

World NO.1 to The Only One

**VITZRO CELL**

Since 1987

# The Core of Smart Weaponry System



**AMPOULE** RESERVE BATTERY



# WHO ARE WE ?

“ Vitzrocell , a world class portable power solution provider ”

Vitzrocell Co.,Ltd. established in **1987**, has been manufacturing and providing **Lithium Primary Battery** all over the world for more than 30 years.

Especially, our lithium based **Ampoule and Thermal reserve batteries** have been recognized as the most optimized solutions for various defense applications such as electronic fuzes, guided missiles, smart bombs, ammunitions, rockets, decoys and torpedoes, etc.

As proven in the field tests and real missions over 20 years, we guarantee **the highest level of reliability** and quality of our products in the defense applications based on long-term accumulated expertise equipped with ISO9001, ISO14001, DQMS(Defense Quality Management System) certified, automatic and vertically integrated production / qualification facilities, superb technical supports and on-time delivery.

## OUR PAST, PRESENT AND FUTURE

|             |       |                                                                              |
|-------------|-------|------------------------------------------------------------------------------|
| 1987 – 1999 | 1987. | Founded the company                                                          |
|             | 1988. | Technical Alliance with Wilson Great batch for Lithium Battery               |
|             | 1993. | Nominated as a Sole Manufacturer for Korean Military                         |
|             | 1996. | Acquired UN certification                                                    |
|             | 1998. | Acquired ISO 9001 Quality Certification                                      |
| 2000 – 2009 | 2002. | Changed Company Name to Vitzrocell from Teckraf                              |
|             | 2004. | Granted a prize of USD 10 million export                                     |
|             | 2005. | Awarded "Advance Technology and R&D Center(ATC)"                             |
|             | 2006. | Acquired Environment System Certification (ISO 14001)                        |
|             | 2007. | Acquired Defense Quality Management System Certification                     |
|             | 2009. | <b>Vitzrocell listed on KOSDAQ (Go public)</b>                               |
| 2010 – 2019 | 2010. | Granted a prize of USD 20 million export                                     |
|             | 2012. | Acquisition of Exium Technologies.,Inc for high temperature battery business |
|             | 2013. | Granted a prize of USD 30 million export                                     |
|             | 2014. | Granted a prize of USD 50 million export                                     |
|             | 2015. | Changed Company Name to Vitzrocell USA from Exium Technologies.,Inc          |
|             | 2018. | <b>The Grand opening of Dangjin Smart Campus</b>                             |
|             | 2018. | ISO9001, ISO14001, ATEX Certificated                                         |
|             | 2019. | <b>DQMS(Defense Quality Management System) Certificated</b>                  |
|             | 2019. | <b>Granted a prize of USD 70 million export</b>                              |
|             |       |                                                                              |
| 2020 – 2021 |       | (Expected) a prize of USD 100 million export                                 |

# WHY VITZROCELL?



- \\ Fully automatic and vertically integrated production line
- \\ **Over 30 years knowhow and technology**
- \\ World's best and the largest Reliability Test Center
- \\ Optimized and customized full ranges of product line-up

## 01 SAFETY

- \\ **The world safest factory (Smart Campus)**
- \\ Hermetic glass-to-metal seal engineered for leak free operation
- \\ Proven in the harsh environment tests and qualified by a number of global defense companies and related institutions.

## 02 (TECHNICAL) SERVICES

- \\ Test capability(180 Chambers/10,000 Discharge channels /Torsional shock & Vibration/3D X Ray Analysis)
- \\ **Customized Technical seminar**
- \\ On-site engineering support for customer application

## 03 QUALITY

- \\ **World's best and the largest Reliability Test Center**
- \\ Fully automated and vertically integrated production line
- \\ ISO9001/14001/MSDS/RoHS/DQMS Certificated
- \\ ATEX (Atmosphere Explosibles) Certificated

LITHIUM BASED

# AMPOULE RESERVE BATTERY



## APPLICATIONS

### ELECTRONIC FUZE SYSTEMS

- \ Calibers
- \ Naval/Artillery Gun
- \ MLRS(Multiple Launch Rocket System)
- \ RAAMS(Remote Anti-Armor Mine System)

## ADVANTAGES

- \ Lithium based technology
- \ High level of reliability
- \ **More than 15 years of shelf life**
- \ **Wide operating temperature range(-43°C ~ +63°C)**
- \ Customized design
- \ Short activation time
- \ No self-discharge

