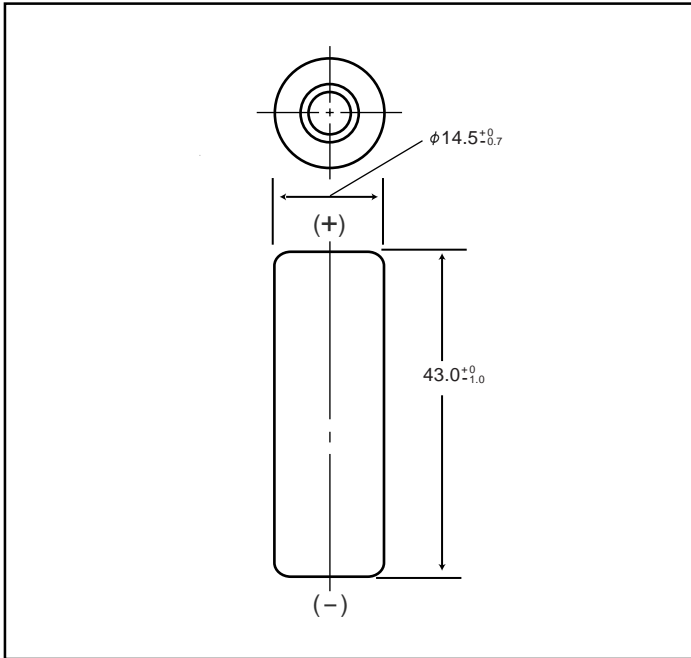


NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR120AA Cylindrical 4/5AA size (HR 15/43)

Dimensions (with Tube) (mm)



Specifications

	mm	inch
Diameter	14.5+0/-0.7	0.57+0/-0.03
Height	43.0+0/-1.0	1.69+0/-0.04
Approximate Weight	Grams	Ounces
	23	0.81

Nominal Voltage		1.2V	
Discharge Capacity*	Average**	1220 mAh	
	Rated (Min.)	1150 mAh	
Approx. Internal impedance at 1000Hz at charged state.		19mΩ	
Charge	Standard	120mA (0.1It) x 16hrs.	
	Rapid	1200mA (1It) x 1.2 hrs.	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		0°C to 45°C
			32°F to 113°F
	Discharge		0°C to 40°C
			32°F to 104°F
Storage	< 1 year		-10°C to 65°C
	< 3 months		14°F to 149°F
	< 1 month		-20°C to 35°C
	< 1 month		-4°F to 95°F

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

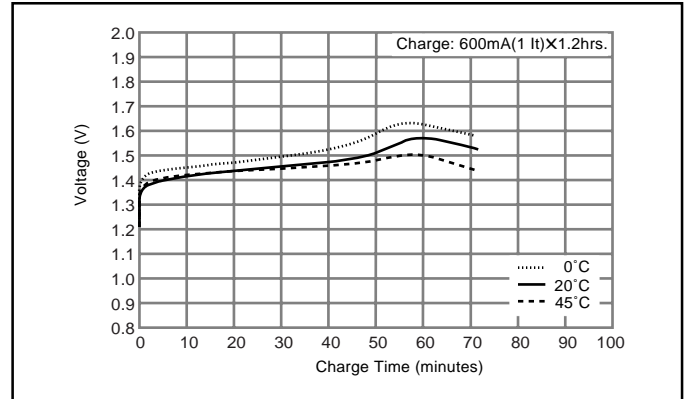
** For reference only.

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.

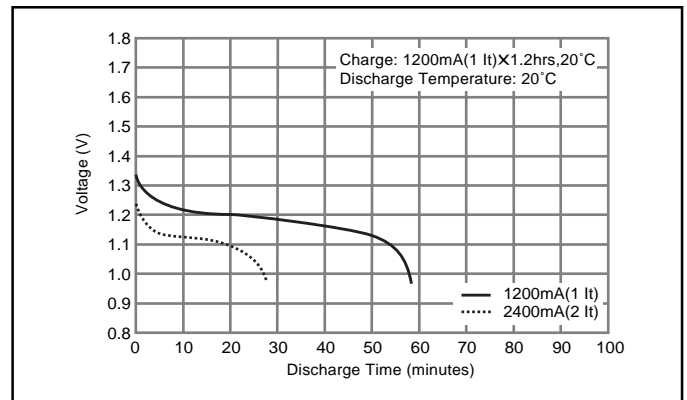
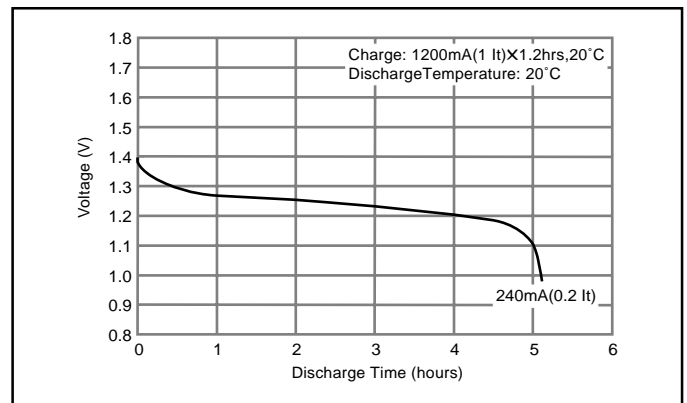
Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:
It(A) = Cn (Ah)/1h.

- [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

Typical Charge Characteristics



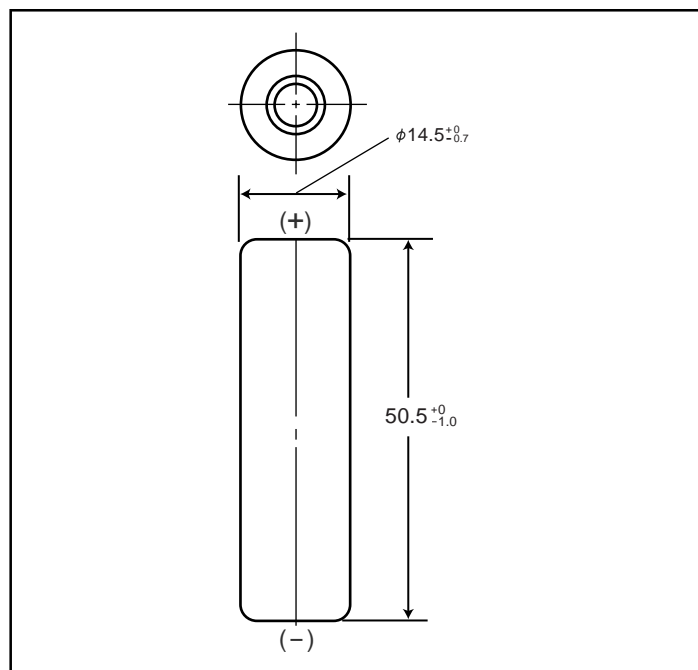
Typical Discharge Characteristics



NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR150AA Cylindrical AA size (HR 15/51)

Dimensions (with Tube) (mm)



Specifications

	mm	inch
Diameter	14.5+0/-0.7	0.57+0/-0.03
Height	50.0+0/-1.0	1.97+0/-0.06
Approximate Weight	Grams	Ounces
	26	0.92

Nominal Voltage		1.2V	
Discharge Capacity*	Average**	1580 mAh	
	Rated (Min.)	1500 mAh	
Approx. Internal impedance at 1000Hz at charged state.		20mΩ	
Charge	Standard	150mA (0.1It) x 16hrs.	
	Rapid	1500mA (1It) x 1.2 hrs.	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		°C
			°F
	Discharge		°C
			°F
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

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

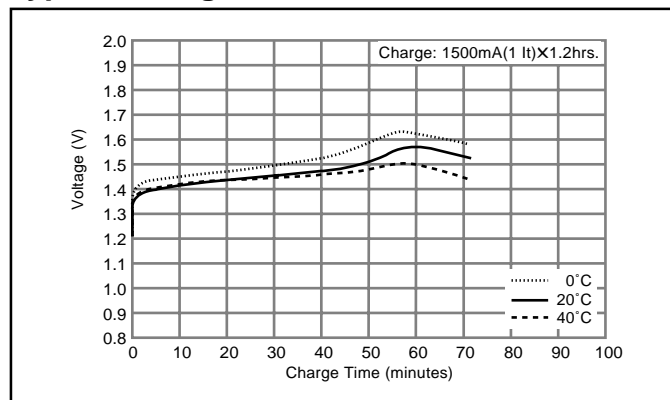
** For reference only.

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.

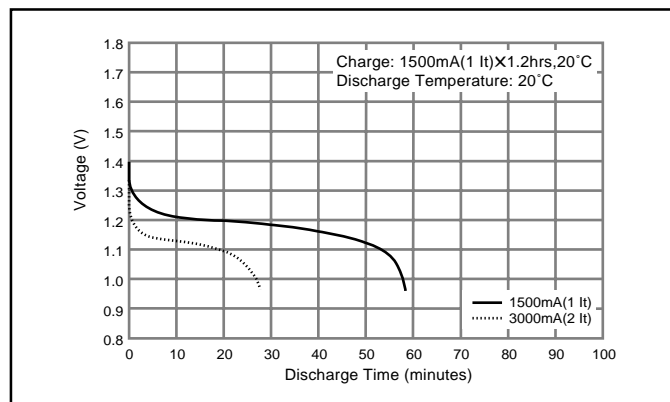
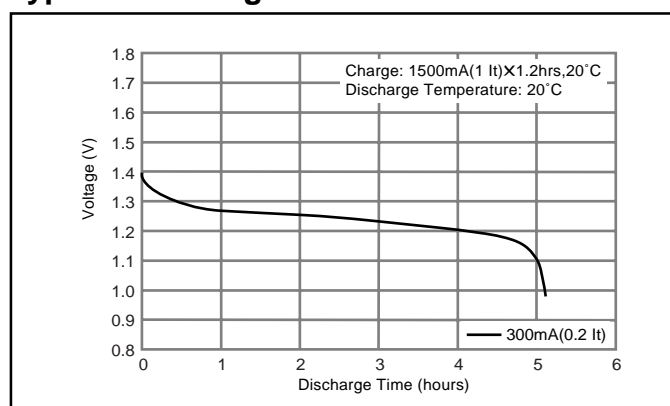
Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:
 $It(A) = Cn (Ah)/1h.$

- [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

Typical Charge Characteristics



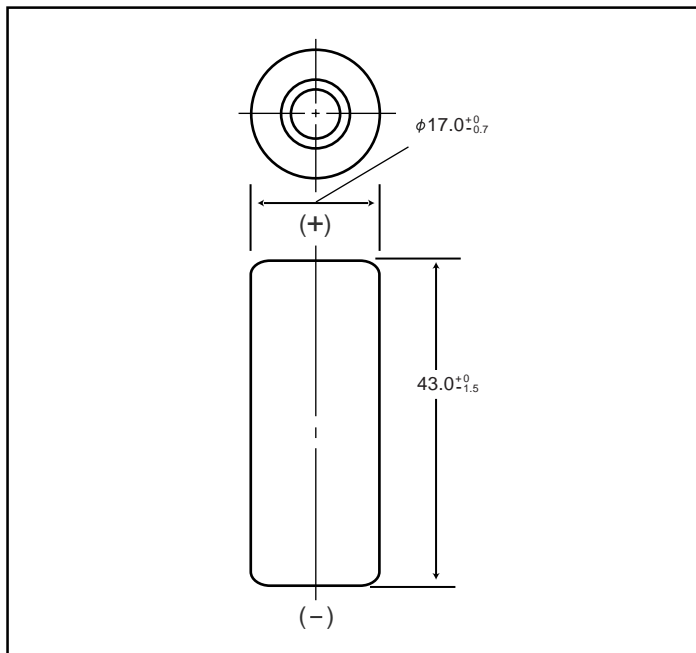
Typical Discharge Characteristics



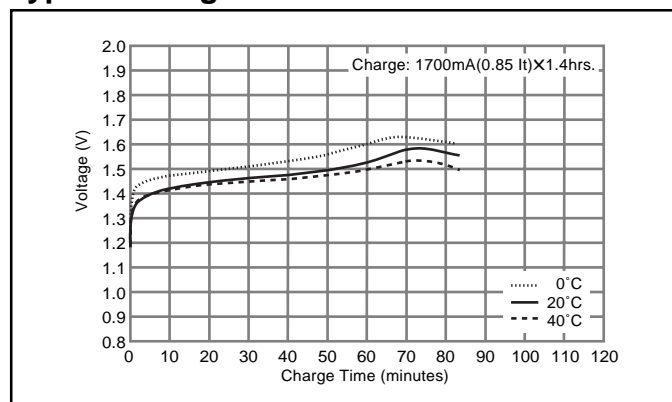
NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR200A Cylindrical 4/5A size (HR 17/43)

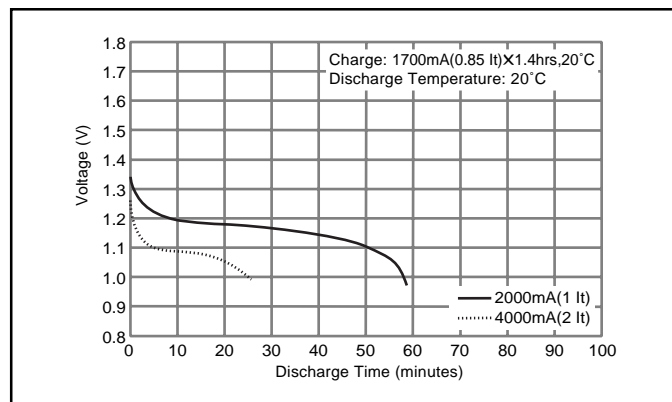
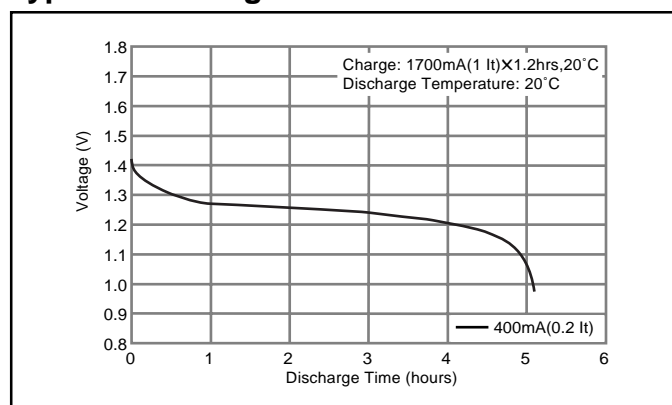
Dimensions (with Tube) (mm)



Typical Charge Characteristics



Typical Discharge Characteristics



Specifications

	mm	inch
Diameter	17.0+0/-0.7	0.67+0/-0.03
Height	43.0+0/-1.5	1.69+0/-0.06
Approximate Weight	Grams	Ounces
	32	1.13

Nominal Voltage		1.2V	
Discharge Capacity*	Average**	2040 mAh	
	Rated (Min.)	2000 mAh	
Approx. Internal impedance at 1000Hz at charged state.		20mΩ	
Charge	Standard	200mA (0.1It) x 16hrs.	
	Rapid	2000mA (1It) x 1.2 hrs.	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		0°C to 45°C
			32°F to 113°F
	Discharge		0°C to 40°C
			32°F to 104°F
Storage	< 1 year		-10°C to 65°C
	< 3 months		14°F to 149°F
	< 1 month		-20°C to 35°C
	< 1 month		-4°F to 95°F

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

** For reference only.

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.

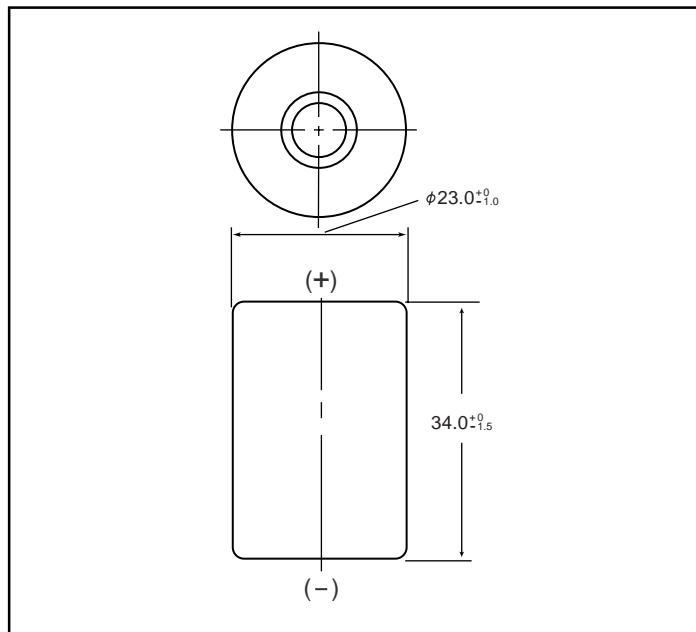
Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:
 $It(A) = Cn (Ah)/1h.$

- [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

HHR200SCP Cylindrical 4/5SC size (HR 23/34)

Dimensions (with Tube) (mm)



Specifications

	mm	inch
Diameter	23.0+0/-0.1	0.91+0/-0.04
Height	34.0+0/-1.5	1.34+0/-0.06
Approximate Weight	Grams	Ounces
	42	1.48

Nominal Voltage			1.2V	
Discharge Capacity*		Average**	2100 mAh	
		Rated (Min.)	1900 mAh	
Approx. Internal impedance at 1000Hz at charged state.			5mΩ	
Charge		Standard	200mA (0.1It) x 16hrs.	
		Rapid	2000mA (1It) x 1.2 hrs.	
Ambient Temperature	Charge	Standard	°C	°F
			0°C to 45°C	32°F to 113°F
		Rapid	0°C to 40°C	32°F to 104°F
	Discharge		-10°C to 65°C	14°F to 149°F
	Storage	< 2 years	-20°C to 35°C	-4°F to 95°F
		< 6 months	-20°C to 45°C	-4°F to 113°F

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

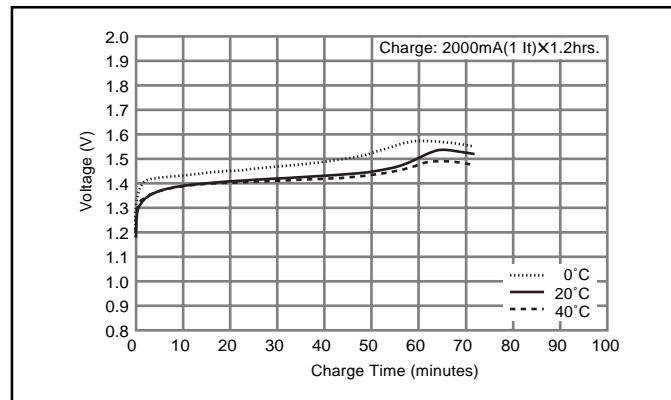
** For reference only.

