

2. ASSORTMENT V...H(T) ROBUST (85)

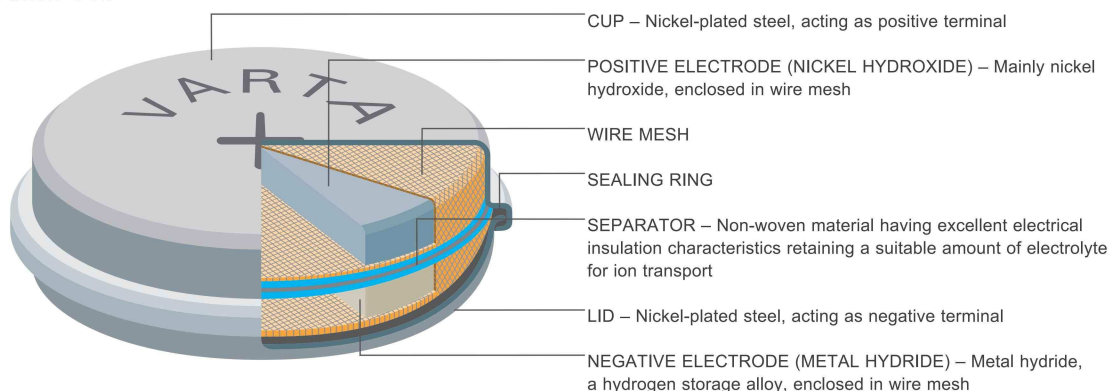


2.1 CONSTRUCTION AND ELECTROCHEMICAL PROCESSES OF NIMH BUTTON CELLS

A special sealing design maximizes the diffusion path and guarantees optimal protection against leakage. The cup of the casing acts as the positive terminal and the lid as the negative terminal. The punched positive sign on the cell is used as a safety device which opens at predetermined internal pressure, in case of gross abuse. Some cells are interchangeable with 1.5 V primary cells of identical dimensions.

A sealed NiMH Button Cell requires that towards the end of the charging process, oxygen which is generated at the positive electrode must be consumed to avoid pressure build-up (charge reserve). Additionally a discharge reserve is necessary to prevent degradation of the negative electrode at the end of discharge. In general the negative electrode is overdimensioned compared with the positive, which determines the usable cell capacity (Fig. 2).

FIG. 2
Schematic view of a NiMH Button Cell



Chemical Process of Charging/Discharging

$\text{Ni(OH)}_2 + \text{Metal}$	Charging	$\text{NiOOH} + \text{MH}$
	Discharging	
Charge product of the positive electrode:		Nickel (III) oxyhydroxide – NiOOH
Charge product of the negative electrode:		Metal hydride
Discharge product of the positive electrode:		Nickel (II) hydroxide – Ni(OH)_2
Discharge product of the negative electrode:		Metal alloy
Electrolyte:		Alkaline solution (KOH)



FIG. 3
Schematic representation of the electrodes, demonstrating useful capacity, charge reserve and discharge reserve

2.2 FEATURES V...H(T) ROBUST (85)

- Cells with typical capacities from 16 up to 380 mAh
- Nominal cell voltage 1.2 V
- Wide operating temperature range
- Built-in safety device
- UL Recognition
- Limited fast charge possible (within 3 h at 0.5 CA, at +20°C, after fully discharged cells)
- Suitable for overcharging at room temperature
- Long life expectancy
- Self-discharge less than 10% after 1 month at +20°C
- High temperature range V...HT
 - High capacity
 - Long life expectancy especially at charging/trickle charging and discharging at higher ambient temperature



