

"H" Type Nickel Metal Hydride Battery

HHR60AAAH, HHR210AH, HHR370AH, HHR250SCH, HHR300CH

NiMH "H" Type Batteries

September 2004

Matsushita Battery Industrial Co., Ltd.

Improved Low Rate Charge Characteristics at Higher Temperatures



Model Number	Size	Nominal Voltage	Discharge Capacity ¹ (mAh)		Dimensions (mm)		Approx. Weight (g)
			Average	Minimum	Diameter	Height	
HHR60AAAH	AAA	1.2	550	500	10.5 + 0/-0.7	44.5 + 0/-1.0	12
HHR210AH	A	1.2	2050	1900	17.0 + 0/-0.7	50.0 + 0/-1.5	38
HHR370AH	L-fat A (18670)	1.2	3700	3500	18.2 + 0/-0.7	67.0 + 0/-1.5	60
HHR250SCH	SC	1.2	2650	2500	23.0 + 0/-1.0	43.0 + 0/-1.5	55
HHR300CH	C	1.2	3300	3100	25.8 + 0/-1.0	50.0 + 0/-1.5	80

1. 0.2It discharge capacity after charging at 0.1It for 16 hours.

Panasonic introduces a new line of NiMH cells that are superior to standard NiMH products in applications with low-rate charge at high temperatures. Improvements were made in existing Panasonic NiMH cells to the negative plate alloy and separator fiber density. A new electrolyte composition was achieved to improve performance. Superior long-life characteristics can be achieved when combined with appropriate intermittent charge control circuitry. The intermittent charge consumes 1/30th the electricity compared to trickle charge and more than doubles the expected life of the NiMH cells compared to NiCd cells that have been trickle charged.

Features

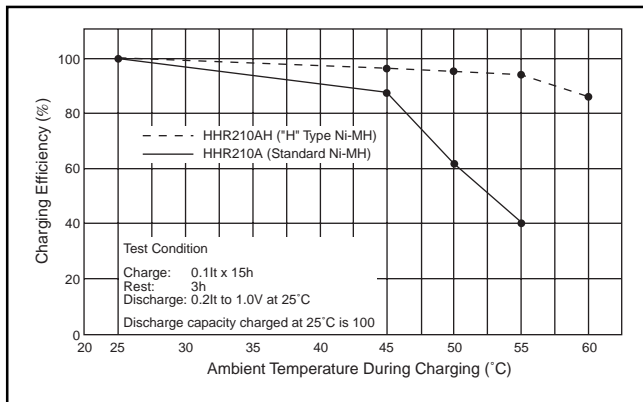
- Higher capacity in a smaller size and lighter weight than other battery back-up solutions (Lead-Acid, NiCd)
- Efficient Charging at high temperatures (up to 60°C)
- 8-12 year expected life when used with the proper charge control circuitry

Applications

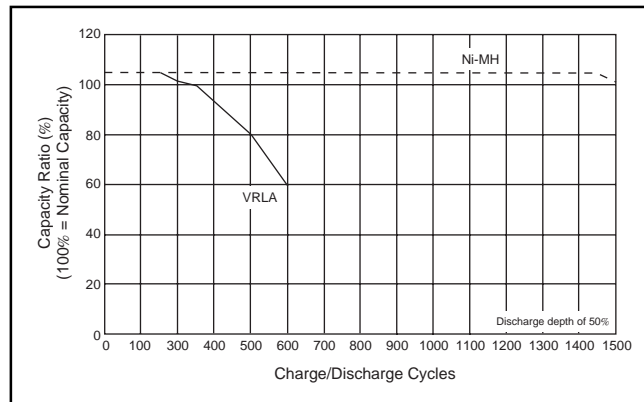
- Network storage-cache memory back-up
- Uninterruptable power supply units (UPS) - (HHR250SCH)
- Emergency lights
- Communication base stations (Micro cell, Pico cell)
- Load leveling

■ Examples of characteristics

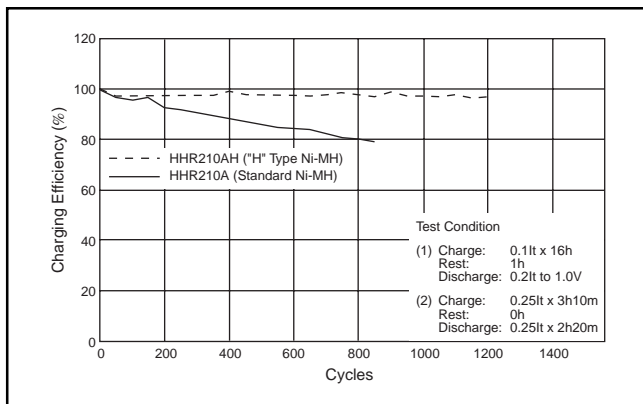
Charging Characteristics by Temperature (H-Type vs. Standard NiMH Cell)