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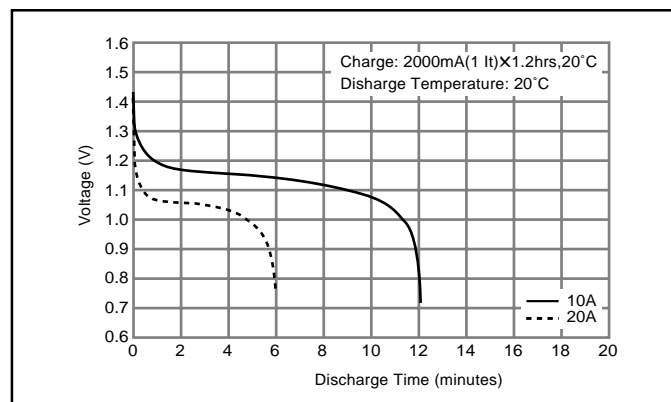
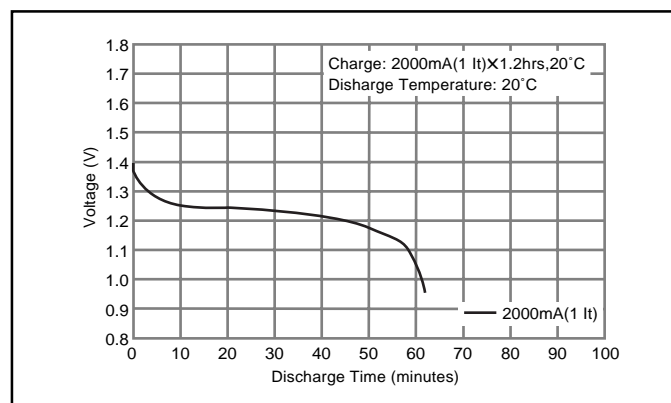
Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:
 $It(A) = Cn (Ah)/1h$.

- [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

Typical Charge Characteristics



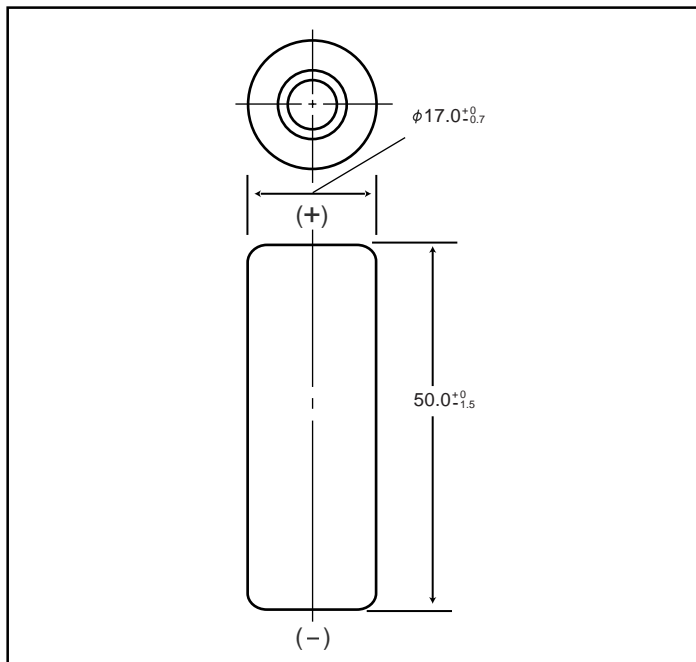
Typical Discharge Characteristics



NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR210A 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*		Average**	2200 mAh	
		Rated (Min.)	2100 mAh	
Approx. Internal impedance at 1000Hz at charged state.			20mΩ	
Charge		Standard	210mA (0.1It) x 16hrs.	
		Rapid	2100mA (1It) x 1.2 hrs.	
Ambient Temperature	Charge	Standard	°C	°F
			0°C to 45°C	32°F to 113°F
		Rapid	0°C to 40°C	32°F to 104°F
	Discharge		-10°C to 65°C	14°F to 149°F
	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

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

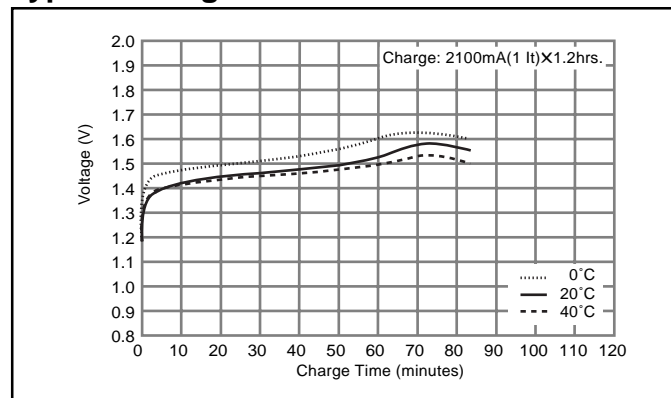
** For reference only.

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.

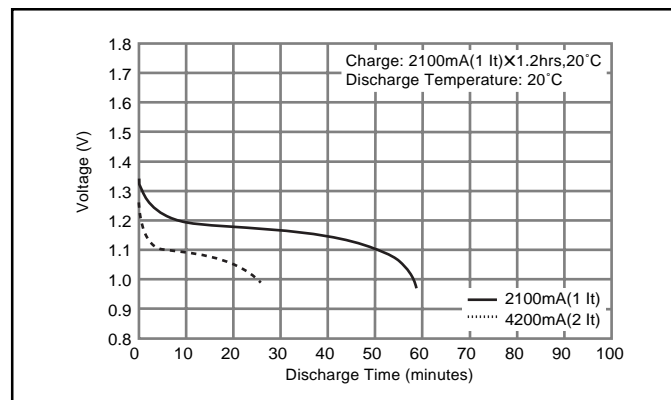
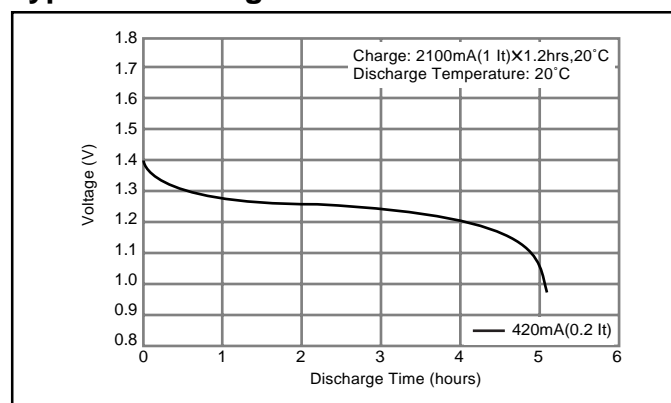
Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:
 $It(A) = Cn (Ah)/1h$.

- [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

Typical Charge Characteristics



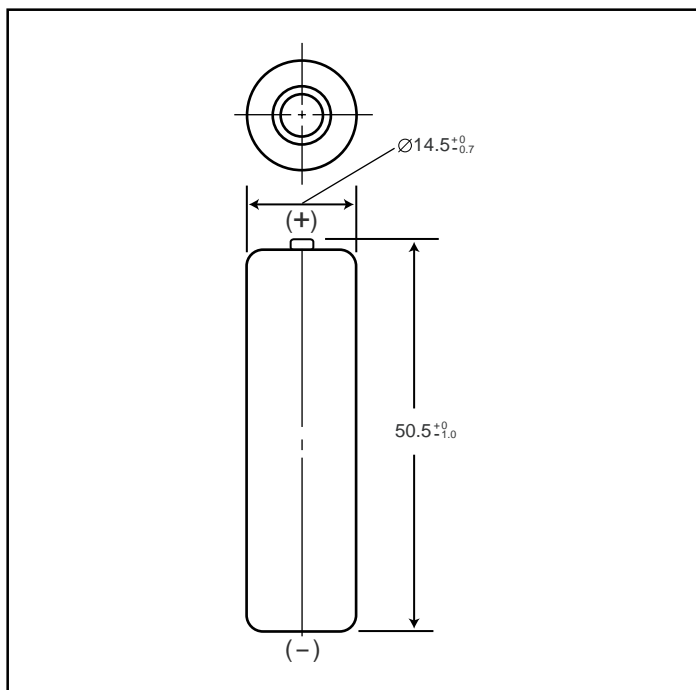
Typical Discharge Characteristics



NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR210AA/B Cylindrical AA size (HR 15/51)

Dimensions (with Tube) (mm)



Specifications

	mm	inch
Diameter	14.5 +0/-0.7	0.57 +0/-0.3
Height	50.5 +0/-1.0	1.99 +0/-0.5
Approximate Weight	Grams	Ounces
	29	1.02

Nominal Voltage		1.2V	
Discharge Capacity*	Average**	2080mAh	
	Rated (Min.)	2000mAh	
Approx. internal Impedance at 1000Hz at charged state.		25mΩ	
Charge	Standard	200mA (0.1It) x 16 hrs.	
	Rapid	1200mA (1It) x 2 hrs.	
Ambient Temperature	Charge	Standard	°C
		0°C to 45°C	32°F to 113°F
		Rapid	°C
		0°C to 40°C	32°F to 113°F
	Discharge		°C
	-10°C to 65°C		14°F to 149°F
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

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

** For reference only.

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.

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:

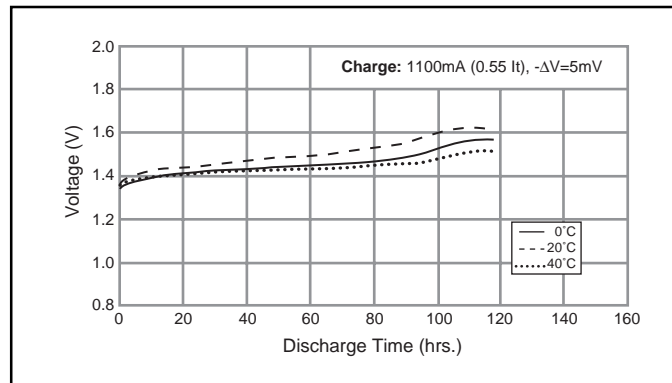
$$It(A) = Cn (Ah)/1h$$

* [It] is the reference test current in amperes

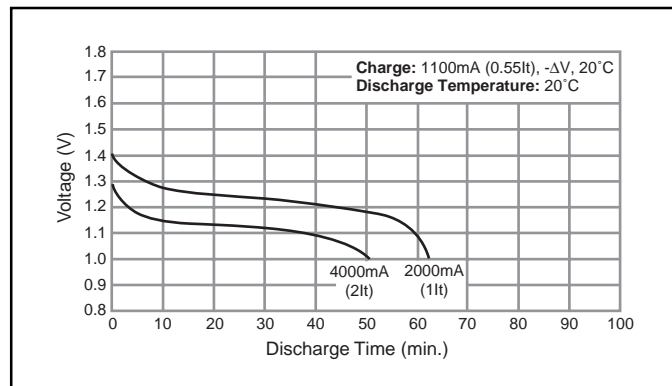
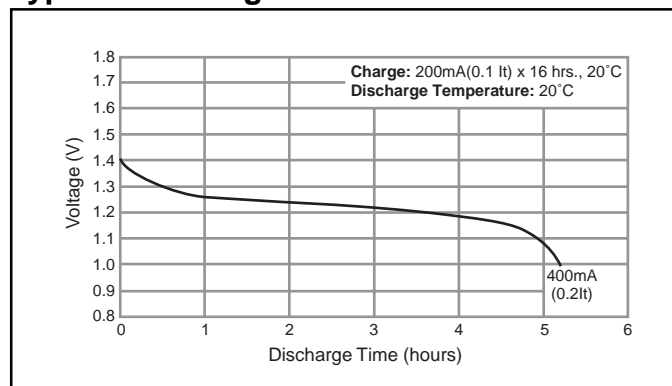
* [Cn] is the rated capacity of the cell or battery in Ampere-hours.

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

Typical Charge Characteristics



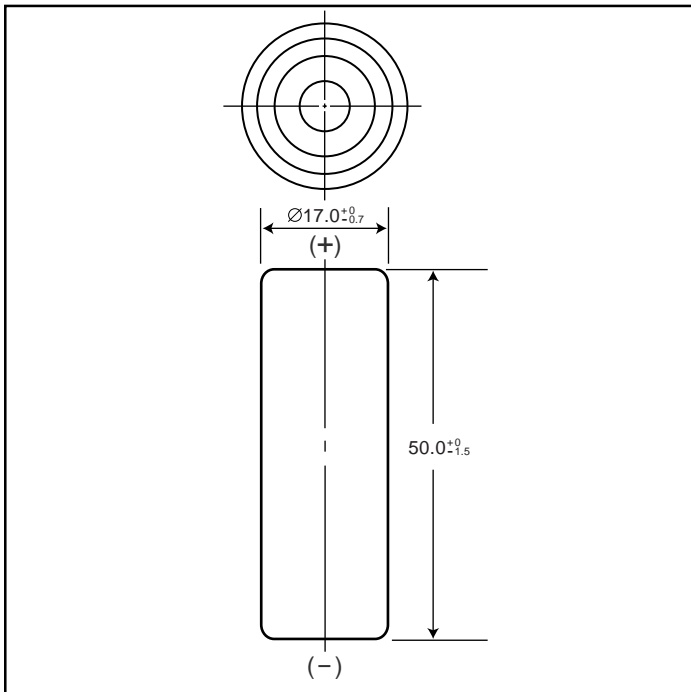
Typical Discharge Characteristics



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	°F
			-10°C to 60°C	14°F to 140°F
		Rapid	-	-
	Discharge		-10°C to 60°C	14°F to 140°F
	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.

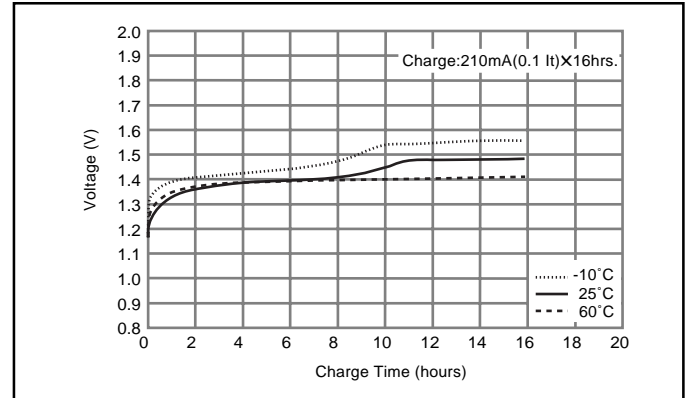
Battery performance and cycle life are strongly affected by how they are used. In order to maximize battery safety, please consult Panasonic when determining charge / discharge specs, warning label contents and unit design.