Technical Data	V 15 H	V 30 H	V 40 H	V 80 H	V 150 H	V 200 H	V 250 H	CP 300 H	V 350 H	V 65 HT	V 150 HT	
Order Number	55602 101 501	55603 101 501	55604 101 501	55608 101 501	55615 101 501	55620 101 501	55625 101 501	55630 101 501	55635 101 501	55707 101 501	55716 101 501	
Typ. Capacity (mAh)	16	31	43	80	150	210	250	300	380	70	150	
Nominal Voltage (V)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
Nom. Capacity (mAh)	15	28	40	70	140	200	240	280	350	65	140	
Dimension												
Diameter/Length (mm)	11.5 _{-0.1}	11.5 _{-0.1}	11.5 _{-0.2}	15.5 _{-0.1}	25.6 _{-0.2}	25.6 _{-0.15}	25.1 _{-0.15}	25.1 _{-0.15}	25.1 _{-0.15}	15.5 _{-0.2}	25.6 _{-0.2}	
Height (mm)	3.1 _{-0.2}	3.85 _{-0.2}	5.35 _{-0.3}	6.0 _{-0.2}	5.85 _{-0.25}	7.4 _{-0.25}	6.7 _{-0.6}	7.55 _{-0.6}	8.8 _{-0.6}	6.0 _{-0.3}	5.85 _{-0.25}	
Width (mm)	-	-	-	-	14.1 _{-0.2}	14.1 _{-0.2}	-	-	-	-	14.1 _{-0.2}	
Weight, approx. (g)	1.3	1.3	1.7	4	6	7	10	11	13	4	6	
Charge Method												
Normal Charging Current for 14–16 h (mA)	1.5	3	4	7	14	20	24	28	35	6.5	14	
Accelerated Charging for 7–8 h (mA)	3	6	8	14	28	40	48	56	70	13	28	
Limited Fast Charge ¹⁾ for 3 h (mA)	7.5	15	20	35	70	-	120	140	-	32.5	70	
Trickle Charge (mA)	0.45	0.9	1.2	2.1	4.2	6.0	7.2	8.4	10.5	1.95	4.2	
Overcharge Current at 20 °C												
For Continuous (mA)	1.5	2	4	7	14	20	24	28	35	6.5	14	
Max. 1 year (mA)	3.0	4	8	14	28	40	48	56	70	13	28	
Self-discharge (1 month storage, 20 °C)	< 10%	< 10%	< 10%	< 10%	< 10%	< 10%	< 10%	< 10%	< 10%	< 10%	< 10%	
Operating Temperature												
Charging	0 to +65°C	0 to +65°C	0 to +65°C	0 to +65°C	0 to +65°C	0 to +65°C	0 to +65°C	0 to +65°C	0 to +85°C	0 to +65°C	0 to +85°C	
Discharging	-20 to +65°C	-20 to +65°C	-20 to +65°C	-20 to +65°C	-20 to +65°C	-20 to +65°C	-20 to +65°C	-20 to +65°C	-20 to +85°C	-20 to +65°C	-20 to +85°C	
Storage	-40 to +65°C	-40 to +65°C	-40 to +65°C	-40 to +65°C	-40 to +65°C	-40 to +65°C	-40 to +65°C	-40 to +65°C	-40 to +85°C	-40 to +65°C	-40 to +85°C	
Life Expectancy (typical)												
IEC Cycles	1000 cycles	1000 cycles	1000 cycles	1000 cycles	1000 cycles	1000 cycles	1000 cycles	1000 cycles	1000 cycles	1000 cycles	1000 cycles	
Trickle Charge at 20°C	up to 6 years	up to 6 years	up to 6 years	up to 6 years	up to 6 years	up to 6 years	up to 6 years	up to 6 years	up to 6 years	up to 6 years	up to 6 years	
Trickle Charge at 45°C	up to 3 years	up to 3 years	up to 3 years	up to 3 years	up to 3 years	up to 3 years	up to 3 years	up to 3 years	up to 5 years	up to 5 years	up to 5 years	
Impedance/Internal Resistance²⁾												
Impedance (mOhm) ³⁾	490	650	420	220	130	140	70	80	80	220	130	
Internal Resistance (Ohm) ⁴⁾	4.03	6.5	3.05	1.30	0.8	0.8	0.46	0.47	0.47	1.25	0.8	

TAB. 7

¹⁾ After full discharge. Limited fast charge must be limited to room temperature, time controlled, voltage control recommended (except V 200 H, V 350 H).