Cycle Life Characteristics H-Type vs. Valve Regulated Lead-Acid Batteries



Cycle Life Characteristics (H-Type vs. Standard NiMH Cell)



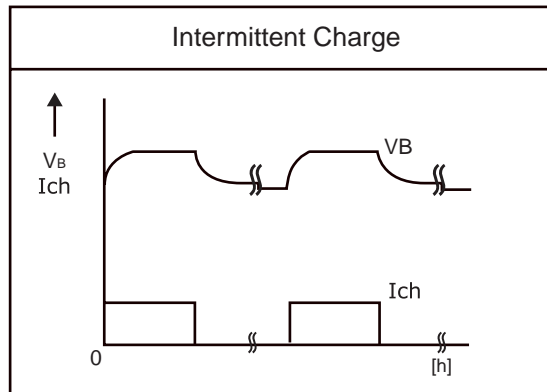
NiMH "H" Series Recommended Charge System for back-up power applications
 (Applies to HHR60AAAH, HHR210AH, HHR370AH, HHR250SCH & HHR300CH Cylindrical cells)

The optimal charge system for the NiMH "H" Series for back-up power applications is an intermittent timer charge. An intermittent timer charge improves charge efficiency, extends battery life (-vs- trickle charge) and reduces electricity consumption up to 30% compared to *trickle charge.

Intermittent Timer Charge: (see diagram) At the beginning of the charge, an IC timer is started and charging is activated at a current of 0.1It until the timer stops and the charge is terminated. When the batteries self discharge down to a set point (1.3V), the timer charge is re-activated.

*Trickle charge is not recommended for NiMH batteries. Please consult Panasonic on any NiMH applications requiring trickle charge.

- Example of intermittent timer charger system:
 Average Charge Current: 0.1ItA
 Re-charge Time: 16 hours
 Pulse charging can be used

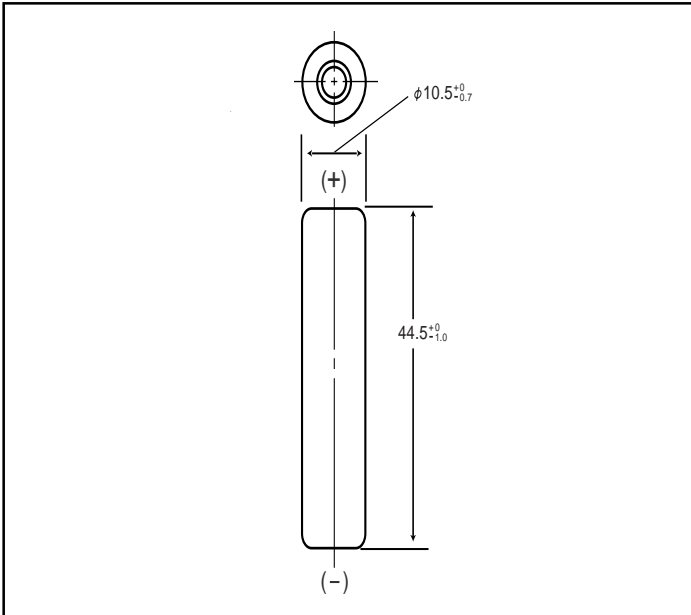


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NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR60AAAH Cylindrical AAA size (HR 11/45)

Dimensions (with Tube) (mm)



Specifications

	mm	inch
Diameter	10.5 +0/-0.7	0.41 +0/-0.03
Height	44.5 +0/-1.0	1.75 +0/-0.04
Approximate Weight	Grams	Ounces
	12	0.42

Nominal Voltage		1.2V	
Discharge Capacity ¹	Average ²	550 mAh	
	Rated (Min.)	500 mAh	
Approx. Internal impedance at 1000Hz at charged state.		35mΩ	
Charge	Standard	50mA x 16hrs.	
	Rapid ³	250mA x 2.4 hrs. ⁴	
	Low Rate	25mA x 32 hrs. 17mA x 48 hrs.	
Ambient Temperature	Charge	Standard	°C: -10°C to 60°C °F: 14°F to 140°F
		Rapid	°C: -10°C to 45°C °F: 14°F to 113°F
	Discharge		°C: -10°C to 60°C °F: 14°F to 140°F
	Storage	< 1 year	°C: -20°C to 35°C °F: -4°F to 95°F
		< 6 months	°C: -20°C to 45°C °F: -4°F to 113°F
		< 1 month	°C: -20°C to 55°C °F: -4°F to 131°F
< 1 week		°C: -20°C to 65°C °F: -4°F to 149°F	

¹ After charging at 0.1It for 16 hours, discharging at 0.2It.