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:

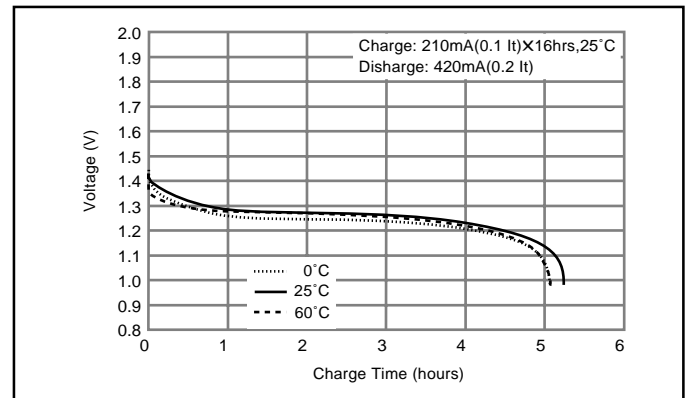
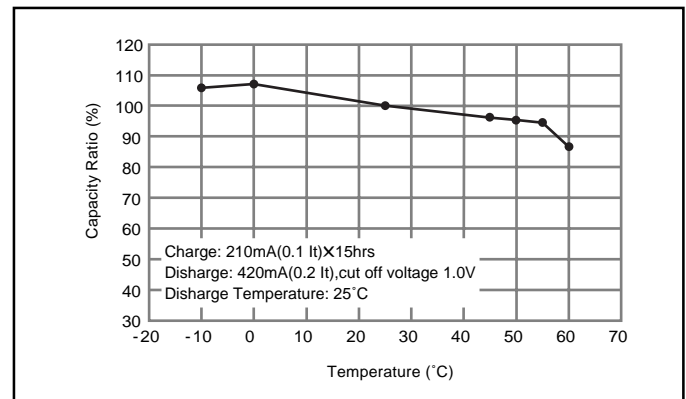
$$It(A) = C_n (Ah)/1h.$$

- [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



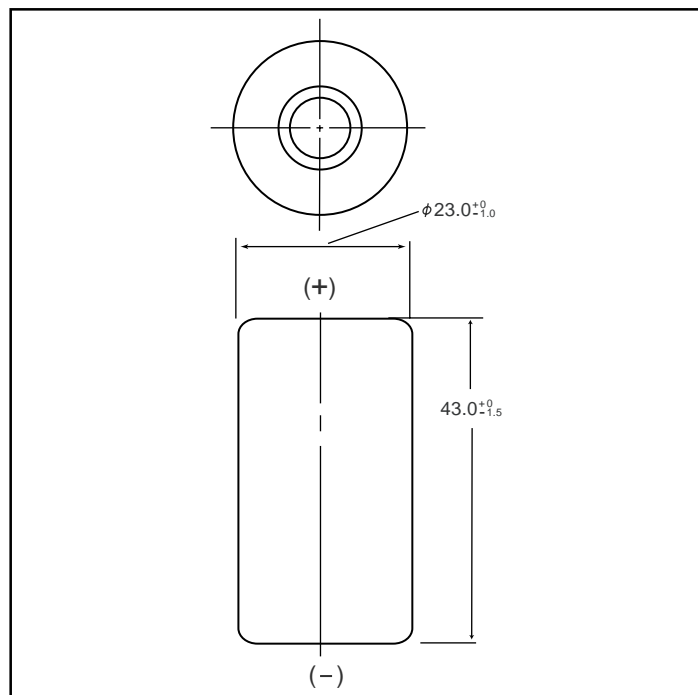
Typical Discharge Characteristics



NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

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
			-10°C to 60°C	14°F to 140°F
		Rapid	-10°C to 45°C	14°F to 113°F
	Discharge		-10°C to 60°C	14°F to 140°F
	Storage	< 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

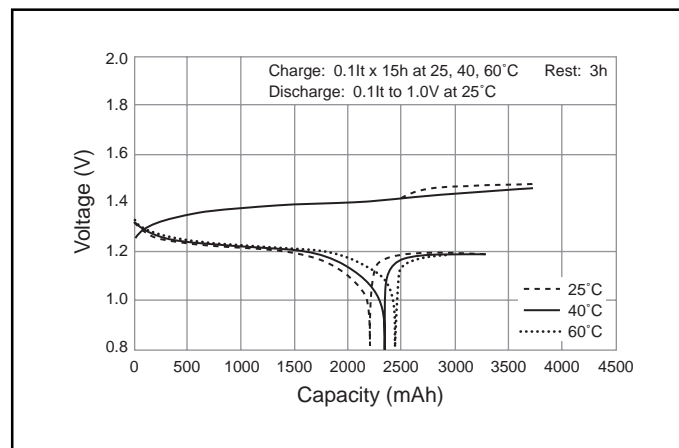
Rapid charger timer; 2.4h (at 1.25a)

Trickle timer; within 2h

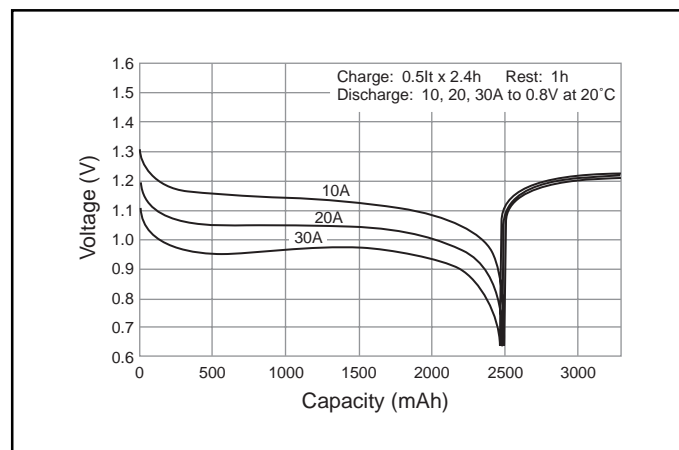
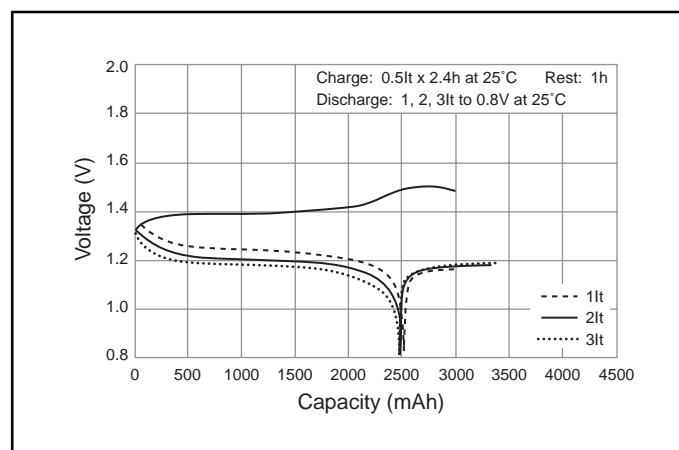
⁴ With control system

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:

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

* [It] is the reference test current in amperes

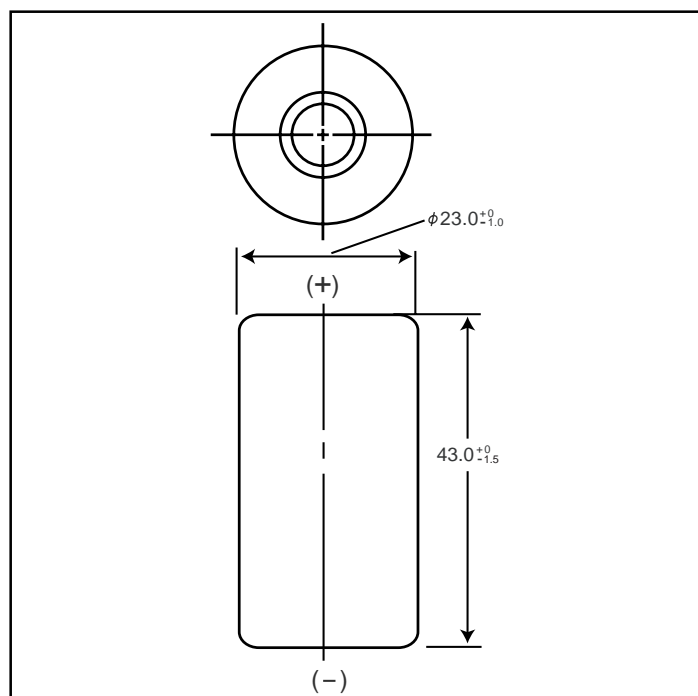
* [Cn] is the rated capacity of the cell or battery in Ampere-hours.

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

NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR260SCP 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	2600 mAh	
		Rated (Min.)	2450 mAh	
Approx. Internal impedance at 1000Hz at charged state.			5mΩ	
Charge		Standard	260mA x 16hrs.	
		Rapid	2600mA x 1.2 hrs.	
Ambient Temperature	Charge	Standard	°C	°F
			0°C to 45°C	32°F to 113°F
		Rapid	10°C to 40°C	50°F to 104°F
	Discharge		-10°C to 65°C	14°F to 149°F
	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 After charging at 0.1It for 16 hours, discharging at 0.2It.

² For reference only.

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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:

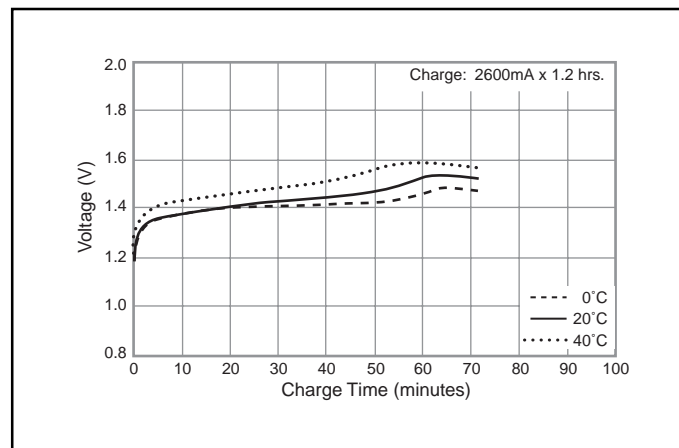
$$It(A) = Cn (Ah)/1h$$

* [It] is the reference test current in amperes

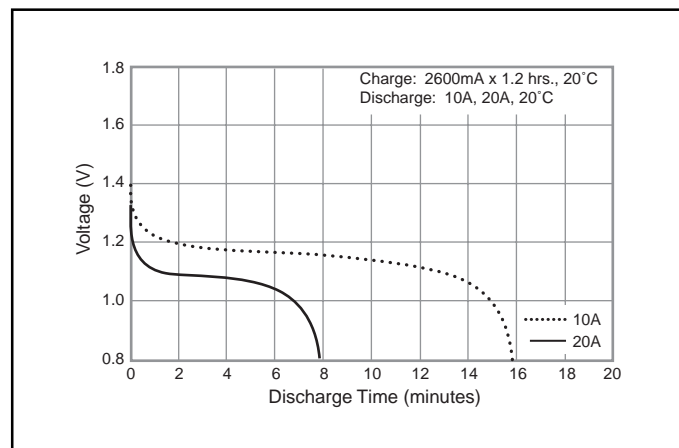
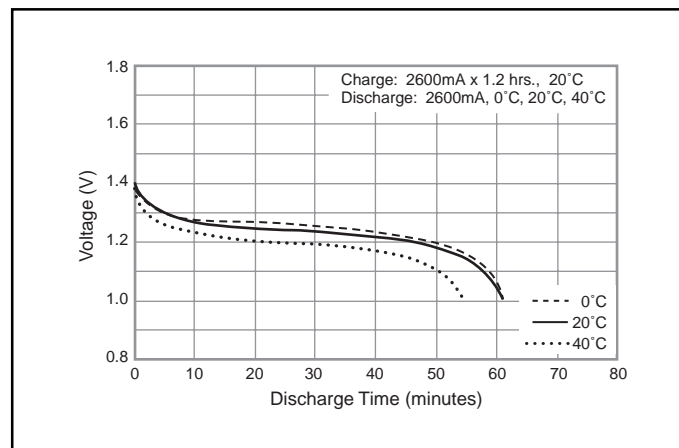
* [Cn] is the rated capacity of the cell or battery in Ampere-hours.

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

Typical Charge Characteristics



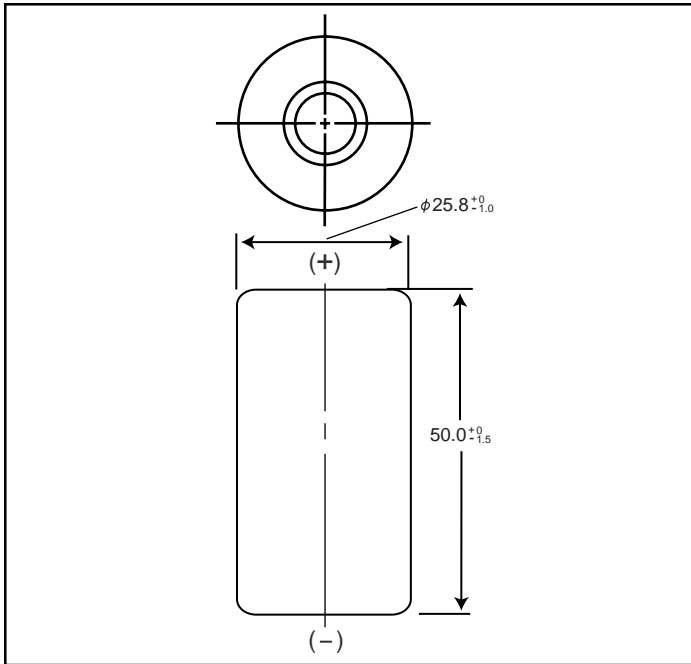
Typical Discharge Characteristics



NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

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

Dimensions (with Tube) (mm)



Specifications

	mm	inch
Diameter	25.8+0/-1.0	1.02+0/-0.04
Height	50.0+0/-1.5	1.97+0/-0.06
Approximate Weight	Grams	Ounces
	80	2.82

Nominal Voltage		1.2V
Discharge Capacity¹	Average²	3300 mAh
	Rated (Min.)	3100 mAh
Approx. Internal impedance at 1000Hz at charged state.		5mΩ
Charge	Standard	300mA (0.1It) x 16hrs.
	Rapid³	1500mA (1It) x 2.4 hrs. ⁴
	Low Rate	155mA x 32 hrs. 100mA x 48 hrs.
	Standard	0°C to 45°C 32°F to 113°F
Ambient Temperature	Charge	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

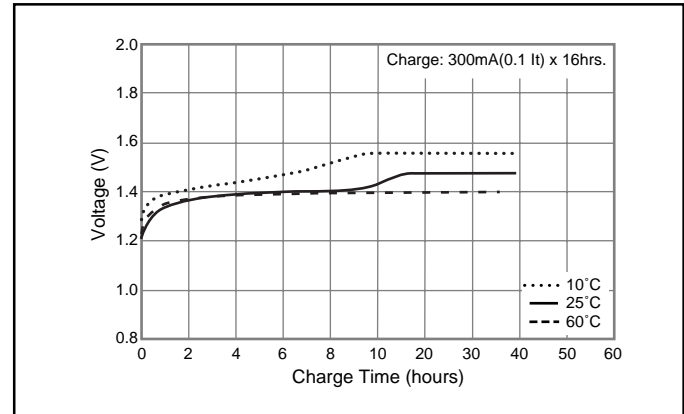
Rapid charger timer; 2.4h (at 1.25a)

Trickle timer; within 2h

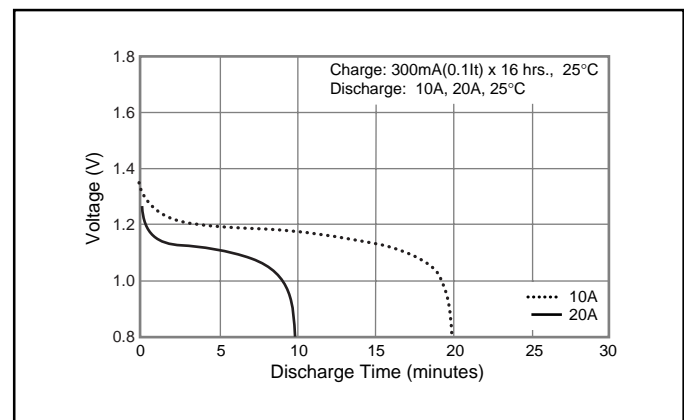
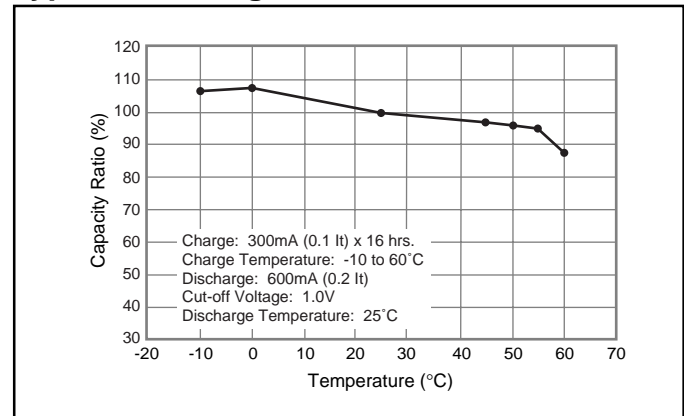
⁴ With control system

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

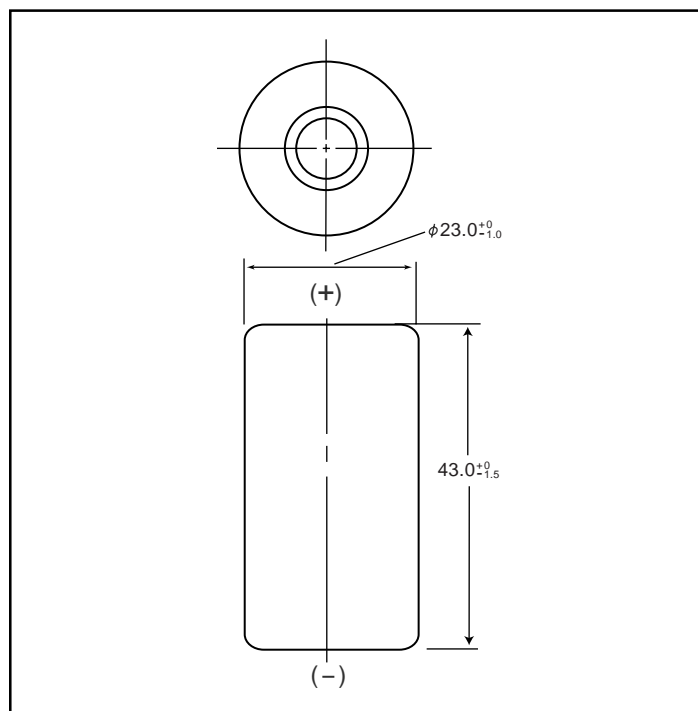
• [Cn] is the rated capacity of the cell or battery in Ampere-hours.