## AMPOULE BATTERY LINE-UP

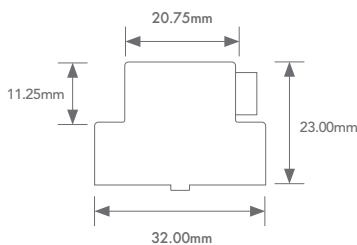
| Model                             | Model No.                    | Size [mm]   | Open Voltage [V]        | Functional Time       | Operating Temperature [°C] | Shelf Time [Year] | Activation Mechanism    |
|-----------------------------------|------------------------------|-------------|-------------------------|-----------------------|----------------------------|-------------------|-------------------------|
| Medium size Ampoule Battery       | R32G15-10<br>[VCG152S10-00]  | Ø32×H23     | 7V(2S) ~ 36V(10S)       | ≥200s, @200mA         | -43°C ~ 63°C               | Over 15years      | Gun launch              |
|                                   | R32H50-10<br>[VCG502S10-00]  | Ø32×H23     | 7V(2S) ~ 36V(10S)       | ≥200s, @200mA         | -43°C ~ 63°C               | Over 15years      | Gun launch              |
|                                   | R32G15-42/32/22              | Ø32×H23     | 14V (4S×2P)~ 7V (2S×2P) | ≥200s @400mA          | -43°C ~ 63°C               | Over 15years      | Gun launch              |
|                                   | R32H50-42/32/22              | Ø32×H23     | 14V (4S×2P)~ 7V (2S×2P) | ≥200s @400mA          | -43°C ~ 63°C               | Over 15years      | Gun launch              |
|                                   | R27H50-06                    | Ø27×H18     | 7V(2S) ~ 36V(10S)       | ≥200s, @50mA          | -43°C ~ 63°C               | Over 15years      | Gun launch              |
| Small size Ampoule Battery        | R12X21-01<br>[VCP-AP1221-00] | Ø12.8×H21.3 | 3.6                     | ≥240hr, @6.6kΩ, 2.5V  | -43°C ~ 63°C               | Over 15years      | Stab / Primer initiated |
| Subminiature size Ampoule Battery | R05X05-01<br>[VCS-GW0505-00] | Ø5.6×H5.5   | 3.6                     | ≥180s, @6.8kΩ, 2.7V   | -43°C ~ 63°C               | Over 15years      | Stab initiated          |
|                                   | R05X07-01                    | Ø5.6×H7.15  | 3.6                     | ≥120hrs, @150kΩ, 2.7V | -43°C ~ 63°C               | Over 15years      | Stab initiated          |

MEDIUM SIZE

## AMPOULE RESERVE BATTERY

## R32G15-10

[VCG152S10-00]



\* **R32G15-00**  
: Number of the stacks  
(ex. 2S > R32G15-02)

\* **R32H50-00**  
: Number of the stacks  
(ex. 4S > R32H50-04)

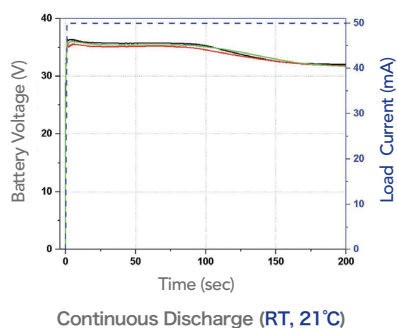
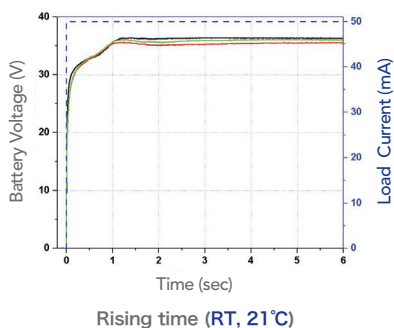
Stacking Structure ..... Serial type (2 ~ 10Serials)  
Dimension (mm) .....  $\varnothing 32 \times H23$  (Medium Size)  
Open Voltage (V) ..... 7V (2S) ~ 36V (10S)  
Discharge Condition .....  $\leq 200\text{mA}$   
Activation Time(s) .....  $\leq 400\text{ms}$ , @100mA

| Stacks  | 2S | 3S | 4S | 5S  | 6S  | 7S  | 8S  | 9S  | 10S |
|---------|----|----|----|-----|-----|-----|-----|-----|-----|
| Voltage | 4V | 6V | 8V | 10V | 12V | 14V | 16V | 18V | 20V |