² For reference only.

³ Need specially designed control system

Control System:

dT/dt cut-off; 1 to 2°C/min

-ΔV cut-off; -ΔV per cell = 5 to 10 mV

T-control; T=65°C

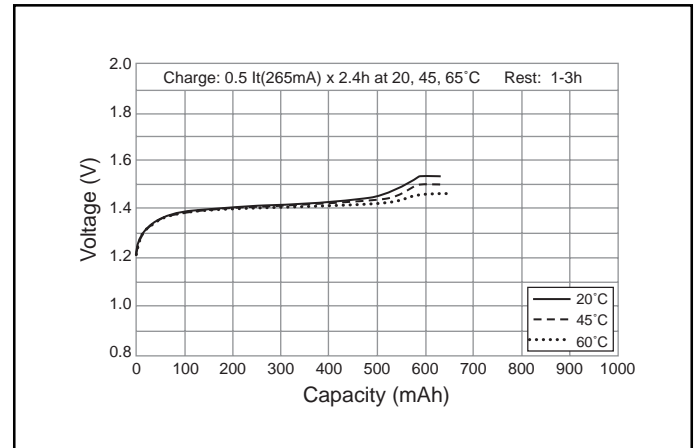
Rapid charger timer; 2.4h (at 1.25a)

Trickle timer; within 2h

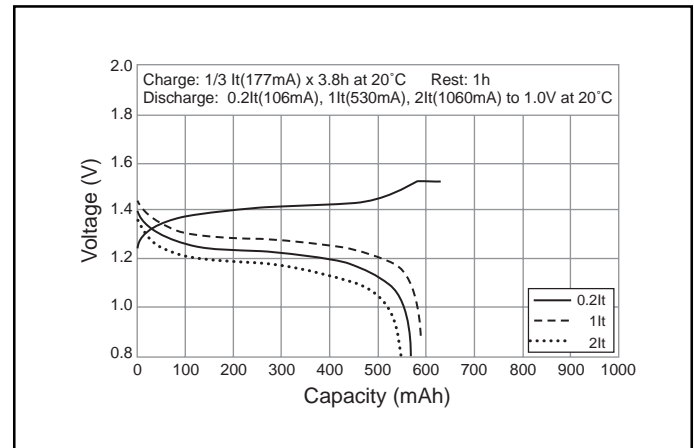
⁴ With control system

Battery performance and cycle life are strongly affected by how they are used. In order to maximize battery safety, please consult Panasonic when determining charge / discharge specs, warning label contents and unit design.

Typical Charge Characteristics



Typical Discharge Characteristics



Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:

$$It(A) = Cn (Ah)/1h$$

* [It] is the reference test current in amperes

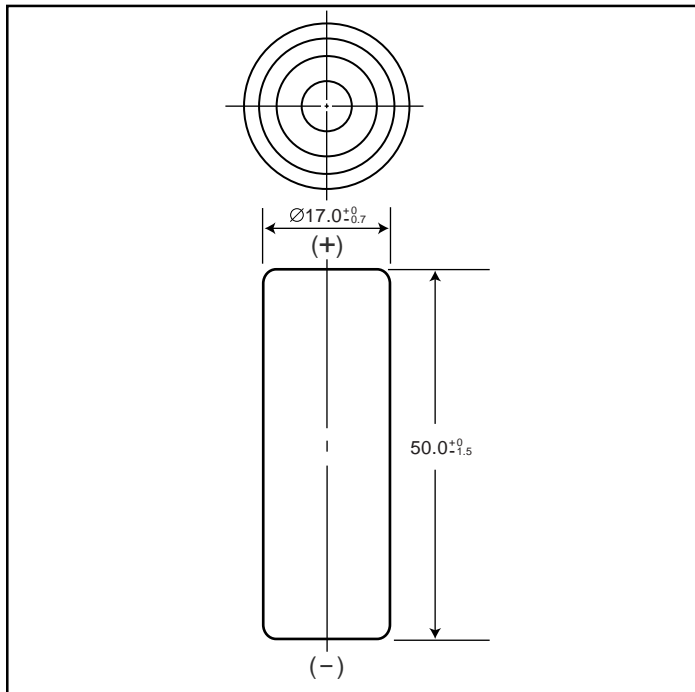
* [Cn] is the rated capacity of the cell or battery in Ampere-hours.

n = the time base [hours] for which the rated capacity is declared

NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR210AH Cylindrical A size (HR 17/50)

Dimensions (with Tube) (mm)