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

NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR300SCP Cylindrical SC size (HR 23/43)

Dimensions (with Tube) (mm)



Specifications

	mm	inch
Diameter	23.0+0/-0.1	0.91+0/-0.04
Height	43.0+0/-1.5	1.69+0/-0.06
Approximate Weight	Grams	Ounces
	57	2.01

Nominal Voltage		1.2V	
Discharge Capacity*	Average**	3050 mAh	
	Rated (Min.)	2800 mAh	
Approx. Internal impedance at 1000Hz at charged state.		4mΩ	
Charge	Standard	300mA (0.1It) x 16hrs.	
	Rapid	3000mA (1It) x 1.2 hrs.	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		°C
			°F
	Discharge		°C
			°F
Storage	< 2 years	-20°C to 35°C	-4°F to 95°F
	< 6 months	-20°C to 45°C	-4°F to 113°F

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

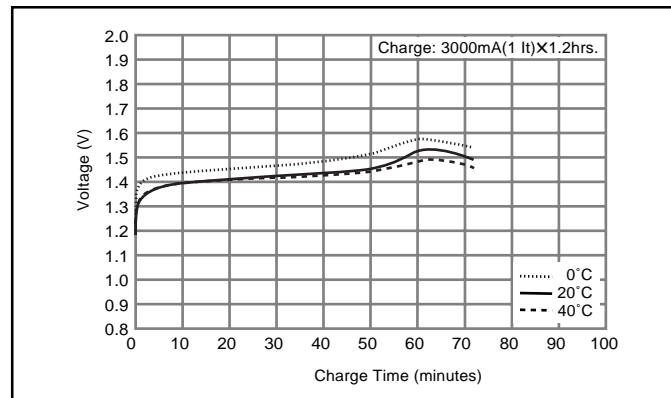
** For reference only.

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.

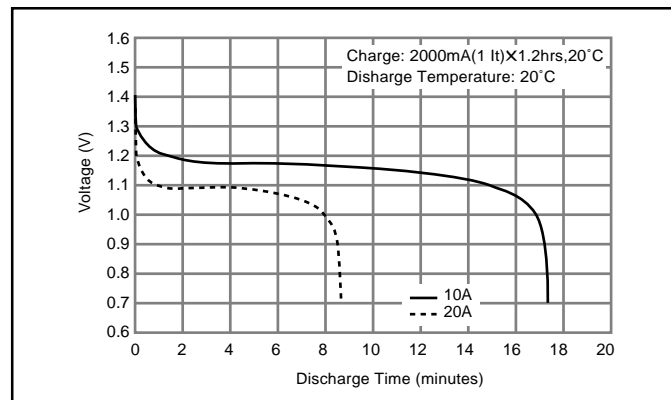
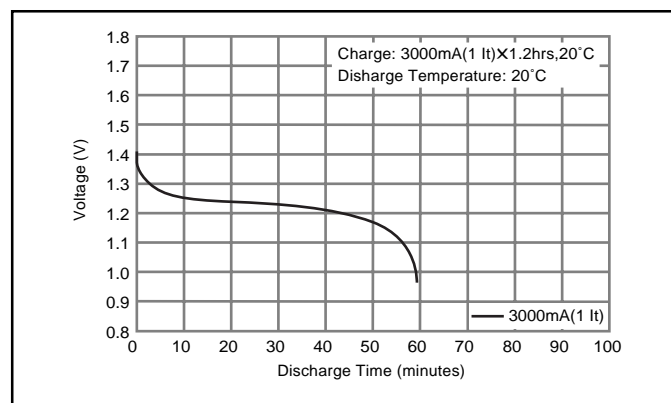
Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:
It(A) = Cn (Ah)/1h.

- [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

Typical Charge Characteristics



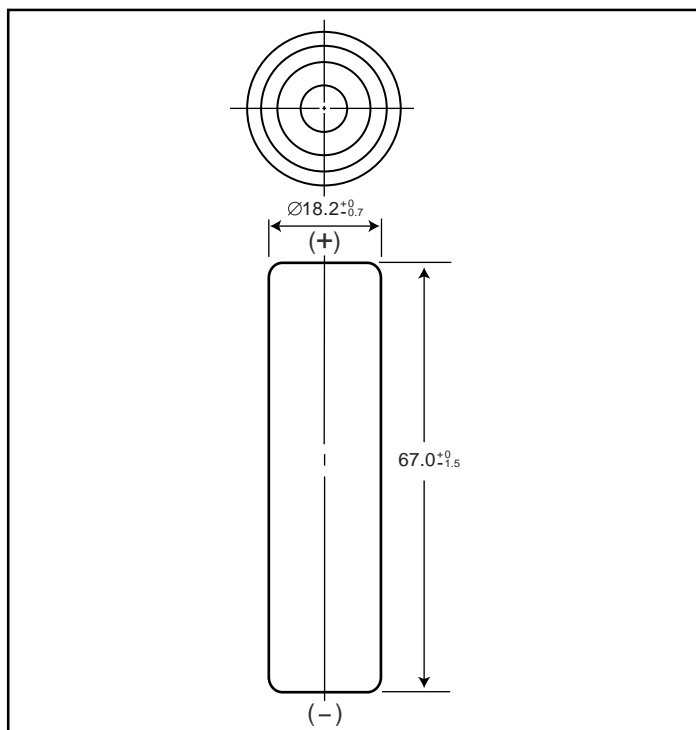
Typical Discharge Characteristics



NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR330APH 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	3300 mAh	
		Rated (Min.)	3200 mAh	
Approx. Internal impedance at 1000Hz at charged state.			5.5mΩ	
Charge		Standard	330mA x 16hrs.	
		Rapid ³	1650mA x 2.4 hrs. ⁴	
		Low Rate	165mA x 32 hrs. 110mA x 48 hrs.	
Ambient Temperature	Charge	Standard	°C	°F
			-10°C to 60°C	14°F to 140°F
		Rapid	-10°C to 45°C	14°F to 113°F
	Discharge		-10°C to 60°C	14°F to 140°F
	Storage	< 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

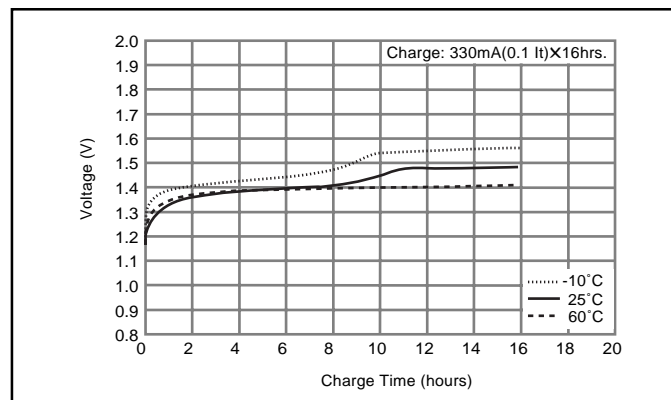
Rapid charger timer; 2.4h (at 1.25a)

Trickle timer; within 2h

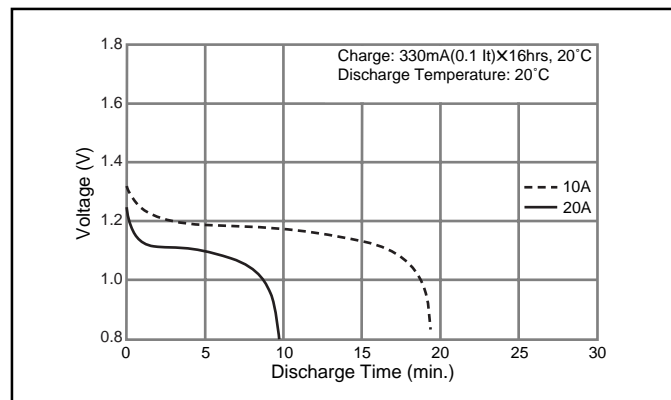
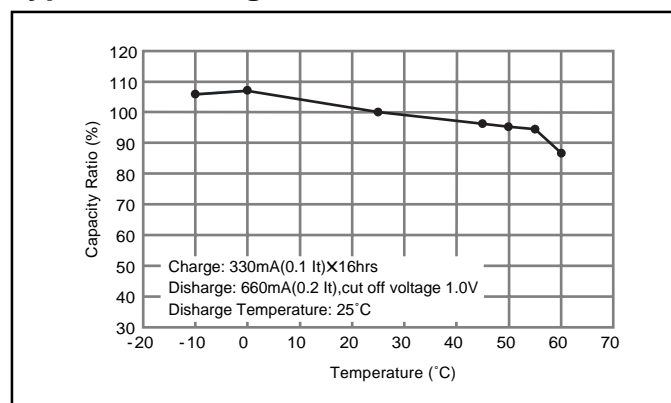
⁴ With control system

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



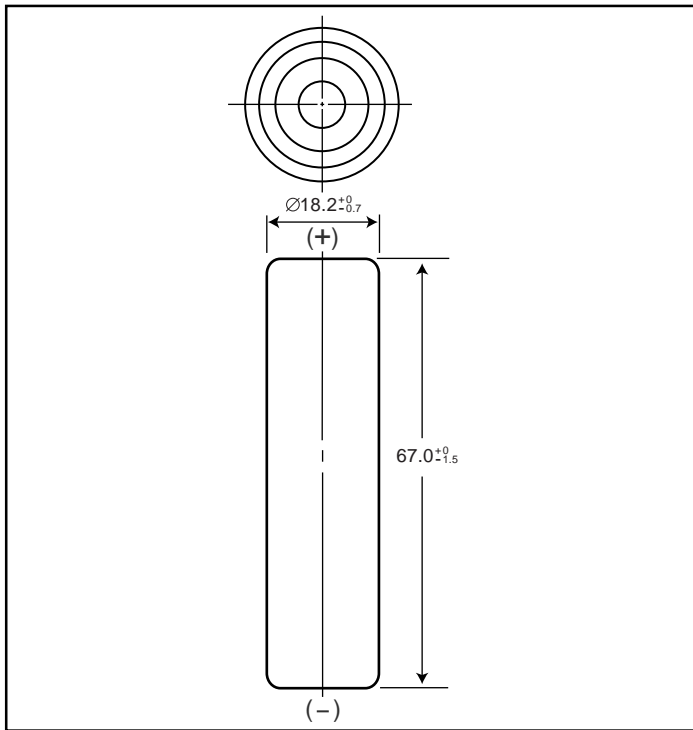
Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:
It(A) = Cn (Ah)/1h.

- [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

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	°F
			-10°C to 60°C	14°F to 140°F
		Rapid	-10°C to 45°C	14°F to 113°F
	Discharge		-10°C to 60°C	14°F to 140°F
	Storage	< 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

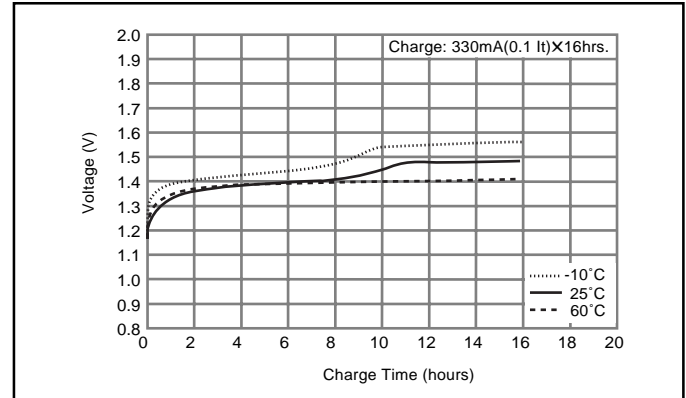
Rapid charger timer; 2.4h (at 1.25a)

Trickle timer; within 2h

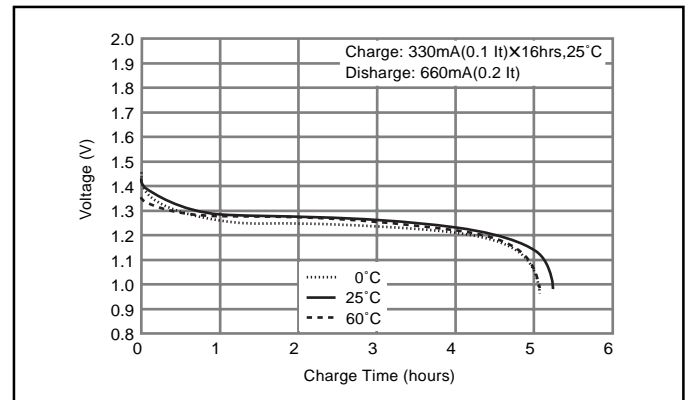
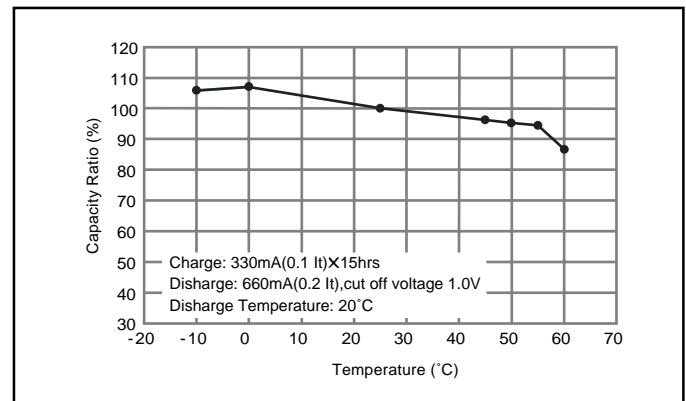
⁴ With control system

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:

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

• [It] is the reference test current in amperes

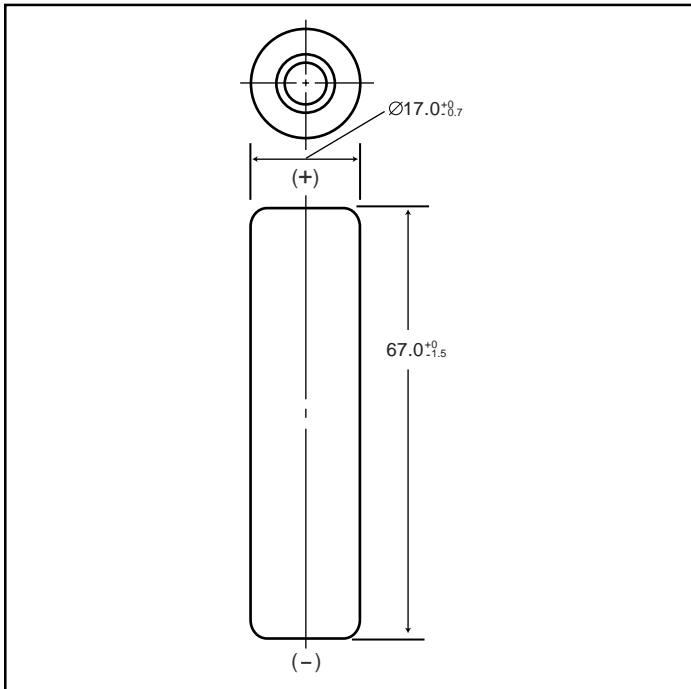
• [Cn] is the rated capacity of the cell or battery in Ampere-hours.

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

NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR380A Cylindrical L-A size (HR 17/67)

Dimensions (with Tube) (mm)



Specifications

	mm	inch
Diameter	17.0+0/-0.7	0.67+0/-0.03
Height	67.0+0/-1.5	2.64+0/-0.06
Approximate Weight	Grams	Ounces
	53	1.87

Nominal Voltage		1.2V	
Discharge Capacity*	Average**	3800 mAh	
	Rated (Min.)	3700 mAh	
Approx. Internal impedance at 1000Hz at charged state.		25mΩ	
Charge	Standard	370mA (0.1It) x 16hrs.	
	Rapid***	2000mA dT/dt	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		0°C to 45°C
			32°F to 113°F
	Discharge		0°C to 40°C
			32°F to 104°F
Storage	Storage	< 1 year	-10°C to 65°C
		< 3 months	14°F to 149°F
		< 1 month	-20°C to 35°C
		< 1 month	-4°F to 95°F

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

** For reference only.

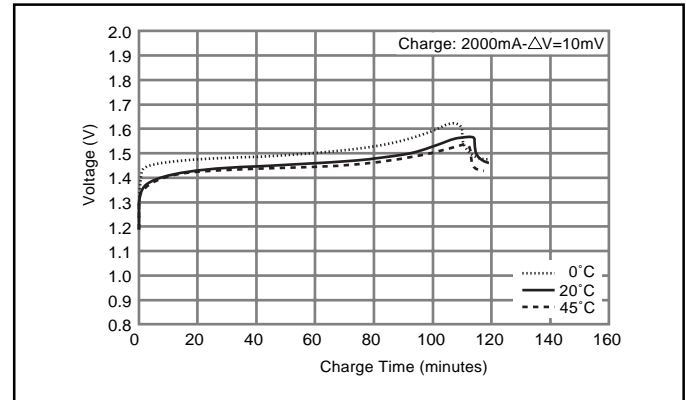
*** For rapid charge: use dT/dt charge termination method. Refer to the Nickel Metal Hydride "Charge Methods" section for further details. Battery performance and cycle life are strongly affected by how they are used. In order to maximize battery safety, please consult Panasonic when determining charge / discharge specs, warning label contents and unit design.