²⁾ In accordance to IEC 61951-2, measured at charged cells at room temperature. Tolerance ±10%. ³⁾ AC at 1 kHz ⁴⁾ DC at 0.2 CA/2 CA

2.3 NIMH BUTTON CELL BATTERIES FOR BRIDGING, HOT SWAP AND MEMORY PROTECTION APPLICATIONS

Bridging Batteries

Bridging batteries from VARTA Microbattery are optimised in small size and provide high power output for bridging mobile computers e.g. during main battery change. Bridging batteries temporarily take over the supply of DRAM and other chips in notebooks, PCs, handhelds, calculators, etc. when the main battery is replaced within a certain time frame specified by the manufacturer.

Typical Application

- Mobile phones (GSM, PCN, GPRS, DECT, cordless phones)
- GPS-terminals/voice organizers

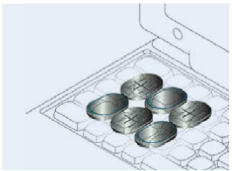
Typical requirement

- Charging current: 0.03 CA continuous
- Discharge current: 30–100 mA¹⁾
- Bridging time: 5–15 min.
- Operating temperature: 0 to +45°C

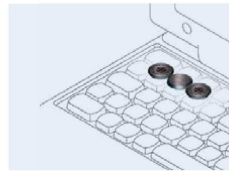
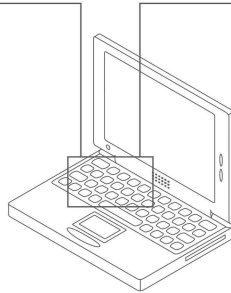
¹⁾ Proper selection of battery capacity is required.

Mobile Computer Applications

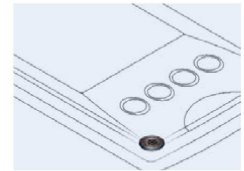
Mobile computers need even more power. Frequent changing of main batteries should be made easy and convenient.



The VARTA HyRate “Hot Swap” batteries maintain the PC operational at high power levels during exchange of the main battery.



The VARTA HyRate “Bridging” batteries maintain the PC partially operational at reduced power levels during exchange of the main battery or during some periods of work interruption.



A single VARTA High Rate Cell is used in handhelds to maintain memory content during battery change.

MBU/RTC Batteries

These batteries are designed for memory backup (MBU) and the support of RTC (Real Time Clock) in various electronic applications. Button cell batteries even in the charged state are suitable for wave soldering ($t_{\max.} = 10 \text{ sec.}$, $T_{\max.} = 265^\circ\text{C}$).

Typical Application

- Handhelds
- Notebooks
- Hi-Fi Systems
- Car stereo, etc.

2.4 NIMH BUTTON CELL BATTERIES FOR MEMORY PROTECTION

MBU/RTC Batteries

These batteries are designed for memory backup (MBU) and support to RTC (Real Time Clock) in various electronic applications. NiMH Button Cell Batteries in the charged state are suitable for wave soldering ($t_{max.} = 10 \text{ sec.}$, $T_{max.} = 265^\circ\text{C}$). For further information on other NiMH Button Cell Batteries for memory protection please consult VARTA Microbattery.

Typical Application

- PCs
- Notebooks
- Hi-Fi Systems
- Car stereo, etc.

Type	No. of cells	Order No.	Nominal voltage (V)	Typical capacity (mAh)	Nominal capacity (mAh)	Length (mm)	Width (mm)	Height without pins (mm)	Weight (g)
Mempac S-H									
3/V 15 H	3	55602 703 012	3.6	16	15	42.4 ^{-0.6}	17.0 ^{-0.4}	10.5 ⁻¹	7
2/V 150 H	2	55615 702 012	2.4	150	140	42.4 ^{-0.6}	17.0 ^{-0.4}	16.0 ⁻¹	15
3/V 150 H	3	55615 703 012	3.6	150	140	40.3 ^{-0.6}	22.2 ^{-0.4}	16.0 ⁻¹	21
3/V 150 H	3	55615 603 540	3.6	150	140				
4/V 150 H	4	55615 604 940	4.8	150	140				
5/V 150 H	5	55615 605 940	6.0	150	140				
Mempac Flat-H									
2/V 80 H	2	55608 702 012	2.4	80	70	37.0 ^{-0.3}	20.0 ^{-0.3}	10.0 ⁻¹	10
3/V 80 H	3	55608 703 012	3.6	80	70	55.0 ^{-0.3}	20.0 ^{-0.3}	10.0 ⁻¹	15
Popular Memory Backup Batteries for PC									
3/V 15 H	3	55602 303 015 ¹⁾	3.6	16	15	10.6 ⁻¹	12.4 ^{-0.5}	12.4 ^{-0.5}	4
2/V 40 H	2	55604 302 059 ²⁾	2.4	43	40	11.0 ⁻¹	12.0 ^{-0.5}	12.0 ^{-0.5}	6
3/V 40 H	3	55604 303 059 ²⁾	3.6	43	40	16.8 ^{-1.5}	12.0 ^{-0.5}	12.0 ^{-0.5}	8
2/V 80 H	2	55608 303 012 ¹⁾	2.4	80	70	13.6 ^{-2.2}	16.0 ^{-0.5}	16.0 ^{-0.5}	10
3/V 80 H	3	55608 303 059 ²⁾	3.6	80	70	19.0 ⁻¹	16.0 ^{-0.5}	16.0 ^{-0.5}	15