Specifications

	mm	inch
Diameter	17.0+0/-0.7	0.67+0/-0.03
Height	50.0+0/-1.5	1.97+0/-0.06
Approximate Weight	Grams	Ounces
	38	1.34

Nominal Voltage		1.2V	
Discharge Capacity ¹	Average ²	2050mAh	
	Rated (Min.)	1900mAh	
Approx. internal Impedance at 1000Hz at charged state.		20mΩ	
Charge	Standard	210mA (0.1It) x 16 hrs.	
	Rapid	-	
Ambient Temperature	Charge	Standard	°C
		Standard	°F
	Discharge	-10°C to 60°C	14°F to 140°F
		Rapid	-
Storage	< 1 year	-20°C to 35°C	-4°F to 95°F
	< 3 months	-20°C to 45°C	-4°F to 113°F
	< 1 month	-20°C to 55°C	-4°F to 131°F
	< 1 week	-20°C to 60°C	-4°F to 140°F

¹ After charging at 0.1It for 16 hours, discharging at 0.2It.

² For reference only.

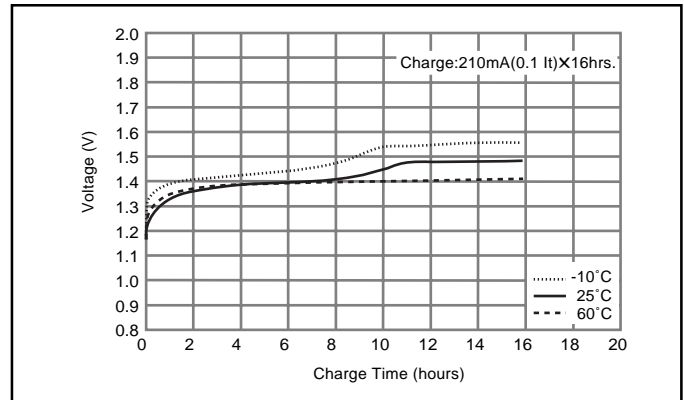
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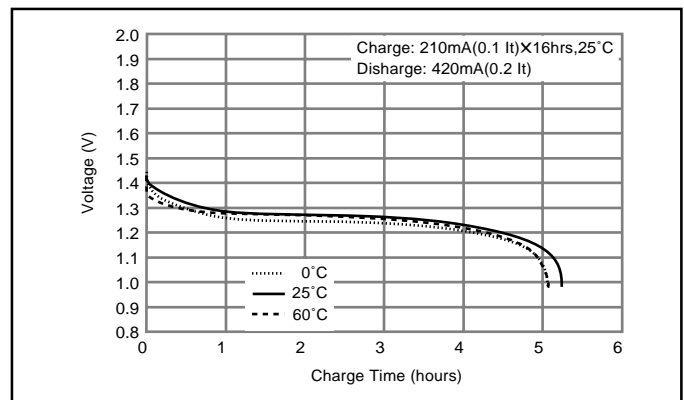
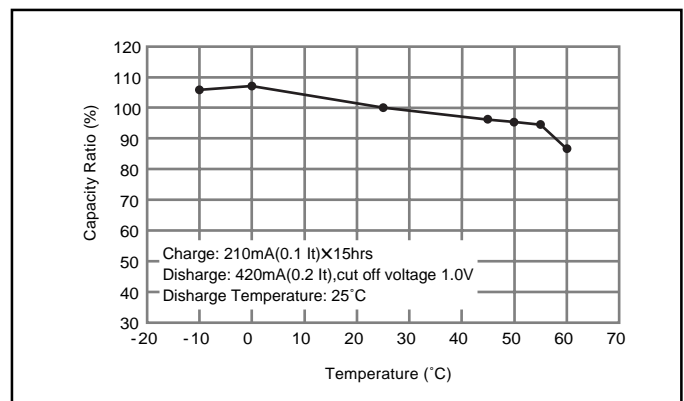
$$It(A) = C_n (Ah)/1h.$$

- [It] is the reference test current in amperes
- [C_n] is the rated capacity of the cell or battery in Ampere-hours.
- n = the time base [hours] for which the rated capacity is declared