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:

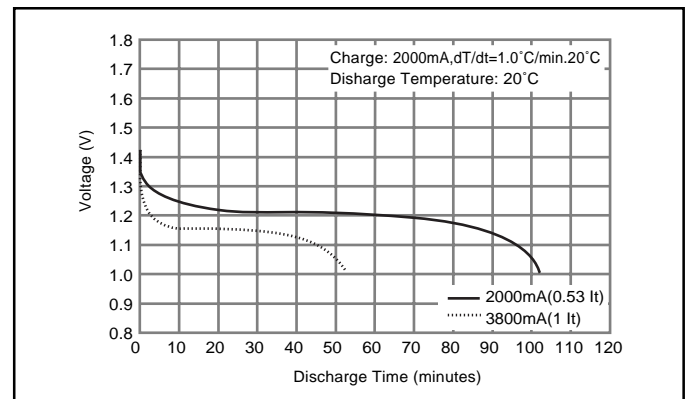
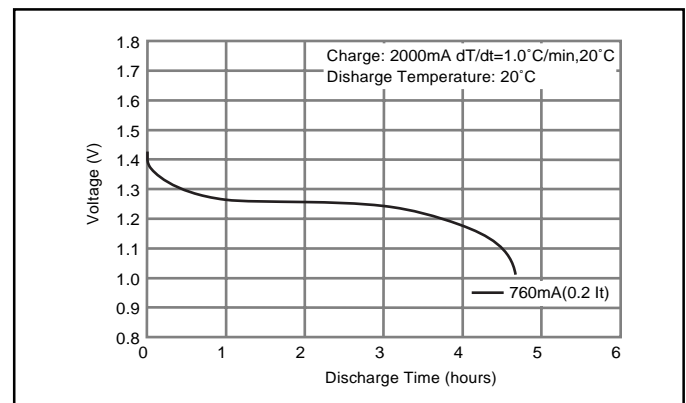
$$It(A) = C_n (Ah)/1h.$$

- [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

Typical Charge Characteristics



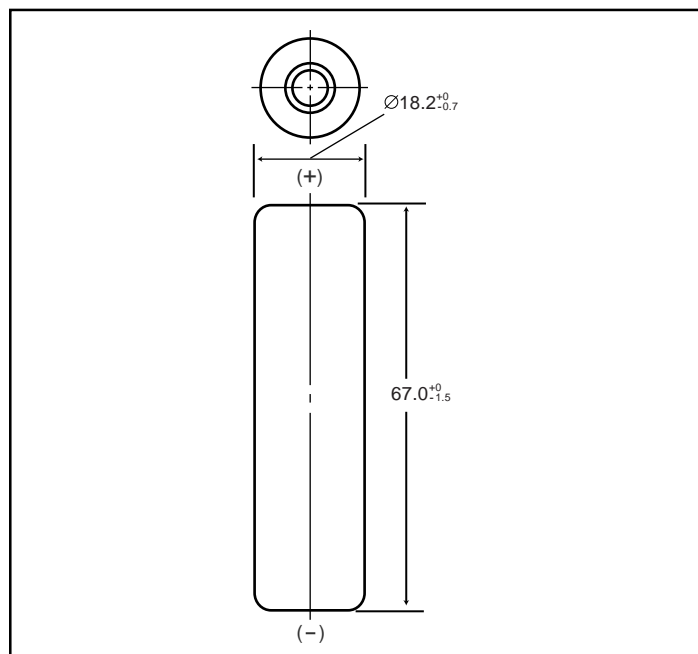
Typical Discharge Characteristics



NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR450A 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*	Average**	4500 mAh	
	Rated (Min.)	4200 mAh	
Approx. Internal impedance at 1000Hz at charged state.		25mΩ	
Charge	Standard	420mA (0.1It) x 16hrs.	
	Rapid***	2000mA dT/dt	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		°C
			°F
	Discharge		°C
			°F
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

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

** For reference only.

*** For rapid charge: use dT/dt charge termination method. Refer to the

Nickel Metal Hydride "Charge Methods" section for further details.

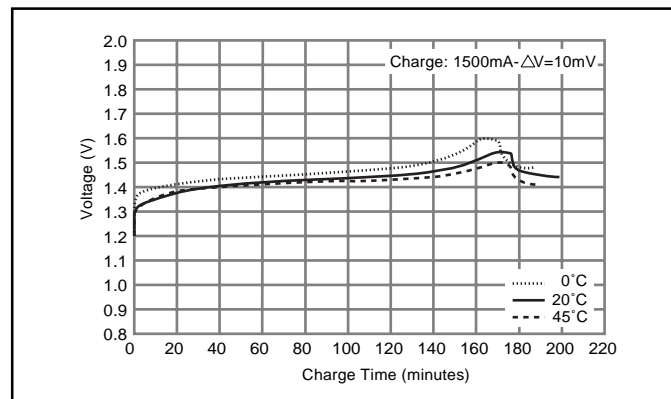
Battery performance and cycle life are strongly affected by how they are used. In order to maximize battery safety, please consult Panasonic when determining charge / discharge specs, warning label contents and unit design.

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:

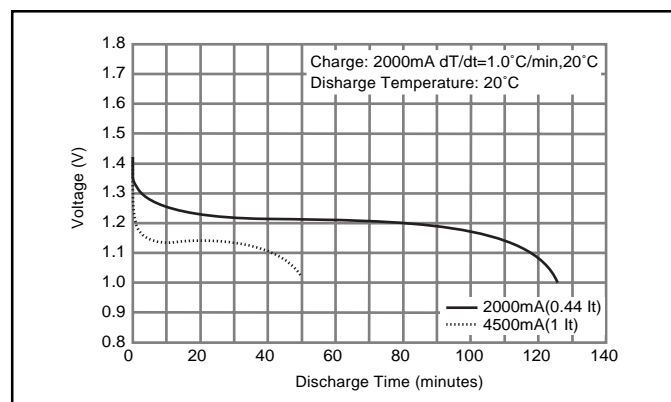
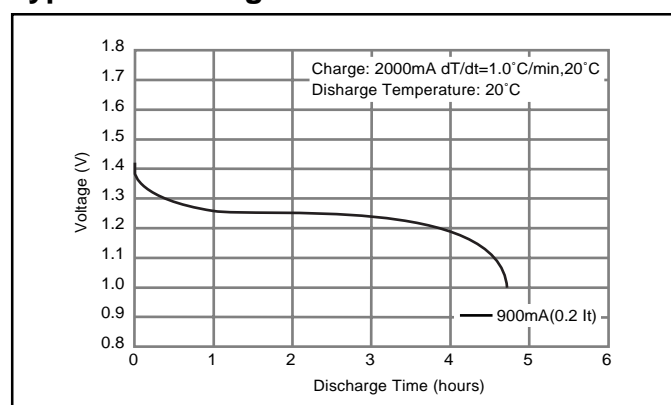
$$It(A) = Cn (Ah)/1h.$$

- [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

Typical Charge Characteristics



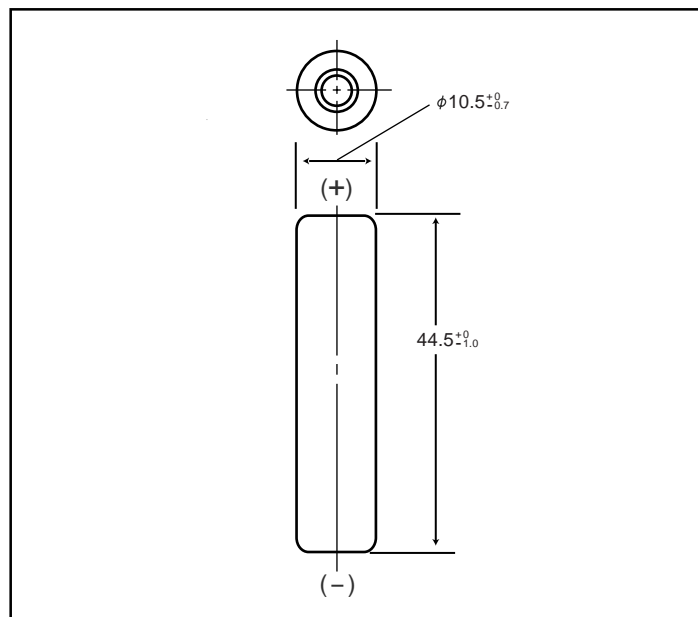
Typical Discharge Characteristics



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
	13	0.46

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	°F
			-10°C to 60°C	14°F to 140°F
		Rapid	-10°C to 45°C	14°F to 113°F
	Discharge		-10°C to 60°C	14°F to 140°F
	Storage	< 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

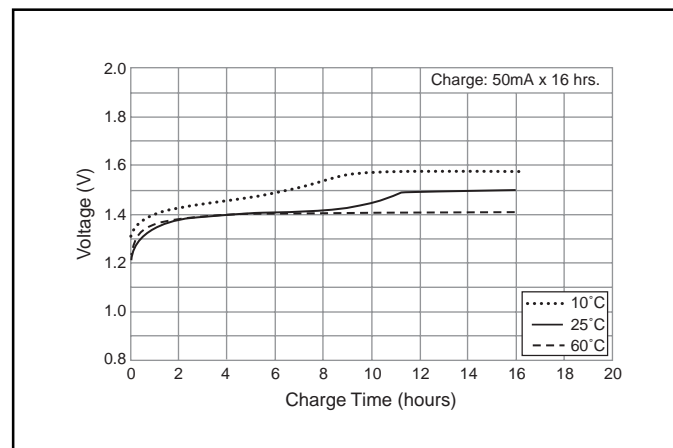
Rapid charger timer; 2.4h (at 1.25a)

Trickle timer; within 2h

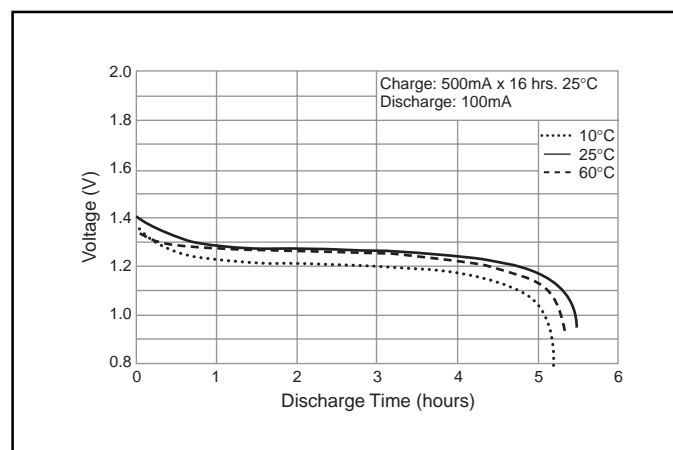
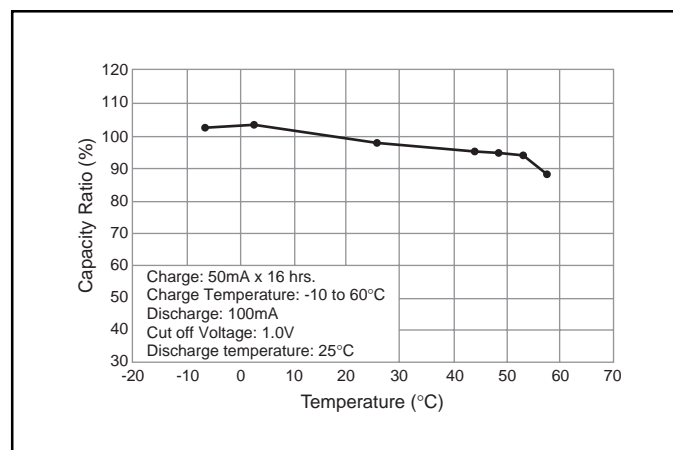
⁴ With control system

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:

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

* [It] is the reference test current in amperes

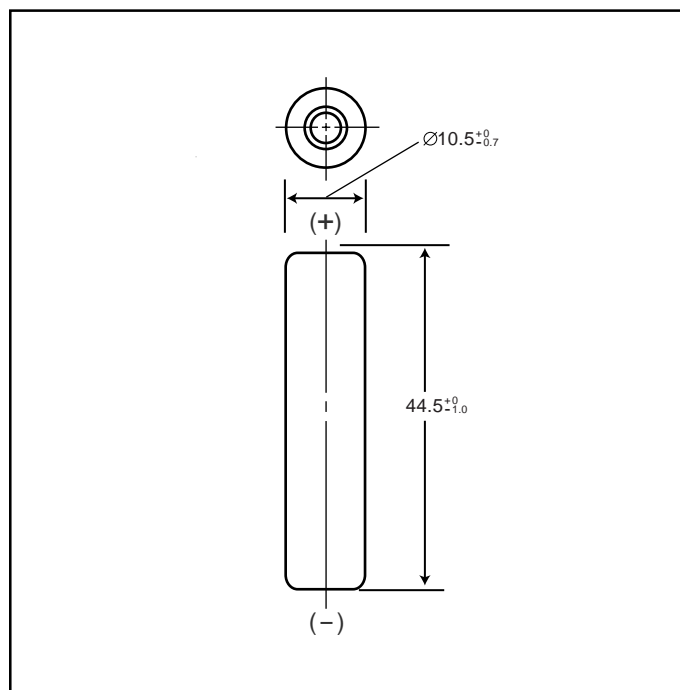
* [Cn] is the rated capacity of the cell or battery in Ampere-hours.

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

NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR70AAAJ Cylindrical HR 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
	13	0.46

Nominal Voltage		1.2V	
Discharge Capacity*	Average**	720 mAh	
	Rated (Min.)	700 mAh	
Approx. Internal impedance at 1000Hz at charged state.		30mΩ	
Charge	Standard	70mA (0.1It) x 16hrs.	
	Rapid	650mA (1It) x 1.2 hrs.	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		°C
			°F
	Discharge		-10°C to 65°C
			14°F to 149°F
Storage	< 1 year		-20°C to 35°C
	< 3 months		-20°C to 45°C
	< 1 month		-20°C to 55°C

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

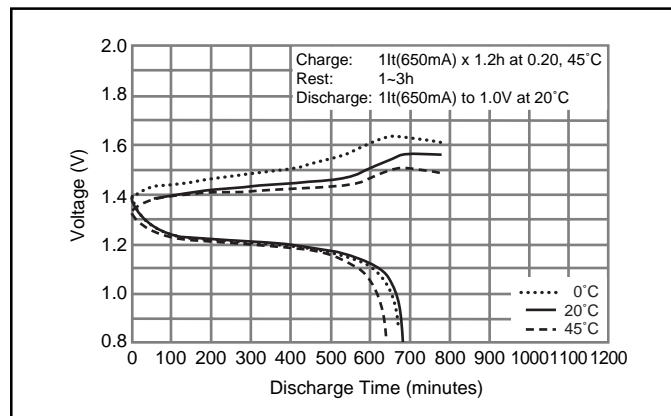
** For reference only.

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.

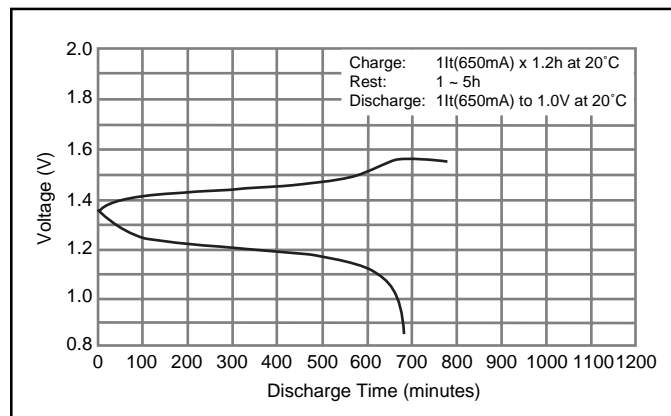
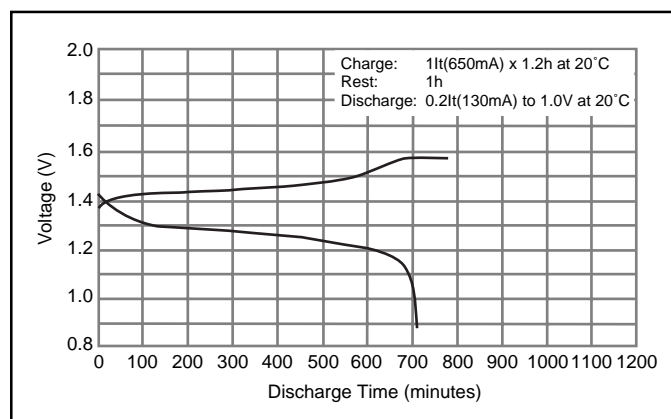
Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:
It(A) = Cn (Ah)/1h.

- [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

Typical Charge Characteristics



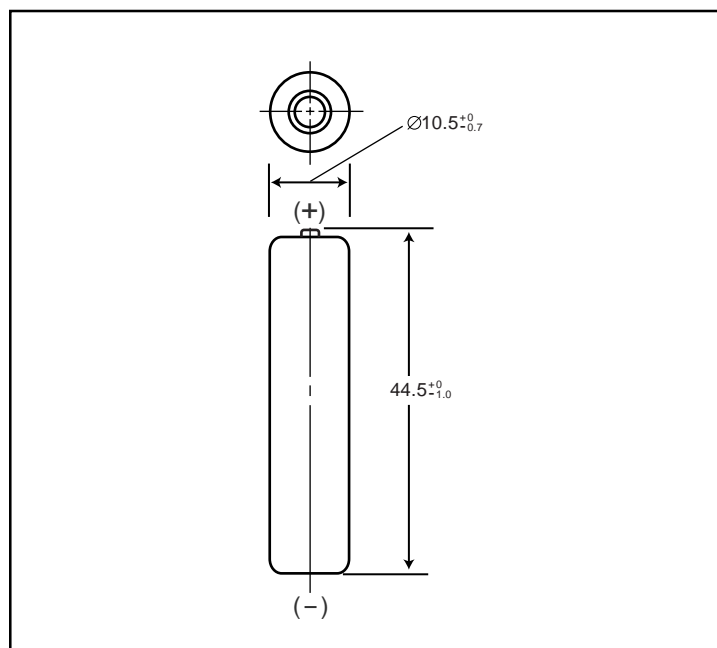
Typical Discharge Characteristics



NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR75AAA/B 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*	Average**	730 mAh	
	Rated (Min.)	700 mAh	
Approx. Internal impedance at 1000Hz at charged state.		35mΩ	
Charge	Standard	70mA x 16hrs.	
	Rapid	450mA x 1.7 hrs.	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		0°C to 45°C
			32°F to 113°F
	Discharge		0°C to 40°C
			32°F to 104°F
Storage	Discharge		-10°C to 65°C
			14°F to 149°F
		< 1 year	-20°C to 35°C
		< 3 months	-4°F to 95°F
Storage	Discharge	< 1 month	-20°C to 45°C
			-4°F to 113°F
Storage	Discharge	< 1 month	-20°C to 55°C
			-4°F to 131°F

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

** For reference only.

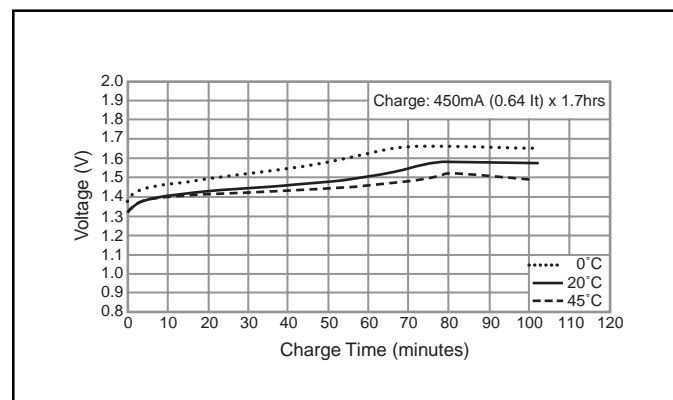
Battery performance and cycle life are strongly affected by how they are used. In order to maximize battery safety, please consult Panasonic when determining charge / discharge specs, warning label contents and unit design.