Functional Time, Capacity .....  $\geq 200\text{s}$ , @100mA

| Stacks            | 2S | 3S | 4S | 5S  | 6S  | 7S  | 8S  | 9S  | 10S |
|-------------------|----|----|----|-----|-----|-----|-----|-----|-----|
| Voltage (cut-off) | 4V | 6V | 8V | 10V | 12V | 14V | 16V | 18V | 20V |

Weight (gram) .....  $\leq 43$   
Activation Acceleration (G) .....  $\geq 1,500\text{G}$   
Rotation Speed (Max) ..... 30,000rpm  
Typical Shelf Life ..... Over 15years  
Operating Temperature .....  $-43^\circ\text{C} \sim +63^\circ\text{C}$   
Storage Temperature .....  $-54^\circ\text{C} \sim +71^\circ\text{C}$   
Electrochemistry .....  $\text{Li/SOCl}_2$   
Activation Mechanism ..... Gun launch  
Typical Application ..... Naval/ Artillery Gun  
(76,127,105,155mm Shell)

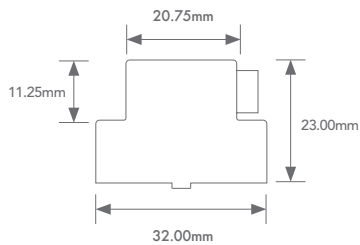


MEDIUM SIZE

## AMPOULE RESERVE BATTERY

# R32H50-10

[VCG502S10-00]



\* **R32G15-00**  
: Number of the stacks  
(ex. 2S > R32G15-02)

\* **R32H50-00**  
: Number of the stacks  
(ex. 4S > R32H50-04)

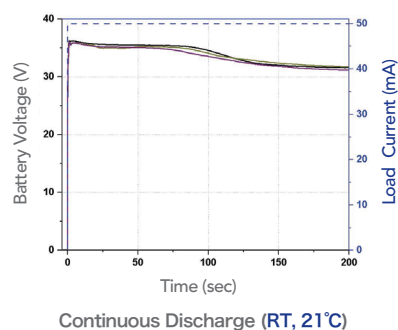
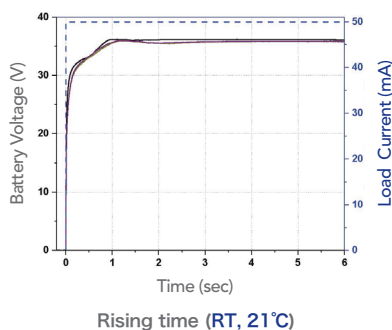
Stacking Structure ..... Serial type (2 ~ 10Serials)  
Dimension (mm) .....  $\varnothing 32 \times H23$  (Medium Size)  
Open Voltage (V) ..... 7V (2S) ~ 36V (10S)  
Discharge Condition .....  $\leq 200\text{mA}$   
Activation Time(s) .....  $\leq 400\text{ms}$ , @100mA

| Stacks  | 2S | 3S | 4S | 5S  | 6S  | 7S  | 8S  | 9S  | 10S |
|---------|----|----|----|-----|-----|-----|-----|-----|-----|
| Voltage | 4V | 6V | 8V | 10V | 12V | 14V | 16V | 18V | 20V |

Functional Time, Capacity .....  $\geq 200\text{s}$ , @100mA

| Stacks            | 2S | 3S | 4S | 5S  | 6S  | 7S  | 8S  | 9S  | 10S |
|-------------------|----|----|----|-----|-----|-----|-----|-----|-----|
| Voltage (cut-off) | 4V | 6V | 8V | 10V | 12V | 14V | 16V | 18V | 20V |