Typical Charge Characteristics



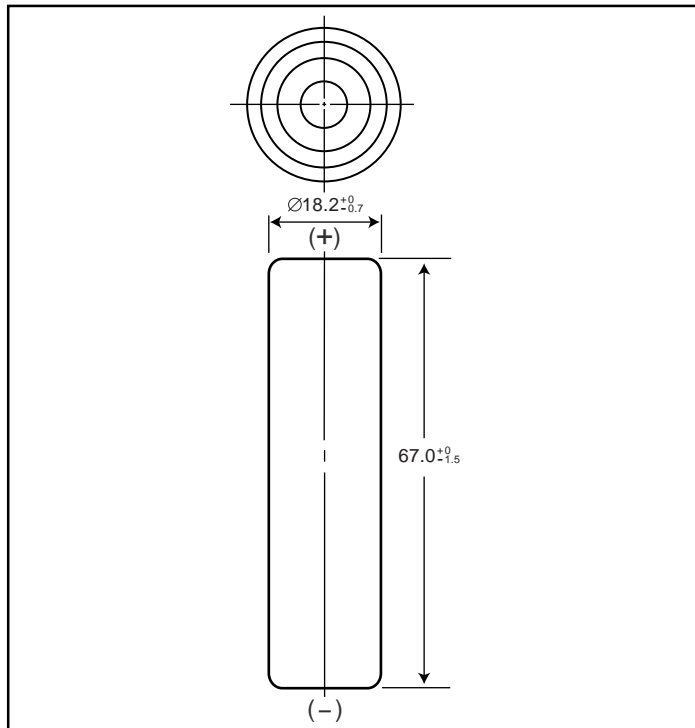
Typical Discharge Characteristics



NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR370AH Cylindrical L-Fat A size (HR 18/67)

Dimensions (with Tube) (mm)



Specifications

	mm	inch
Diameter	18.2+0/-0.7	0.72+0/-0.03
Height	67.0+0/-1.5	2.64+0/-0.06
Approximate Weight	Grams	Ounces
	60	2.12

Nominal Voltage		1.2V	
Discharge Capacity ¹	Average ²	3700 mAh	
	Rated (Min.)	3500 mAh	
Approx. Internal impedance at 1000Hz at charged state.		20mΩ	
Charge	Standard	370mA x 16hrs.	
	Rapid ³	1750mA x 2.4 hrs. ⁴	
	Low Rate	185mA x 32 hrs. 123mA x 48 hrs.	
Ambient Temperature	Charge	Standard	°C: -10°C to 60°C °F: 14°F to 140°F
		Rapid	-10°C to 45°C -4°F to 113°F
Storage	Discharge		-10°C to 60°C 14°F to 140°F
	< 1 year	-20°C to 35°C -4°F to 95°F	
	< 6 months	-20°C to 45°C -4°F to 113°F	
	< 1 month	-20°C to 55°C -4°F to 131°F	
	< 1 week	-20°C to 65°C -4°F to 149°F	

¹ After charging at 0.1It for 16 hours, discharging at 0.2It.

² For reference only.

³ Need specially designed control system

Control System:

dT/dt cut-off; 1 to 2°C/min

-ΔV cut-off; -ΔV per cell = 5 to 10 mV

T-control; T=65°C

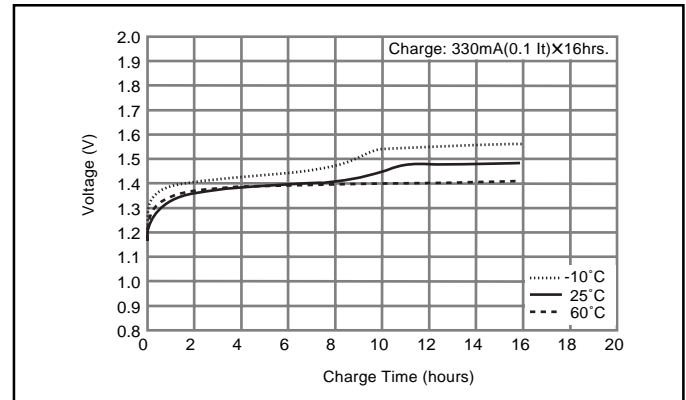
Rapid charger timer; 2.4h (at 1.25a)

Trickle timer; within 2h

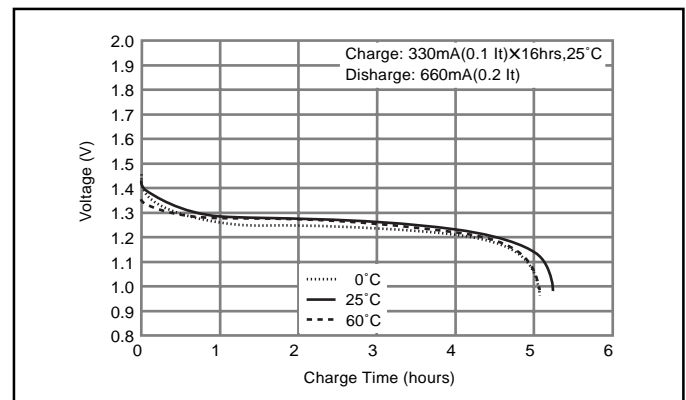
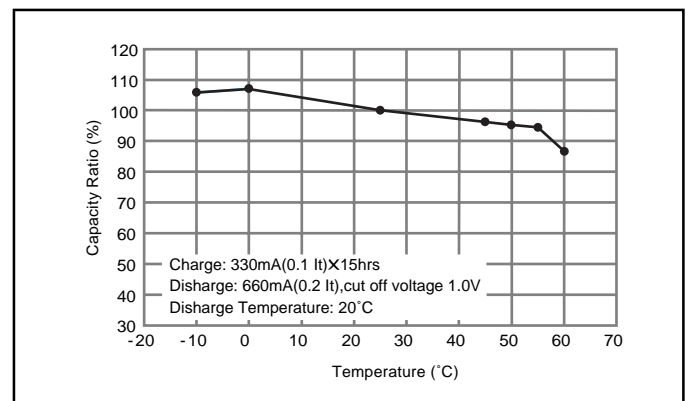
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Typical Charge Characteristics