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:

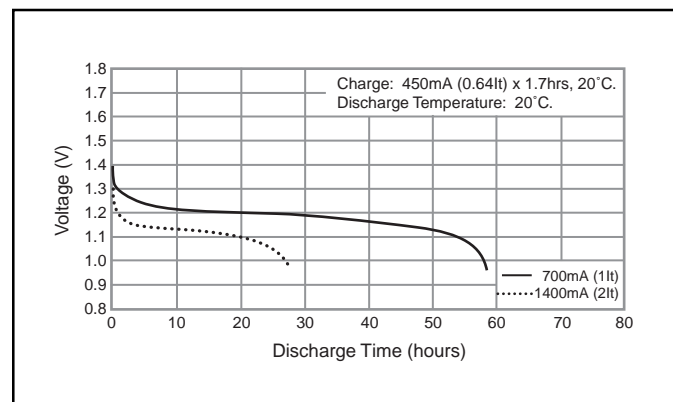
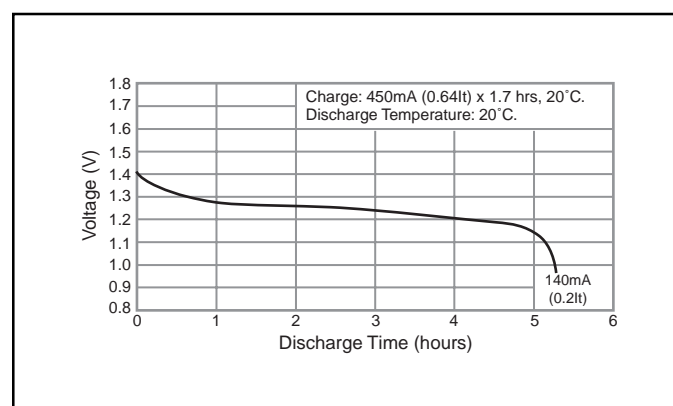
$$It(A) = Cn(Ah)/1h.$$

- [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

Typical Charge Characteristics



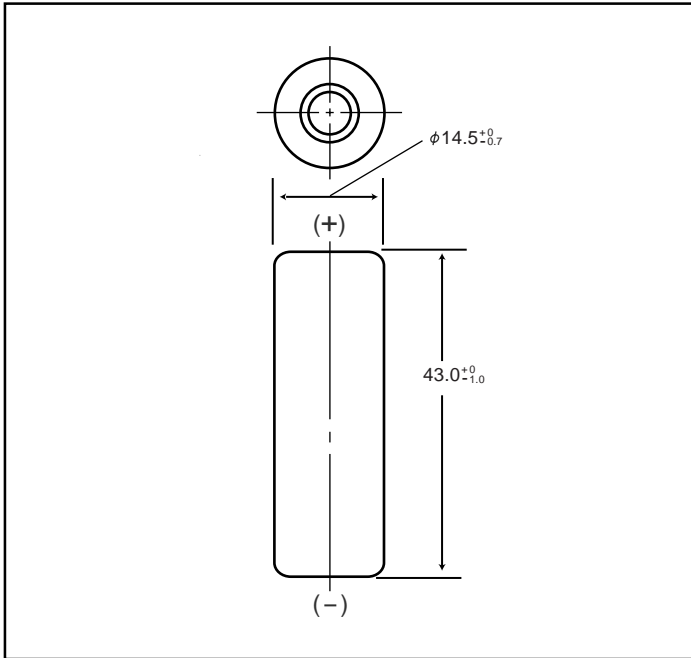
Typical Discharge Characteristics



NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR120AA Cylindrical 4/5AA size (HR 15/43)

Dimensions (with Tube) (mm)



Specifications

	mm	inch
Diameter	14.5+0/-0.7	0.57+0/-0.03
Height	43.0+0/-1.0	1.69+0/-0.04
Approximate Weight	Grams	Ounces
	23	0.81

Nominal Voltage		1.2V	
Discharge Capacity*	Average**	1220 mAh	
	Rated (Min.)	1150 mAh	
Approx. Internal impedance at 1000Hz at charged state.		19mΩ	
Charge	Standard	120mA (0.1It) x 16hrs.	
	Rapid	1200mA (1It) x 1.2 hrs.	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		0°C to 45°C
			32°F to 113°F
	Discharge		0°C to 40°C
			32°F to 104°F
Storage	< 1 year		-20°C to 35°C
	< 3 months		-20°C to 45°C
	< 1 month		-20°C to 55°C
			-4°F to 131°F

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

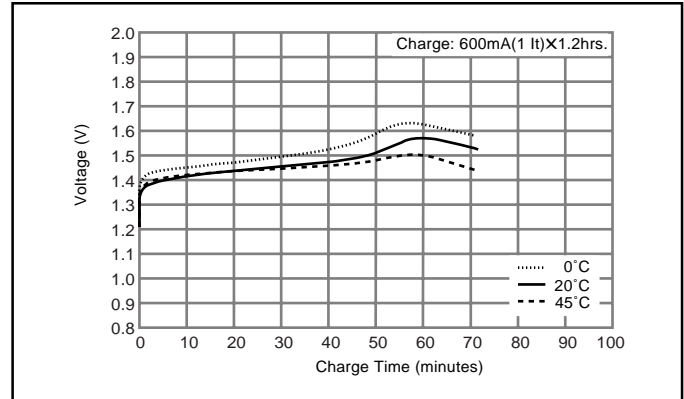
** For reference only.

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.

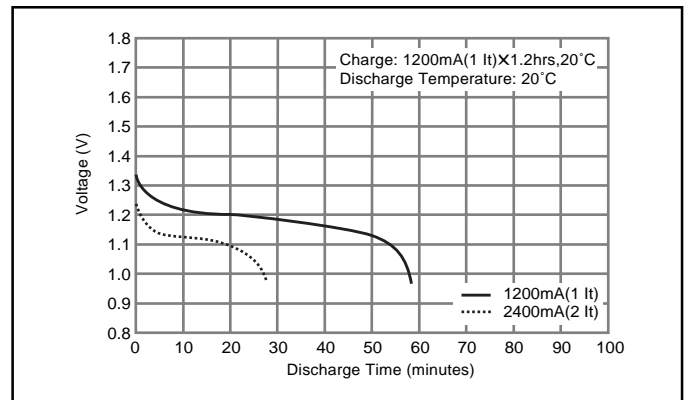
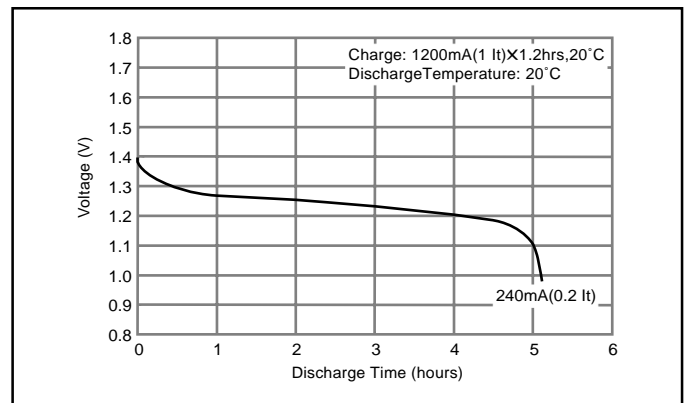
Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:
It(A) = Cn (Ah)/1h.

- [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

Typical Charge Characteristics



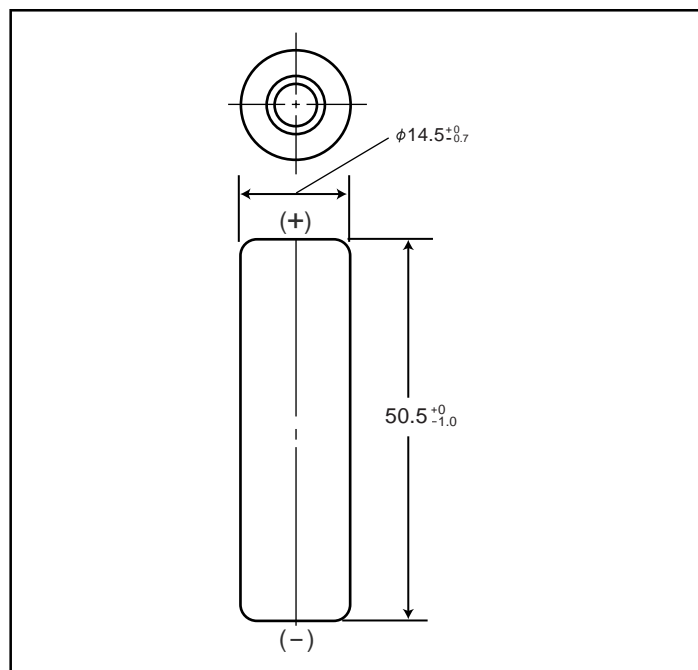
Typical Discharge Characteristics



NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR150AA Cylindrical AA size (HR 15/51)

Dimensions (with Tube) (mm)



Specifications

	mm	inch
Diameter	14.5+0/-0.7	0.57+0/-0.03
Height	50.0+0/-1.0	1.97+0/-0.06
Approximate Weight	Grams	Ounces
	26	0.92

Nominal Voltage		1.2V	
Discharge Capacity*	Average**	1580 mAh	
	Rated (Min.)	1500 mAh	
Approx. Internal impedance at 1000Hz at charged state.		20mΩ	
Charge	Standard	150mA (0.1It) x 16hrs.	
	Rapid	1500mA (1It) x 1.2 hrs.	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		°C
			°F
	Discharge		°C
			°F
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

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

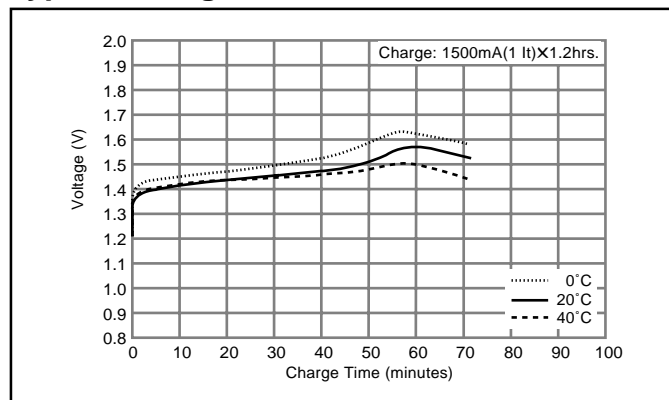
** For reference only.

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.

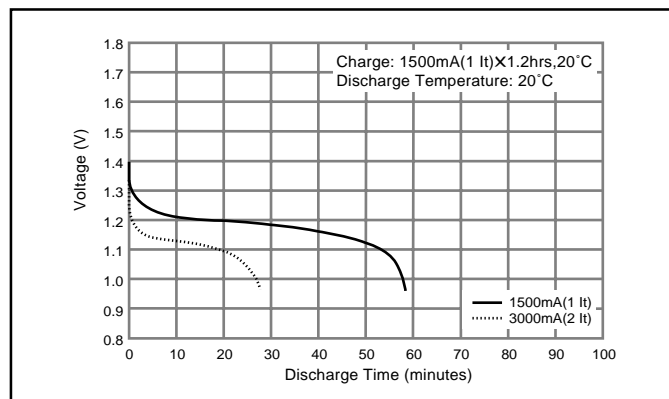
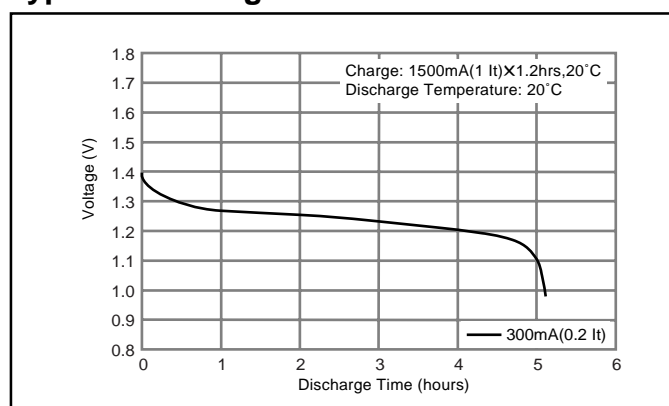
Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:
 $It(A) = Cn (Ah)/1h.$

- [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

Typical Charge Characteristics



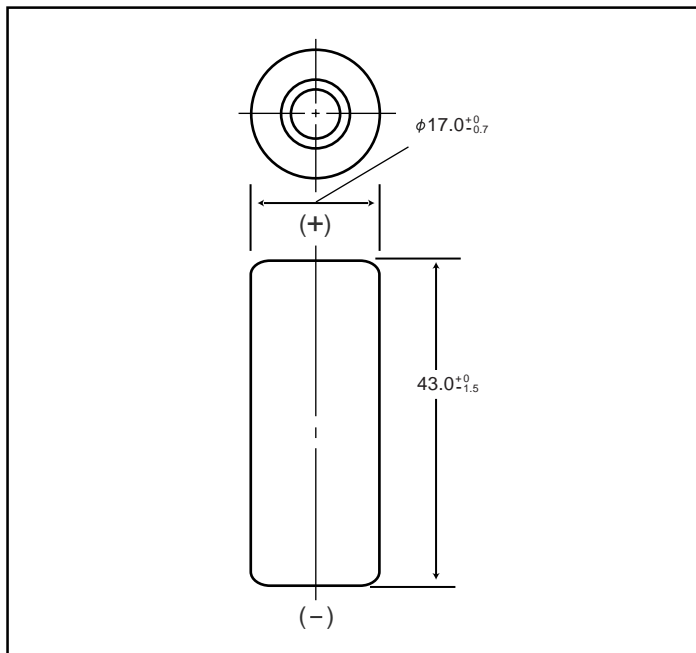
Typical Discharge Characteristics



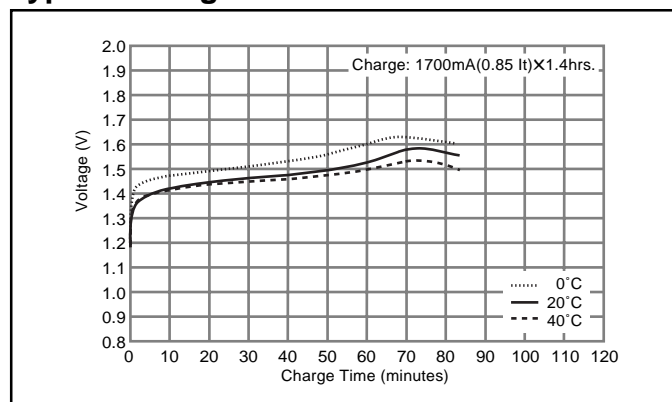
NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR200A Cylindrical 4/5A size (HR 17/43)

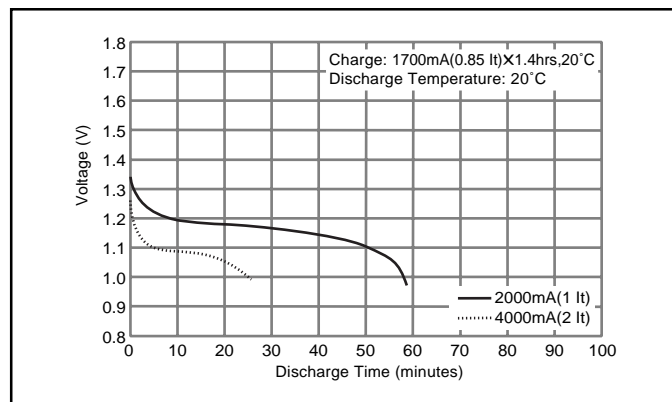
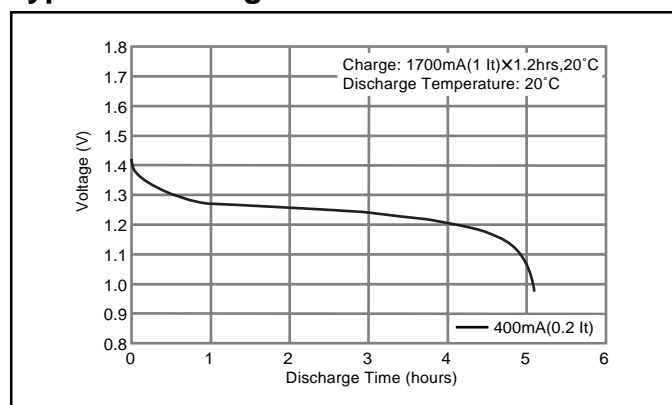
Dimensions (with Tube) (mm)



Typical Charge Characteristics



Typical Discharge Characteristics



Specifications

	mm	inch
Diameter	17.0+0/-0.7	0.67+0/-0.03
Height	43.0+0/-1.5	1.69+0/-0.06
Approximate Weight	Grams	Ounces
	32	1.13

Nominal Voltage		1.2V	
Discharge Capacity*	Average**	2040 mAh	
	Rated (Min.)	2000 mAh	
Approx. Internal impedance at 1000Hz at charged state.		20mΩ	
Charge	Standard	200mA (0.1It) x 16hrs.	
	Rapid	2000mA (1It) x 1.2 hrs.	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		0°C to 45°C
			32°F to 113°F
	Discharge		0°C to 40°C
			32°F to 104°F
Storage	< 1 year		-10°C to 65°C
			14°F to 149°F
			-20°C to 35°C
			-4°F to 95°F
Storage	< 3 months		-20°C to 45°C
			-4°F to 113°F
Storage	< 1 month		-20°C to 55°C
			-4°F to 131°F

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

** For reference only.

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.

