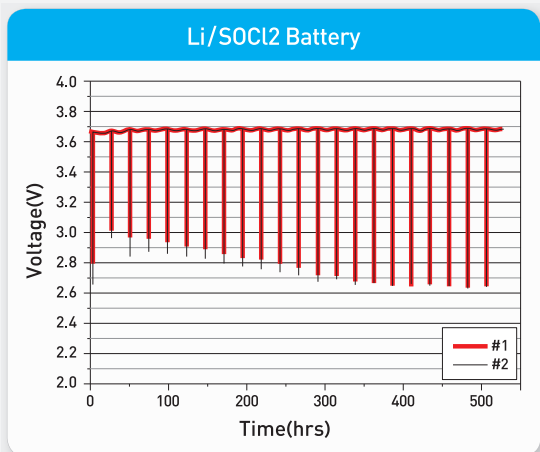
Hybrid Power Solution(Li-SOCl₂ Battery + EDLC)

- Hybrid Battery Pack uses the advantage of Li-SOCl₂ Battery with its high working Voltage and capacity as well as the advantage of EDLC with its high power capability
- The energy of Li-SOCl₂ Battery will charge to EDLC and be used for high pulse currents without severe voltage drop.



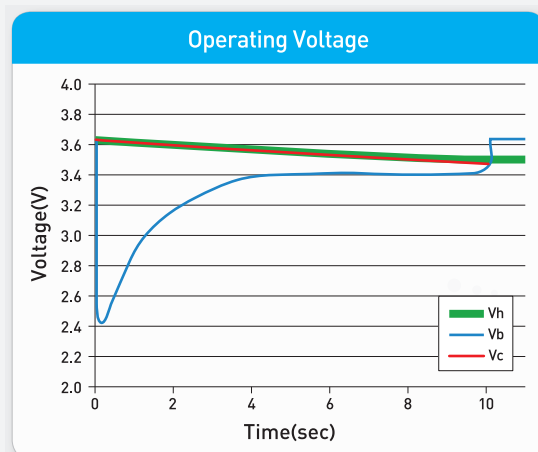
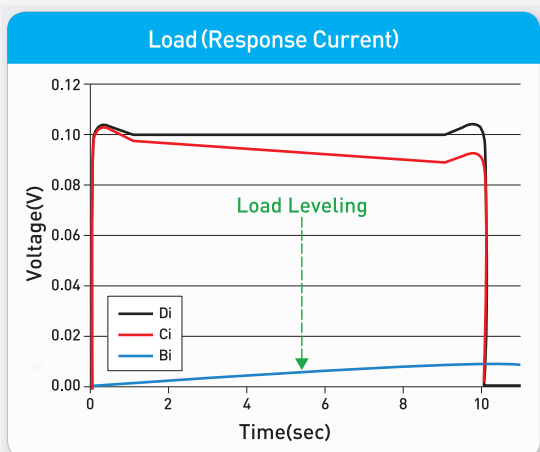
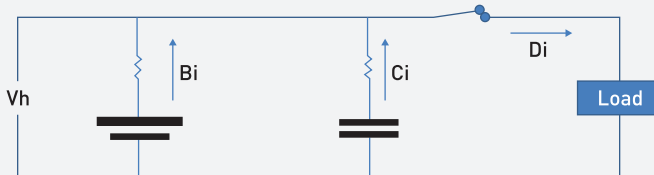
>>> Comparative Results for Operating Voltage

- Test Sample: Li/SOCl₂ Bobbin A vs Li/SOCl₂ Bobbin A + 0.5F EDLC
- Load Condition: Sleep 6.5μA, 20mA/1s and 6.9mA/2s Pulse every 1day
- Temp. Condition: Temp. Cycle(30 ~ 55°C)



>>> Simulation Results in Hybrid Circuit

- Applied Power: Bobbin D, 5F EDLC
- Applied Load: 100mA/10sec



Reliability Test Center for Technical Support

- 5,160 channels & 130 chambers have been set up for reliability test as of 2016.
- We plan to secure 6,500 channels & 180 chambers for EDLC & battery test till 2017.
- We invested about US\$ 3,500,000 for battery & EDLC test center until 2015.
- Test center is running 24/7 throughout the year for customers.
- Vitzrocell conducts tests according to Customer's Condition & Requirements and supply technical report to customers.

>>> Test Center

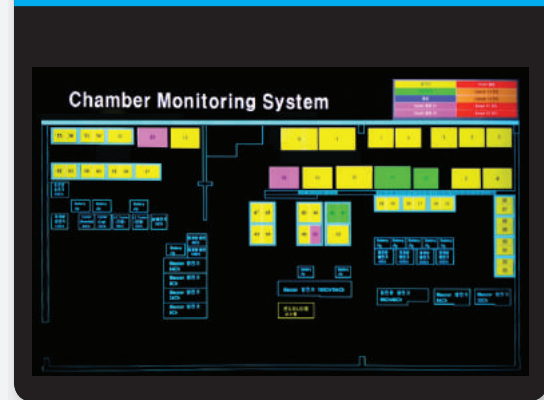
Customer Requirements for Test Item
(Customer Condition)

Vitzrocell perform tests according to
Customer's Condition & Requirements

Discharging & High Temp. Chamber Room



Temperature Monitoring System (Chamber Control)



- Utility: UPS System, Temperature Monitoring System, Chamber Monitoring System, Exhaust System, Centrifuge / Vibration / Drop Test machine, etc.

Electric Double Layer Capacitor Vitzrocap

Electric Double Layer Capacitor

- **Provision** : Semi-permanent cycle life characteristics(over 500,000 times), high power(10,000W/kg)
- **Application** : Memory Backup, Smart Meters, Network Equipment, Car Black-Box, DVR, Solar Street Lamps, Emergency Lamps, Currency Counter, Printer, Engine Start/Stop, UPS system, Wind Turbine, etc.

Application

>>> Backup



Rice Cooker



SSD



Car Black Box



Currency Counter



Photo Copier

>>> Power assist



Smart Meter



Actuator



Hybrid Fork Lift



HEV



Pitch Control



Hybrid Bus

>>> Energy harvesting, Smart grid



Solar Light



Road Sign



Solar System



UPS



ESS



Memo

Vitzrocell's Product Lineup



EDLC(Radial & Lug Type)



High Temperature Battery



Ampoule Battery



Thermal Battery



LiSOCl₂ & Hybrid Type