Typical Discharge Characteristics



Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:

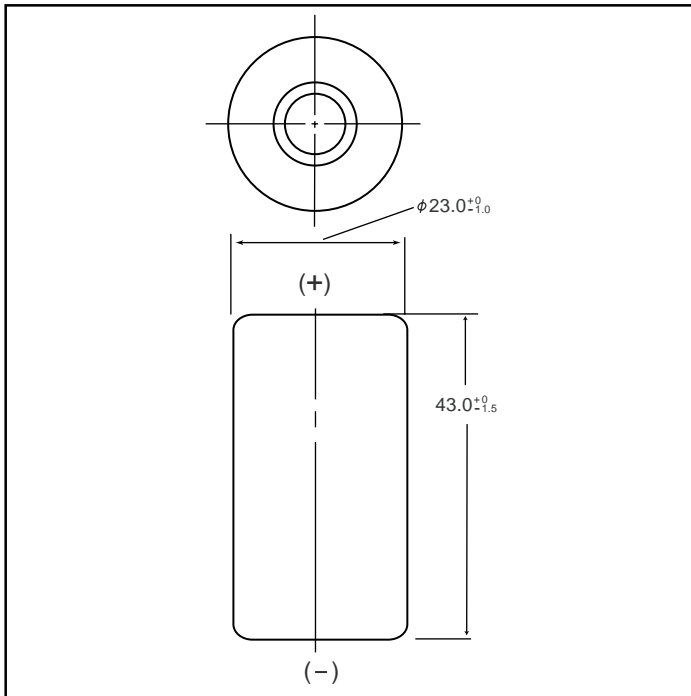
$$It(A) = Cn (Ah)/1h.$$

- [It] is the reference test current in amperes
- [Cn] is the rated capacity of the cell or battery in Ampere-hours.
n = the time base [hours] for which the rated capacity is declared

NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR250SCH Cylindrical SC size (HR 23/43)

Dimensions (with Tube) (mm)



Specifications

	mm	inch
Diameter	23.0+0/-1.0	0.91+0/-0.04
Height	43.0+0/-1.5	1.69+0/-0.06
Approximate Weight	Grams	Ounces
	55	1.94

Nominal Voltage		1.2V	
Discharge Capacity ¹	Average ²	2650 mAh	
	Rated (Min.)	2500 mAh	
Approx. Internal impedance at 1000Hz at charged state.		5mΩ	
Charge	Standard	250mA x 16hrs.	
	Rapid ³	1250mA x 2.4 hrs. ⁴	
	Low Rate	125mA x 32 hrs. 83mA x 48 hrs.	
Ambient Temperature	Charge	Standard	°C °F
		Rapid	-10°C to 45°C 14°F to 113°F
Storage	Discharge	-10°C to 60°C 14°F to 140°F	
		< 1 year	-20°C to 35°C -4°F to 95°F
		< 6 months	-20°C to 45°C -4°F to 113°F
		< 1 month	-20°C to 55°C -4°F to 131°F
		< 1 week	-20°C to 65°C -4°F to 149°F

¹ After charging at 0.1It for 16 hours, discharging at 0.2It.

² For reference only.