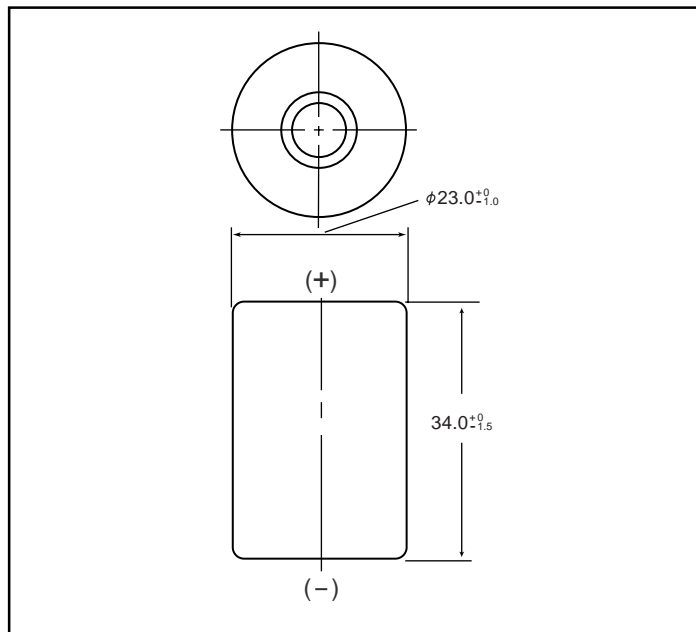
Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:
 $It(A) = Cn (Ah)/1h.$

- [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

HHR200SCP Cylindrical 4/5SC size (HR 23/34)

Dimensions (with Tube) (mm)



Specifications

	mm	inch
Diameter	23.0+0/-0.1	0.91+0/-0.04
Height	34.0+0/-1.5	1.34+0/-0.06
Approximate Weight	Grams	Ounces
	42	1.48

Nominal Voltage		1.2V	
Discharge Capacity*	Average**	2100 mAh	
	Rated (Min.)	1900 mAh	
Approx. Internal impedance at 1000Hz at charged state.		5mΩ	
Charge	Standard	200mA (0.1It) x 16hrs.	
	Rapid	2000mA (1It) x 1.2 hrs.	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		0°C to 45°C
			32°F to 113°F
	Discharge		0°C to 40°C
			32°F to 104°F
Storage	Discharge		-10°C to 65°C
	< 2 years		14°F to 149°F
	< 6 months		-20°C to 35°C
			-4°F to 95°F
			-20°C to 45°C
			-4°F to 113°F

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

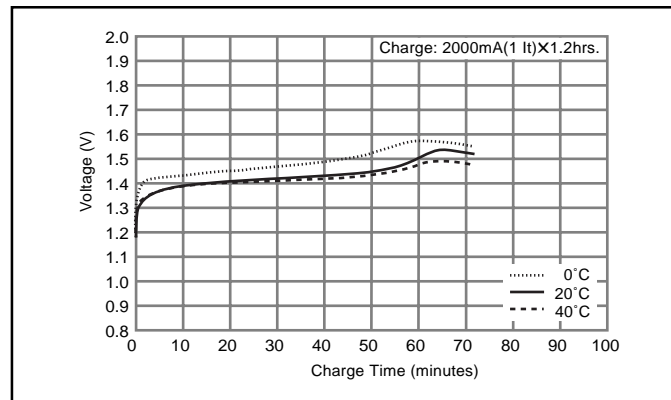
** For reference only.

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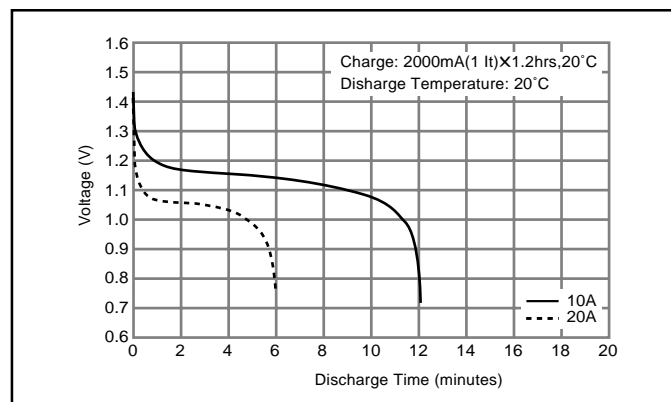
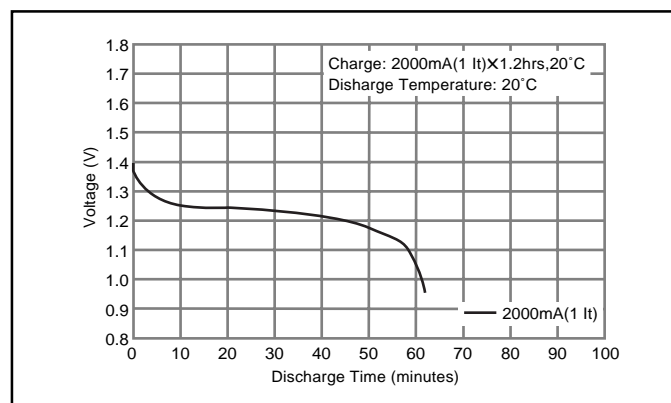
Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:
It(A) = Cn (Ah)/1h.

- [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

Typical Charge Characteristics



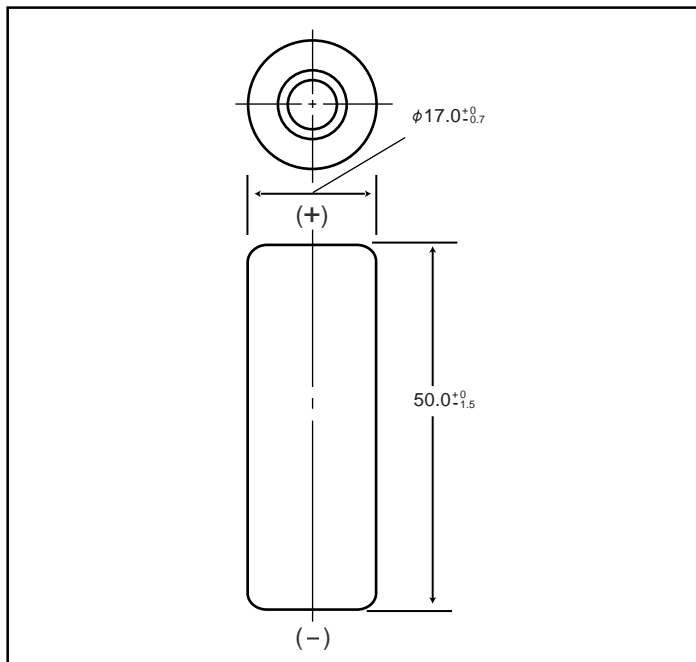
Typical Discharge Characteristics



NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR210A 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*		Average**	2200 mAh	
		Rated (Min.)	2100 mAh	
Approx. Internal impedance at 1000Hz at charged state.			20mΩ	
Charge		Standard	210mA (0.1It) x 16hrs.	
		Rapid	2100mA (1It) x 1.2 hrs.	
Ambient Temperature	Charge	Standard	°C	°F
			0°C to 45°C	32°F to 113°F
		Rapid	0°C to 40°C	32°F to 104°F
	Discharge		-10°C to 65°C	14°F to 149°F
	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

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

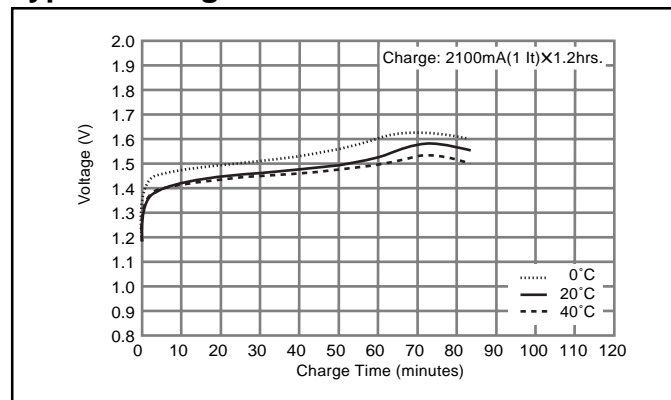
** For reference only.

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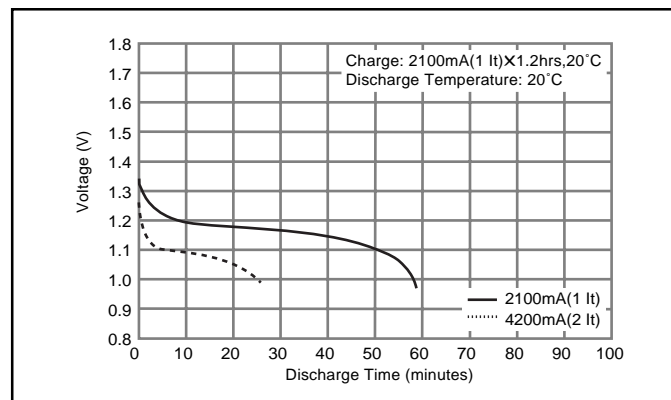
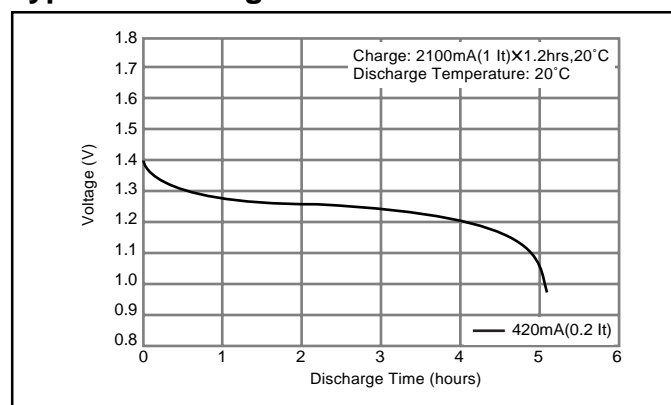
Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:
 $It(A) = Cn (Ah)/1h$.

- [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

Typical Charge Characteristics



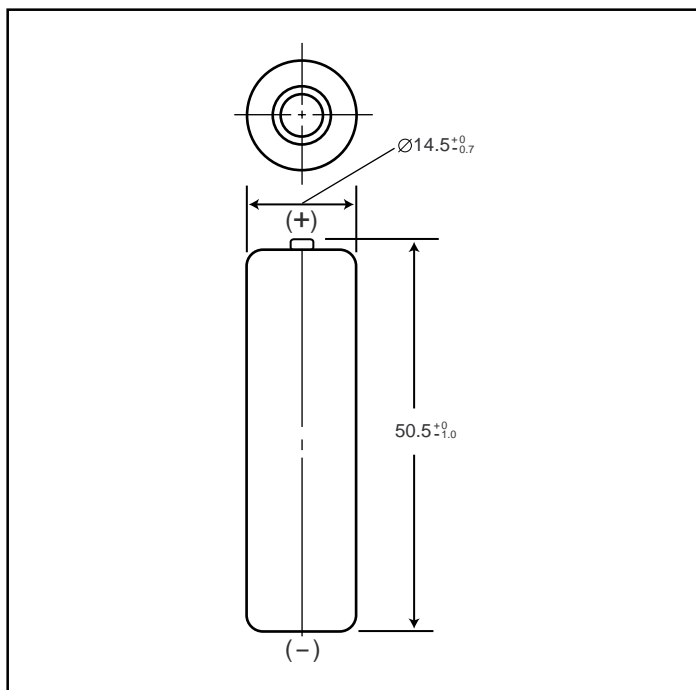
Typical Discharge Characteristics



NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR210AA/B Cylindrical AA size (HR 15/51)

Dimensions (with Tube) (mm)



Specifications

	mm	inch
Diameter	14.5 +0/-0.7	0.57 +0/-0.3
Height	50.5 +0/-1.0	1.99 +0/-0.5
Approximate Weight	Grams	Ounces
	29	1.02

Nominal Voltage		1.2V	
Discharge Capacity*	Average**	2080mAh	
	Rated (Min.)	2000mAh	
Approx. internal Impedance at 1000Hz at charged state.		25mΩ	
Charge	Standard	200mA (0.1It) x 16 hrs.	
	Rapid	1200mA (1It) x 2 hrs.	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		0°C to 45°C
			32°F to 113°F
	Discharge		0°C to 40°C
			32°F to 113°F
Storage	Storage	< 1 year	-10°C to 65°C
			14°F to 149°F
		< 3 months	-20°C to 35°C
			-4°F to 95°F
Storage	Storage	< 3 months	-20°C to 45°C
			-4°F to 113°F
		< 1 month	-20°C to 55°C
			-4°F to 131°F

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

** For reference only.

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.

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:

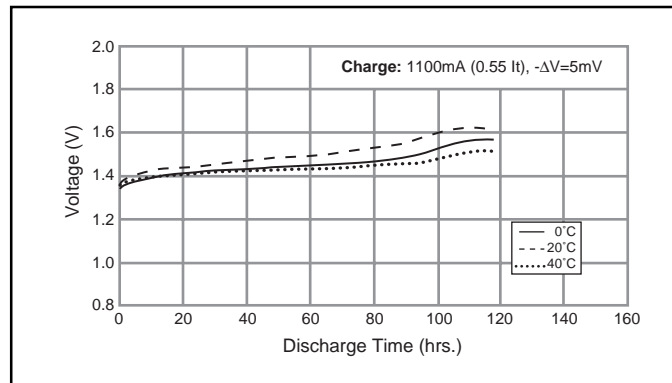
$$It(A) = Cn (Ah)/1h$$

* [It] is the reference test current in amperes

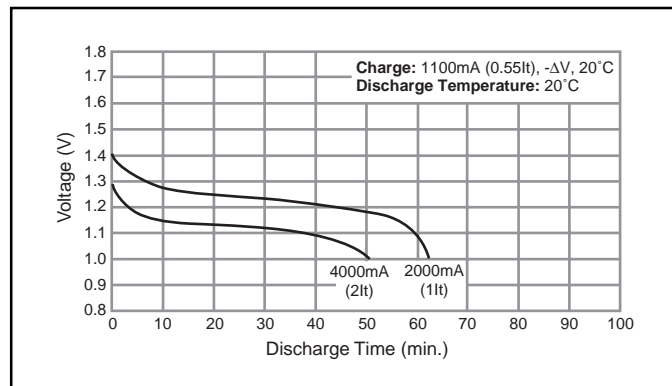
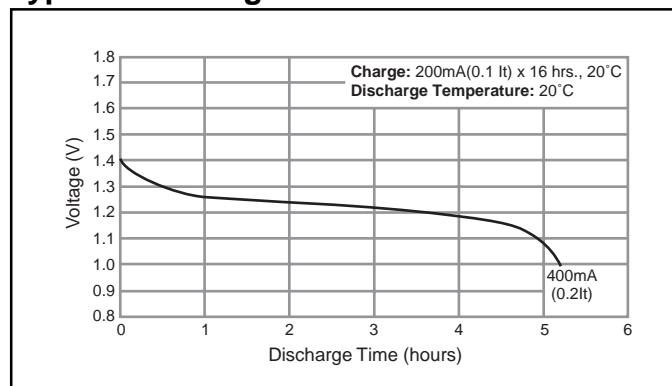
* [Cn] is the rated capacity of the cell or battery in Ampere-hours.

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

Typical Charge Characteristics



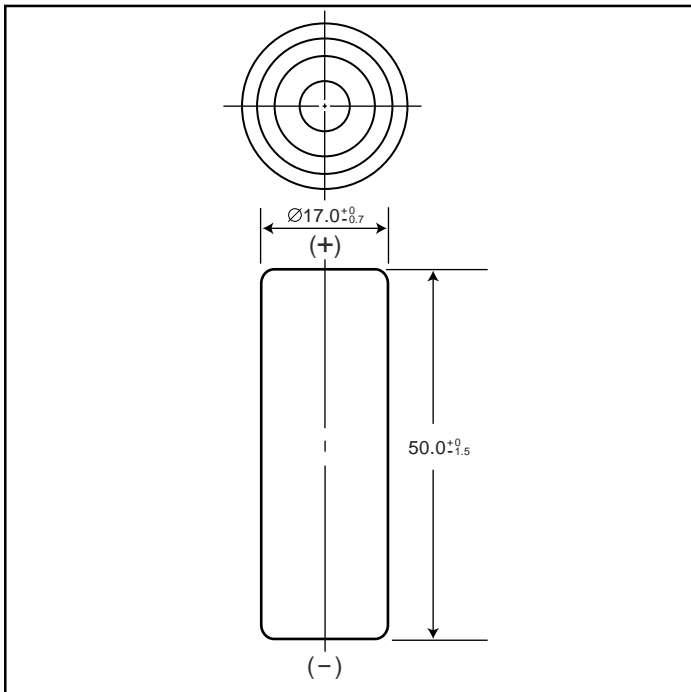
Typical Discharge Characteristics



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
			-10°C to 60°C
			14°F to 140°F
	Discharge		°F
			-10°C to 60°C
			14°F to 140°F
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.