TAB. 8

Series Mempac S-H, Mempac Flat-H and other standard batteries (for temperature up to +65°C)

¹⁾ Stack in shrink sleeve, with solder tags (2 pins) ²⁾ Stack in shrink sleeve, with solder tags (3 pins)



2/V40H
(stack in plastic case)



3/V40H



3/V80H



Mempac Flat Series



Mempac Series

2.5 NIMH BUTTON CELL BATTERIES FOR BRIDGING APPLICATIONS

Bridging Batteries

Bridging batteries from VARTA Microbattery are optimised in small size and provide high power output for bridging mobile computers e.g. during main battery change. Bridging batteries temporarily take over the supply of DRAM and other chips in notebooks, PCs, handhelds, calculators, etc. when the main battery is replaced within a certain time frame specified by the manufacturer.

Typical Application

- Notebooks
- Handhelds
- Calculators

A typical requirement for example is this:

- Charging current: 0.1 CA (+0.03 CA) continuous
- Discharge current: 30–100 mA¹⁾
- Bridging time: 5–15 min.
- Operating temperature: 0 to +45°C

¹⁾ Proper selection of battery capacity is required.

Type	No. of cells	Order No.	Nominal voltage (V)	Typical capacity (mAh)	Nominal capacity (mAh)	Length (mm)	Width (mm)	Height without pins (mm)	Weight (g)	Wire length (mm)
NiMH Batteries for Bridging Applications										
6/V 15 H	6	55602 406 020 ¹⁾	7.2	16	15	72.0	14.5	4.5	10	30
6/V 40 H	6	55604 406 012 ¹⁾	7.2	43	40	70.5	14.0	7.0	12	65

TAB. 9

¹⁾ Layflat version with wires and connector. Other configurations available on request.



6/V 15 H
(layflat version)



6/V 40 H
(3x2 layflat version)

2.6 STANDARD NIMH BUTTON CELL BATTERIES FOR ALARM EQUIPMENT (CAR ALARM, ...)

Alarm Batteries

Reliable VARTA Microbattery Alarm Batteries with high capacity supply power for alarm signals as back up or main battery. VARTA Microbattery offers suitable solutions for all different alarm equipments (piezzo, electromagnetic loudspeakers, ...).

Typical Application

- Car alarm equipment
- Domestic alarm equipment

Type	No. of cells	Order No.	Nominal voltage (V)	Typical capacity (mAh), 5 hours	Nominal capacity (mAh), 5 hours	Discharge current (mA), 0.2 CA	Charge current (mA), 14-16 hours	Dimensions (mm), l/b	Width (mm)	Height (mm)	Weight (g)
NiMH Batteries for Alarm Equipment											
6/V 150 H	6	55615 306 060	7.2	150	140	28	14	max. 26.5	15.0	max. 37.8	41
6/V 250 H	6	55625 906 014	7.2	250	240	48	24	52.0	48.0	14.7	65

TAB. 10
Further car alarm batteries in different configurations from 4.8 V up to 10.8 V are available. Please contact VARTA Microbattery.



6/V 150 H



5/V 150 HT



5/V 80 H

FIG. 4
Discharge curve for car alarm application with a horn. Discharge of 6/V 250 H with 4 Ohm horn and typical discharge voltage and discharge current characteristics.