³ Need specially designed control system

Control System:

dT/dt cut-off; 1 to 2°C/min

-ΔV cut-off; -ΔV per cell = 5 to 10 mV

T-control; T=65°C

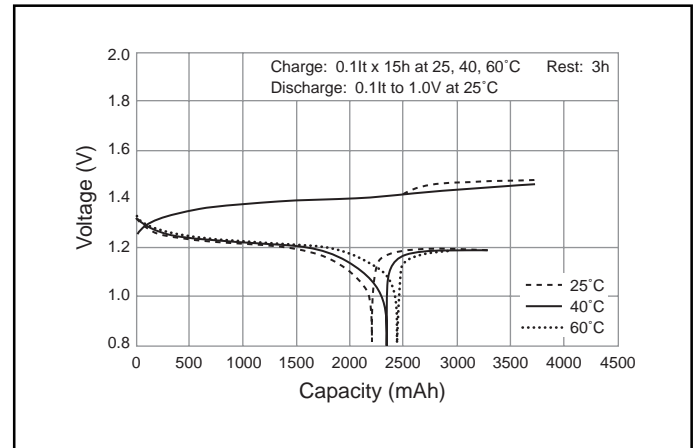
Rapid charger timer; 2.4h (at 1.25a)

Trickle timer; within 2h

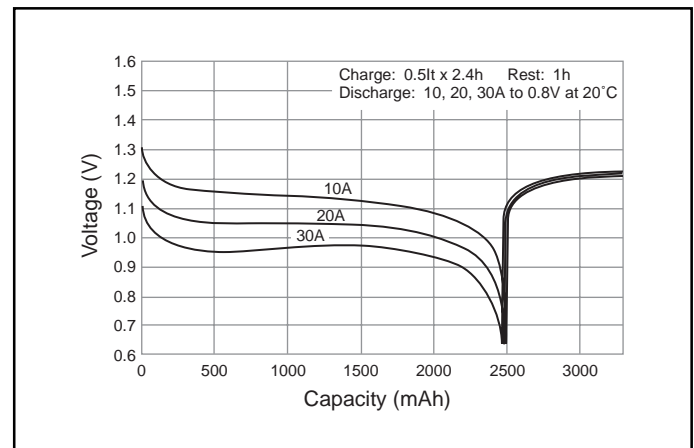
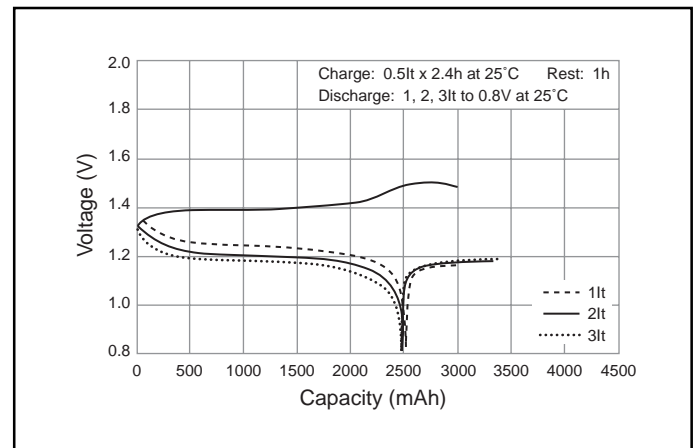
⁴ With control system

Battery performance and cycle life are strongly affected by how they are used. In order to maximize battery safety, please consult Panasonic when determining charge / discharge specs, warning label contents and unit design.

Typical Charge Characteristics



Typical Discharge Characteristics



Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:

$I_t(A) = C_n(Ah)/1h$

* [It] is the reference test current in amperes

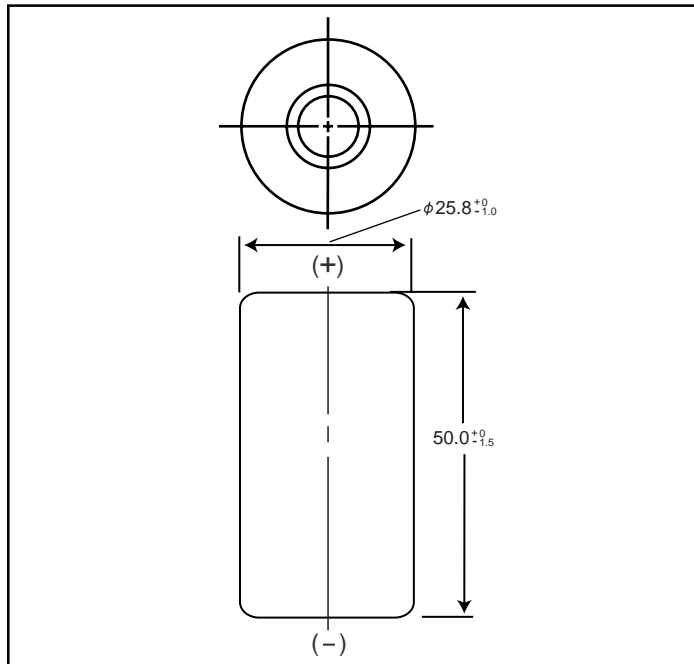
* [C_n] is the rated capacity of the cell or battery in Ampere-hours.

n = the time base [hours] for which the rated capacity is declared

NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR300CH Cylindrical C size (HR 26/50) for backup use