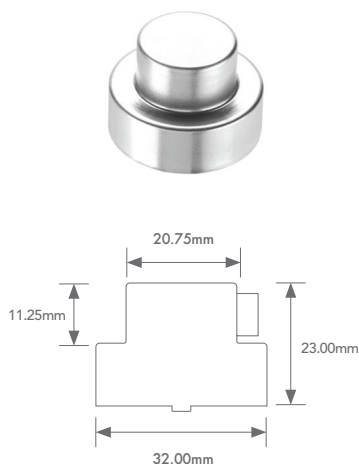
Weight (gram) .....  $\leq 40$   
Activation Acceleration (G) .....  $\geq 5,000\text{G}$   
Rotation Speed (Max) ..... 30,000rpm  
Typical Shelf Life ..... Over 15years  
Operating Temperature .....  $-43^{\circ}\text{C} \sim +63^{\circ}\text{C}$   
Storage Temperature .....  $-54^{\circ}\text{C} \sim +71^{\circ}\text{C}$   
Electrochemistry .....  $\text{Li/SOCl}_2$   
Activation Mechanism ..... Gun launch  
Typical Application ..... Naval/ Artillery Gun  
(76,127,105,155mm Shell)



MEDIUM SIZE

## AMPOULE RESERVE BATTERY

## R32G15-42/32/22



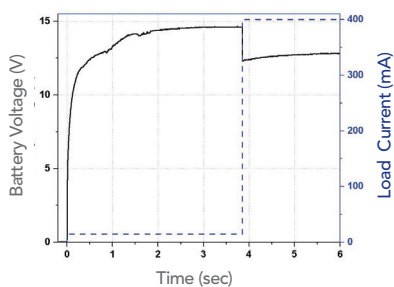
## \* R32G15-00

: Number of the stacks  
(ex. 2S × 2P > R32G15-22)

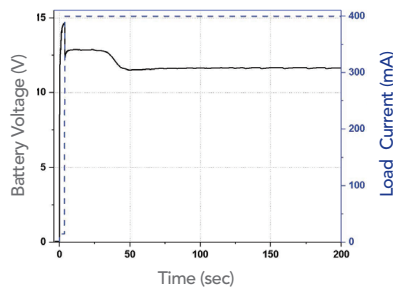
## \* R32H50-00

: Number of the stacks  
(ex. 4S × 2P > R32H50-42)

|                             |                                                                                             |
|-----------------------------|---------------------------------------------------------------------------------------------|
| Stacking Structure          | Parallel type (4Serials × 2Parallels)<br>(3Serials × 2Parallels)<br>(2Serials × 2Parallels) |
| Dimension (mm)              | Ø32 × H23 (Medium Size)                                                                     |
| Open Voltage (V)            | 14.4V(4S × 2P)                                                                              |
| Discharge Condition         | ≤400mA                                                                                      |
| Activation Time(s)          | ≤500ms, @400mA(4S × 2P)                                                                     |
| Functional Time, Capacity   | ≥200s @400mA                                                                                |
| Weight (gram)               | ≤43                                                                                         |
| Activation Acceleration (G) | ≥1,500G                                                                                     |
| Rotation Speed (Max)        | 30,000rpm                                                                                   |
| Typical Shelf Life          | Over 15years                                                                                |
| Operating Temperature       | -43°C ~ +63°C                                                                               |
| Storage Temperature         | -54°C ~ +71°C                                                                               |
| Electrochemistry            | Li/SOCl <sub>2</sub>                                                                        |
| Activation Mechanism        | Gun launch                                                                                  |
| Typical Application         | Naval/ Artillery Gun<br>(76,127,105,155mm Shell)                                            |



Rising time (RT, 21°C) [4S × 2P]

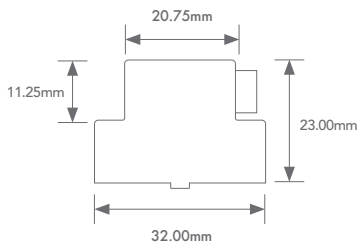


Continuous Discharge (RT, 21°C) [4S × 2P]

MEDIUM SIZE

## AMPOULE RESERVE BATTERY

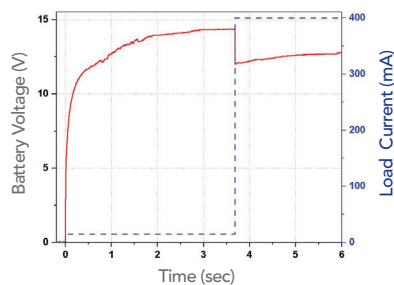
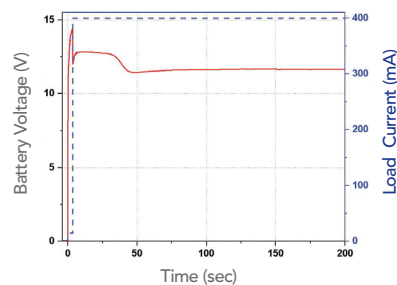
R32H50-42/32/22