Dimensions (with Tube) (mm)



Specifications

	mm	
Diameter	25.8+0/-1.0	
Height	50.0+0/-1.5	
Approximate Weight	Grams	Ounces
	80	2.82

Nominal Voltage		1.2V		
Discharge Capacity ¹	Average ²	3300 mAh		
	Rated (Min.)	3100 mAh		
Approx. Internal impedance at 1000Hz at charged state.		5mΩ		
Charge	Standard	300mA (0.1It) x 16hrs.		
	Rapid ³	1500mA (1It) x 2.4 hrs. ⁴		
	Low Rate	155mA x 32 hrs. 100mA x 48 hrs.		
Ambient Temperature	Charge	Standard	°C	°F
			0°C to 45°C	32°F to 113°F
		Rapid	10°C to 40°C	32°F to 104°F
	Low Rate	-10°C to 45°C	14°F to 149°F	
	Discharge	-10°C to 65°C		14°F to 113°F
	Storage	< 1 year	-20°C to 35°C	-4°F to 95°F
< 3 months		-20°C to 35°C	-4°F to 95°F	
< 1 month		-20°C to 55°C	-4°F to 131°F	

¹ After charging at 0.1It for 16 hours, discharging at 0.2It.

² For reference only.

³ Need specially designed control system

Control System:

dT/dt cut-off; 1 to 2°C/min

-ΔV cut-off; -ΔV per cell = 5 to 10 mV

T-control; T=65°C

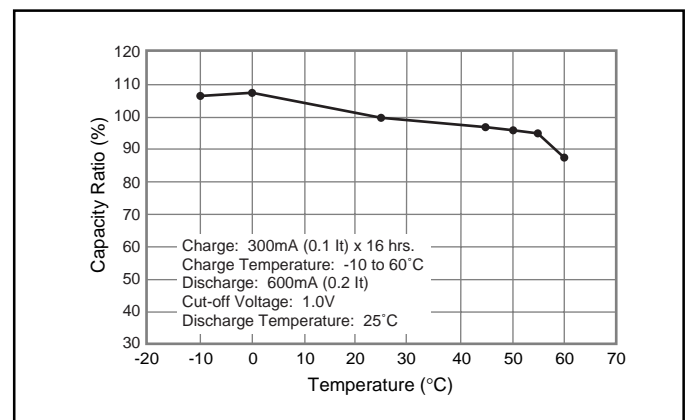
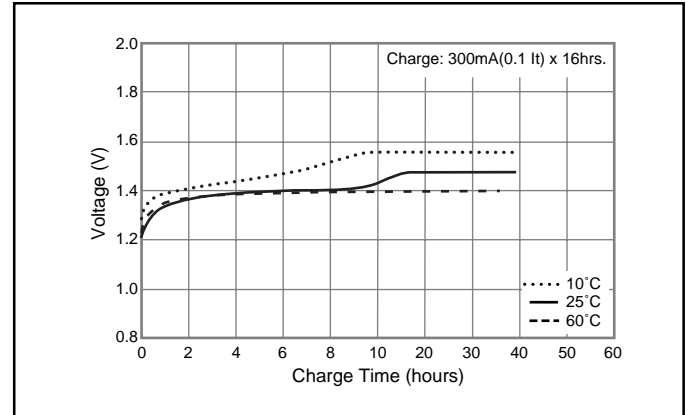
Rapid charger timer; 2.4h (at 1.25a)

Trickle timer; within 2h

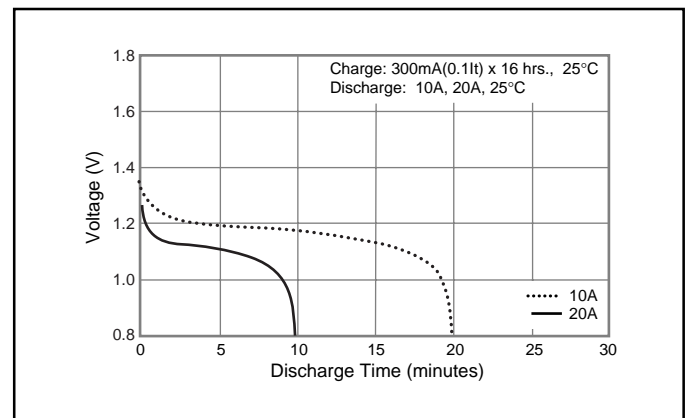
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Typical Charge Characteristics



Typical Discharge Characteristics



Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as: It(A) = Cn (Ah)/1h.

• [It] is the reference test current in amperes

• [Cn] is the rated capacity of the cell or battery in Ampere-hours.
n = the time base [hours] for which the rated capacity is declared