\* **R32G15-00**  
: Number of the stacks  
(ex.  $2S \times 2P > R32G15-22$ )

\* **R32H50-00**  
: Number of the stacks  
(ex.  $4S \times 2P > R32H50-42$ )

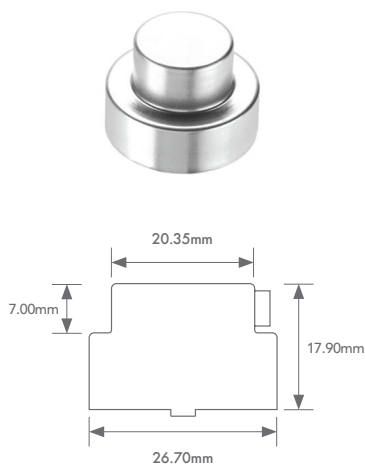
|                             |                                                                                                                  |
|-----------------------------|------------------------------------------------------------------------------------------------------------------|
| Stacking Structure          | Parallel type (4Serials $\times$ 2Parallels)<br>(3Serials $\times$ 2Parallels)<br>(2Serials $\times$ 2Parallels) |
| Dimension (mm)              | $\varnothing 32 \times H23$ (Medium Size)                                                                        |
| Open Voltage (V)            | 14.4V(4S $\times$ 2P)                                                                                            |
| Discharge Condition         | $\leq 400mA$                                                                                                     |
| Activation Time(s)          | $\leq 500ms$ , @400mA(4S $\times$ 2P)                                                                            |
| Functional Time, Capacity   | $\geq 200s$ @400mA                                                                                               |
| Weight (gram)               | $\leq 40$                                                                                                        |
| Activation Acceleration (G) | $\geq 5,000G$                                                                                                    |
| Rotation Speed (Max)        | 30,000rpm                                                                                                        |
| Typical Shelf Life          | Over 15years                                                                                                     |
| Operating Temperature       | $-43^{\circ}C \sim +63^{\circ}C$                                                                                 |
| Storage Temperature         | $-54^{\circ}C \sim +71^{\circ}C$                                                                                 |
| Electrochemistry            | Li/SOCl <sub>2</sub>                                                                                             |
| Activation Mechanism        | Gun launch                                                                                                       |
| Typical Application         | Naval/ Artillery Gun<br>(76,127,105,155mm Shell)                                                                 |

Rising time (RT, 21°C) [4S  $\times$  2P]Continuous Discharge (RT, 21°C) [4S  $\times$  2P]

MEDIUM SIZE

## AMPOULE RESERVE BATTERY

## R27H50-06



Stacking Structure ..... Serial type (2 ~ 10Serials)

Dimension (mm) .....  $\varnothing 27 \times H18$  (Medium Size)

Open Voltage (V) ..... 7V (2S) ~ 36V (10S)

Discharge Condition .....  $\leq 50\text{mA}$ Activation Time(s) .....  $\leq 400\text{ms}$ , @50mA

| Stacks  | 2S | 3S | 4S | 5S  | 6S  | 7S  | 8S  | 9S  | 10S |
|---------|----|----|----|-----|-----|-----|-----|-----|-----|
| Voltage | 4V | 6V | 8V | 10V | 12V | 14V | 16V | 18V | 20V |

Functional Time, Capacity .....  $\geq 150\text{s}$ , @50mA

| Stacks            | 2S | 3S | 4S | 5S  | 6S  | 7S  | 8S  | 9S  | 10S |
|-------------------|----|----|----|-----|-----|-----|-----|-----|-----|
| Voltage (cut-off) | 4V | 6V | 8V | 10V | 12V | 14V | 16V | 18V | 20V |

Weight (gram) .....  $\leq 20$ Activation Acceleration (G) .....  $\geq 5,000\text{G}$ 

Rotation Speed (Max) ..... 30,000rpm

Typical Shelf Life ..... Over 15years

Operating Temperature .....  $-43^{\circ}\text{C} \sim +63^{\circ}\text{C}$ Storage Temperature .....  $-54^{\circ}\text{C} \sim +71^{\circ}\text{C}$ Electrochemistry .....  $\text{Li/SOCl}_2$ 

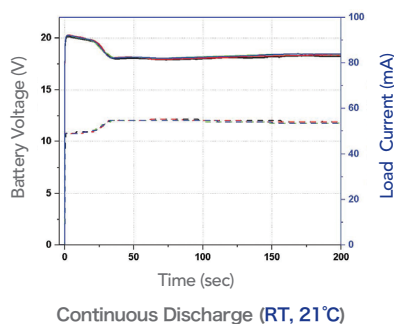
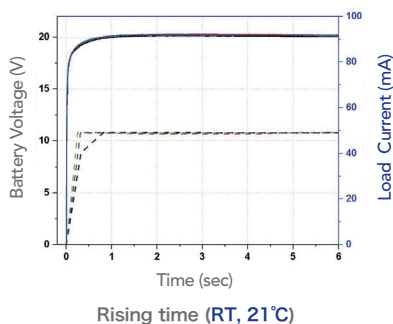
Activation Mechanism ..... Gun launch

Typical Application ..... Naval/ Artillery Gun  
(40,76mm Shell)

\* R27H50-00

: Number of the stacks

(ex.6S &gt; R27H50-06)

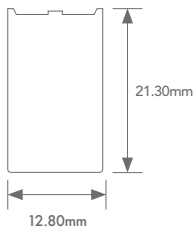


SMALL SIZE

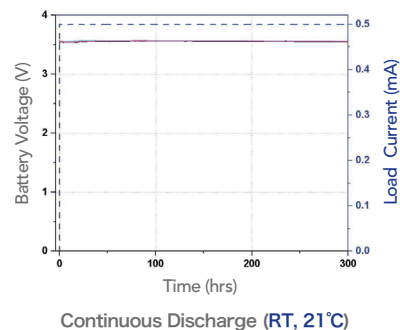
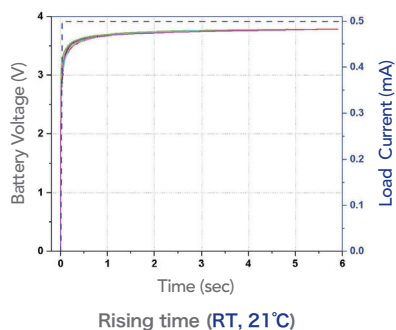
## AMPOULE RESERVE BATTERY

# R12X21-01

[VCP-AP1221-00]



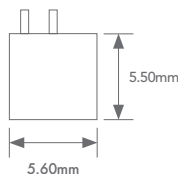
|                             |                                                  |
|-----------------------------|--------------------------------------------------|
| Stacking Structure          | Single cell                                      |
| Dimension (mm)              | Ø12.8×H21.3 (Small Size)                         |
| Open Voltage (V)            | 3.6                                              |
| Discharge Condition         | 6.6kΩ                                            |
| Activation Time(s)          | ≤500ms, @6.6kΩ, 2.5V                             |
| Functional Time, Capacity   | ≥240hr, @6.6kΩ, 2.5V                             |
| Weight (gram)               | ≤6.5                                             |
| Activation Acceleration (G) | >10,000G                                         |
| Shock Resistance            | ≤10,000G                                         |
| Typical Shelf Life          | Over 15years                                     |
| Operating Temperature       | -43 °C ~ +63°C                                   |
| Storage Temperature         | -54°C ~ +71°C                                    |
| Electrochemistry            | Li/SOCl <sub>2</sub>                             |
| Activation Mechanism        | Stab / Primer initiated                          |
| Typical Application         | "155mm RAAMS<br>(Remote Anti-Armor Mine System)" |



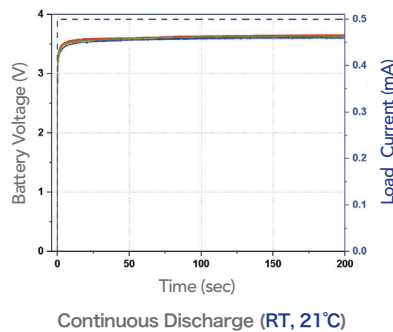
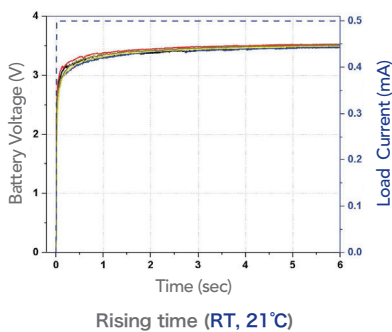
SUBMINIATURE SIZE

# AMPOULE RESERVE BATTERY

R05X05-01  
[VCS-GW0505-00]



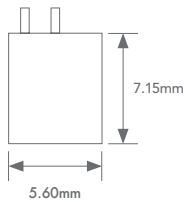
|                           |                                                               |
|---------------------------|---------------------------------------------------------------|
| Stacking Structure        | Single cell                                                   |
| Dimension (mm)            | Ø5.6×H5.5 (Subminiature Size)                                 |
| Open Voltage (V)          | 3.6                                                           |
| Discharge Condition       | 6.8kΩ ~ 150kΩ                                                 |
| Activation Time(s)        | ≤1s, @6.8kΩ, 2.7V (at ≥+20°C)<br>≤5s, @6.8kΩ, 2.7V (at -40°C) |
| Functional Time, Capacity | ≥180s, @6.8kΩ, 2.7V                                           |
| Weight (gram)             | 0.7                                                           |
| Shock Resistance          | ≤10,000G                                                      |
| Typical Shelf Life        | Over 15years                                                  |
| Operating Temperature     | -43°C ~ +63°C                                                 |
| Storage Temperature       | -54°C ~ +71°C                                                 |
| Electrochemistry          | Li/SOCl <sub>2</sub>                                          |
| Activation Mechanism      | Stab initiated                                                |
| Typical Application       | Sub-munition (MLRS, etc)                                      |



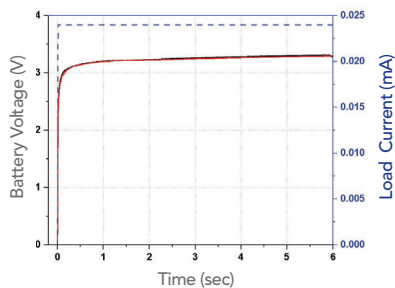
SUBMINIATURE SIZE

# AMPOULE RESERVE BATTERY

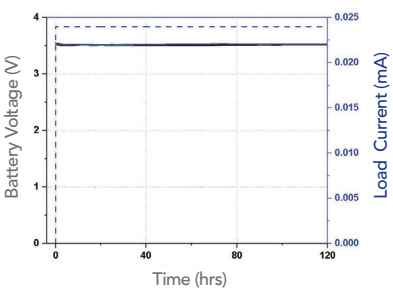
R05X07-01



|                           |                                                                |
|---------------------------|----------------------------------------------------------------|
| Stacking Structure        | Single cell                                                    |
| Dimension (mm)            | Ø5.6×H7.15 (Subminiature Size)                                 |
| Open Voltage (V)          | 3.6                                                            |
| Discharge Condition       | 6.8kΩ ~ 150kΩ                                                  |
| Activation Time(s)        | ≤1s, @150kΩ, 2.7V (at ≥+20°C)<br>≤5s, @150kΩ, 2.7V (at. -40°C) |
| Functional Time, Capacity | ≥120hrs, @150kΩ, 2.7V                                          |
| Weight (gram)             | 0.9                                                            |
| Shock Resistance          | ≤20,000G                                                       |
| Typical Shelf Life        | Over 15years                                                   |
| Operating Temperature     | -43°C ~ +63°C                                                  |
| Storage Temperature       | -54°C ~ +71°C                                                  |
| Electrochemistry          | Li/SOCl <sub>2</sub>                                           |
| Activation Mechanism      | Stab initiated                                                 |
| Typical Application       | Sub-munition (MLRS, etc)                                       |



Rising time (RT, 21°C)



Continuous Discharge (RT, 21°C)

# MEMO



# THE OPTIMUM POWER SOLUTIONS FOR DEFENSE APPLICATIONS

## LITHIUM PRIMARY SOLUTIONS



Li-SOCl<sub>2</sub>  
Li-MnO<sub>2</sub>



EDLC  
(Electric Double Layer Capacitor)

## LITHIUM RECHARGEABLE SOLUTIONS



VLB(Rechargeable Battery)  
VHC(Hybrid Capacitor)

## APPLICATIONS



MILITARY  
OPTICAL DEVICE



MILITARY  
COMMUNICATION  
DEVICE



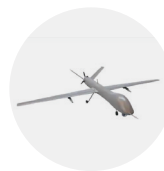
GAS MASK



HAND  
GRENADE



DRONE



UAV

**VITZRO CELL**

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