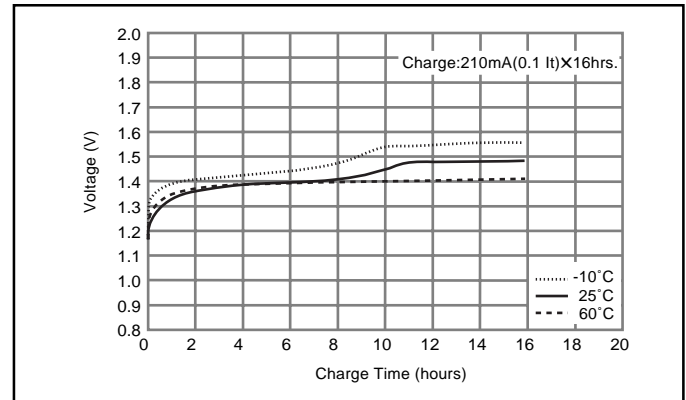
Battery performance and cycle life are strongly affected by how they are used. In order to maximize battery safety, please consult Panasonic when determining charge / discharge specs, warning label contents and unit design.

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:

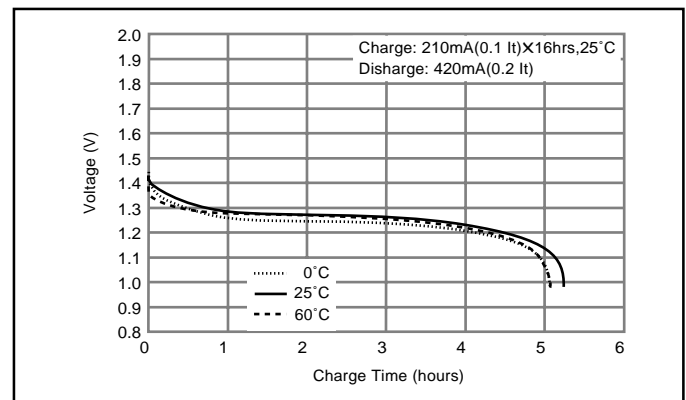
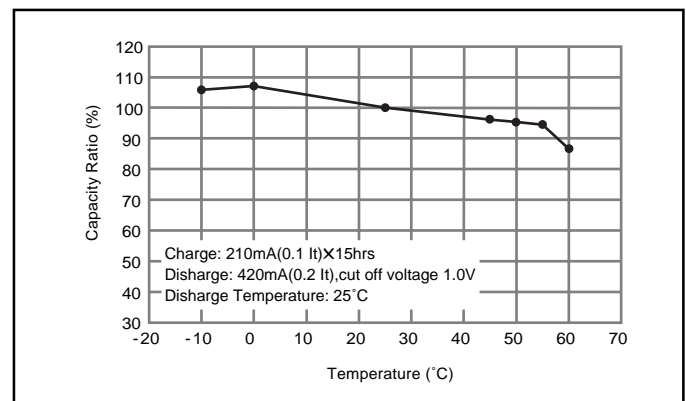
$$It(A) = C_n (Ah)/1h.$$

- [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



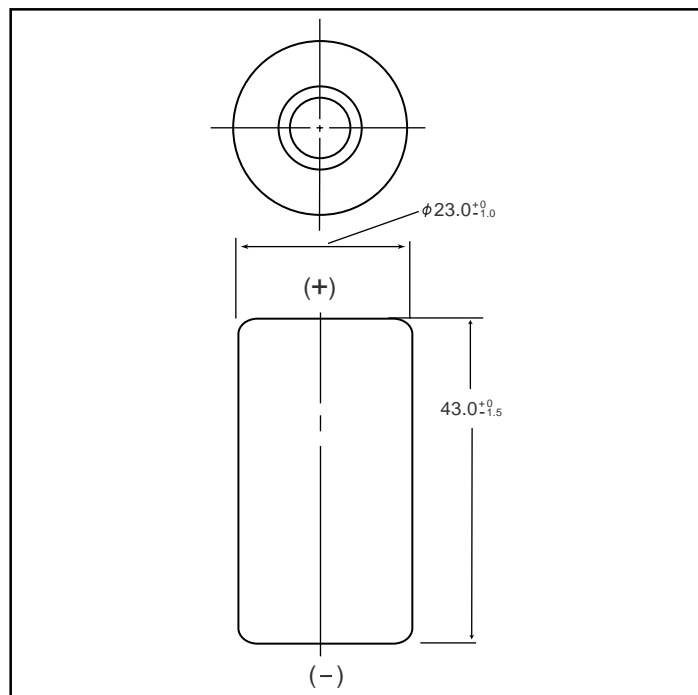
Typical Discharge Characteristics



NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

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
			-10°C to 60°C	14°F to 140°F
		Rapid	-10°C to 45°C	14°F to 113°F
	Discharge		-10°C to 60°C	14°F to 140°F
	Storage	< 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

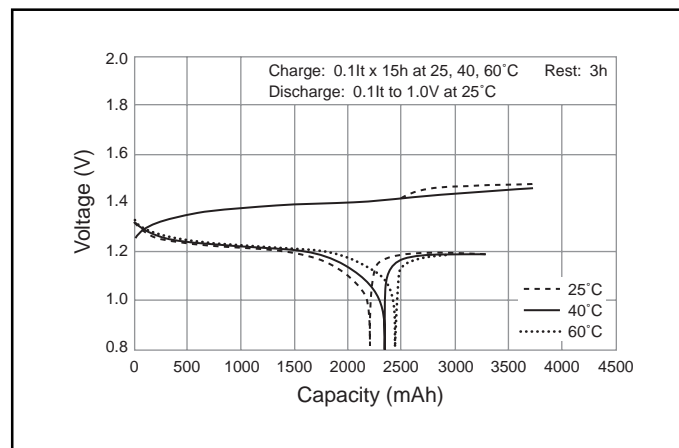
Rapid charger timer; 2.4h (at 1.25a)

Trickle timer; within 2h

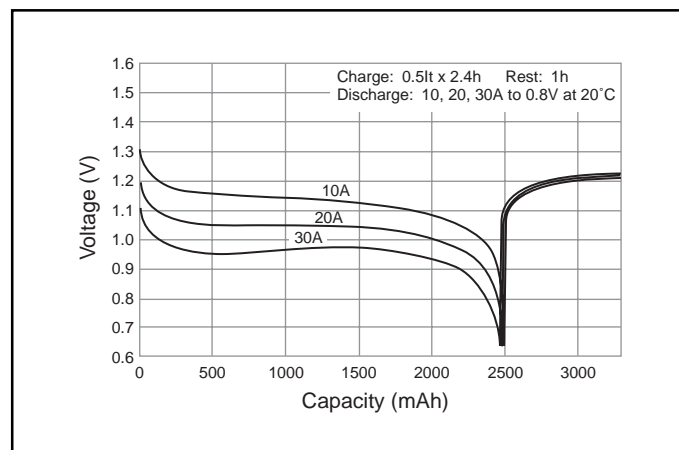
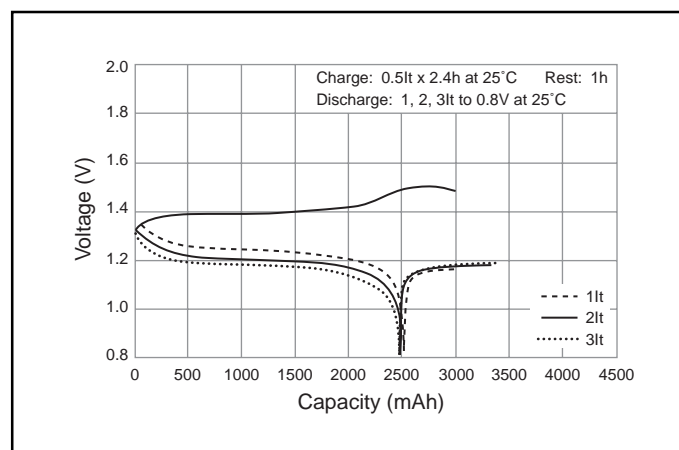
⁴ With control system

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:

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

* [It] is the reference test current in amperes

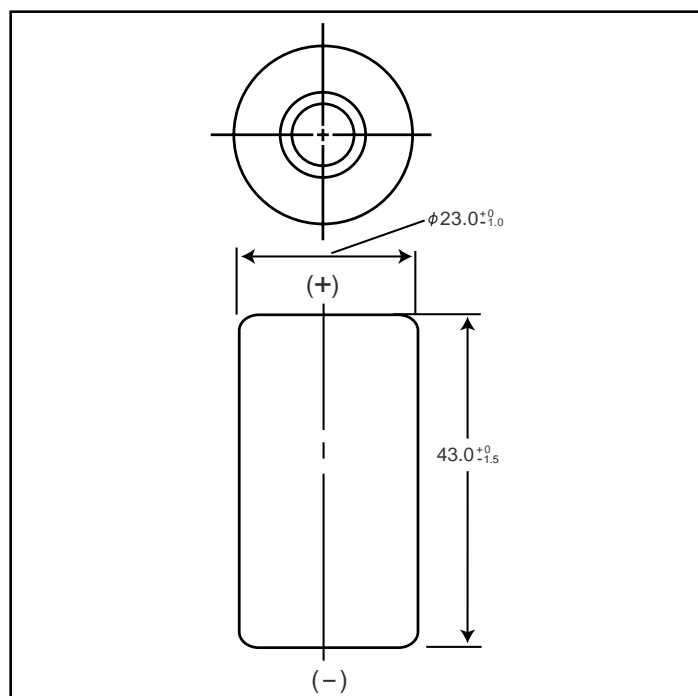
* [Cn] is the rated capacity of the cell or battery in Ampere-hours.

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

NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR260SCP 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	2600 mAh	
		Rated (Min.)	2450 mAh	
Approx. Internal impedance at 1000Hz at charged state.			5mΩ	
Charge		Standard	260mA x 16hrs.	
		Rapid	2600mA x 1.2 hrs.	
Ambient Temperature	Charge	Standard	°C	°F
			0°C to 45°C	32°F to 113°F
		Rapid	10°C to 40°C	50°F to 104°F
	Discharge		-10°C to 65°C	14°F to 149°F
	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 After charging at 0.1It for 16 hours, discharging at 0.2It.

² For reference only.

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.

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:

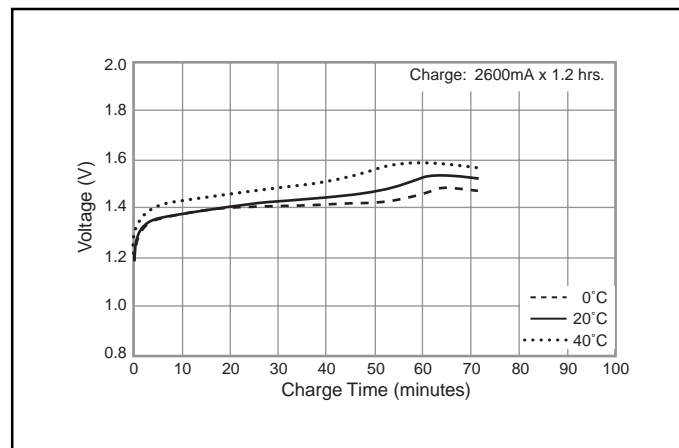
$It(A) = Cn(Ah)/1h$

* [It] is the reference test current in amperes

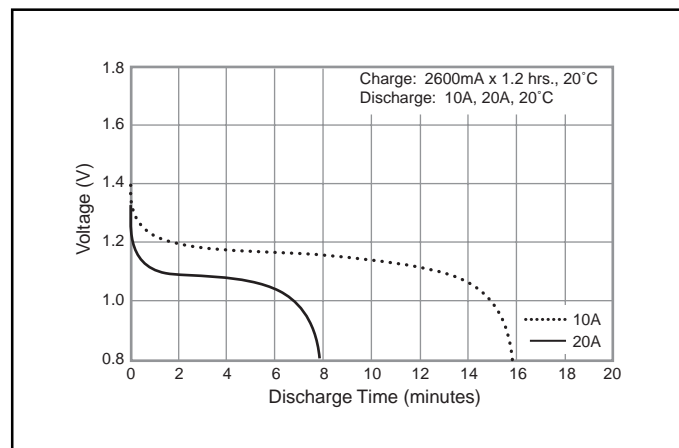
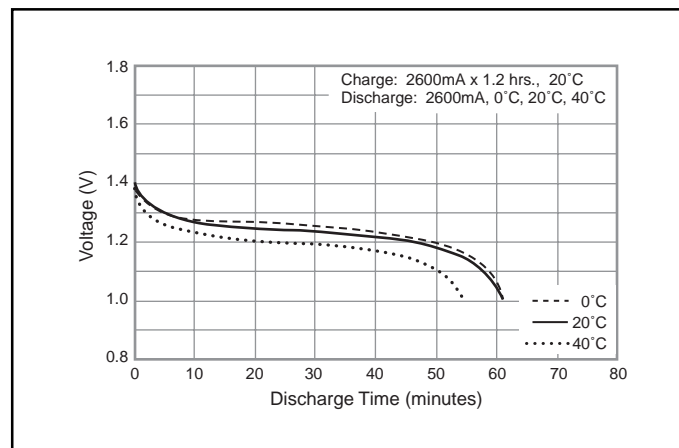
* [Cn] is the rated capacity of the cell or battery in Ampere-hours.

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

Typical Charge Characteristics



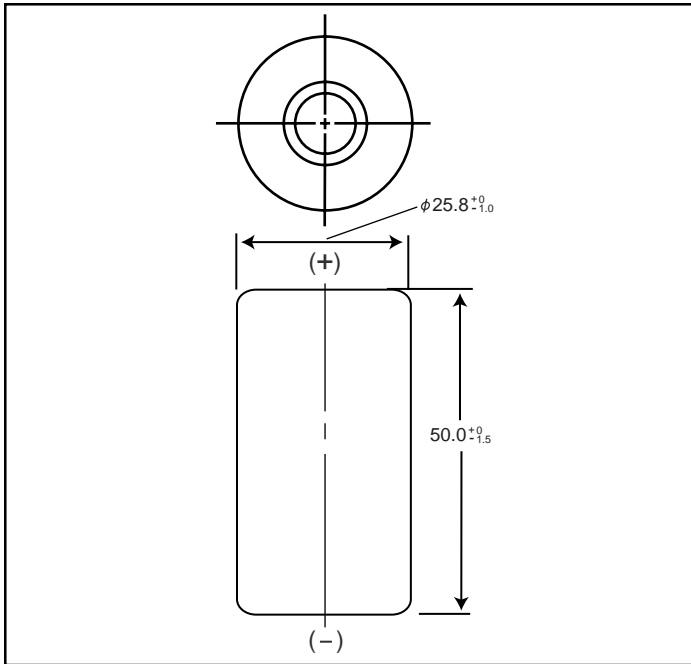
Typical Discharge Characteristics



NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

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

Dimensions (with Tube) (mm)



Specifications

	mm	inch
Diameter	25.8+0/-1.0	1.02+0/-0.04
Height	50.0+0/-1.5	1.97+0/-0.06
Approximate Weight	Grams	Ounces
	80	2.82

Nominal Voltage		1.2V
Discharge Capacity¹	Average²	3300 mAh
	Rated (Min.)	3100 mAh
Approx. Internal impedance at 1000Hz at charged state.		5mΩ
Charge	Standard	300mA (0.1It) x 16hrs.
	Rapid³	1500mA (1It) x 2.4 hrs. ⁴
	Low Rate	155mA x 32 hrs. 100mA x 48 hrs.
	Standard	0°C to 45°C 32°F to 113°F
Ambient Temperature	Charge	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

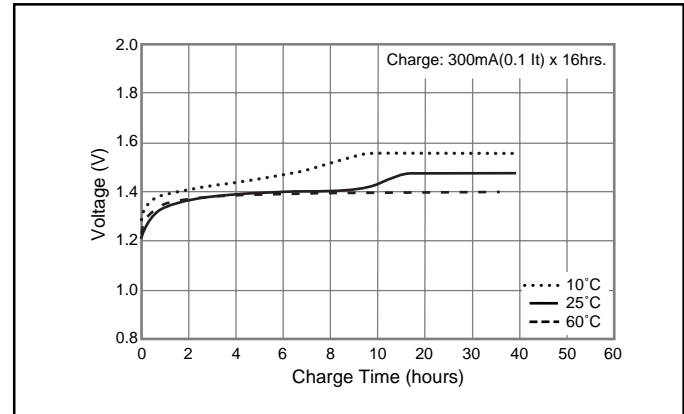
Rapid charger timer; 2.4h (at 1.25a)

Trickle timer; within 2h

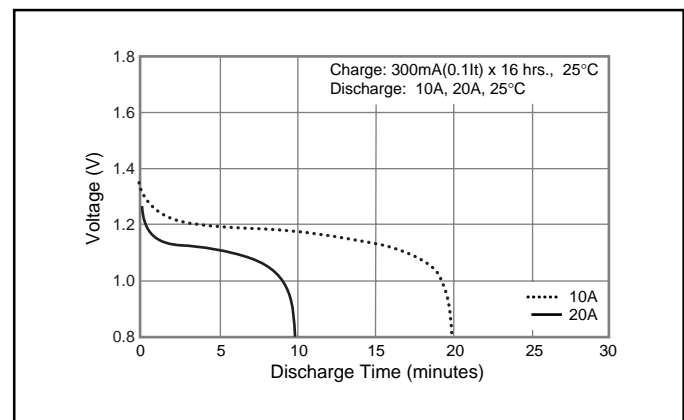
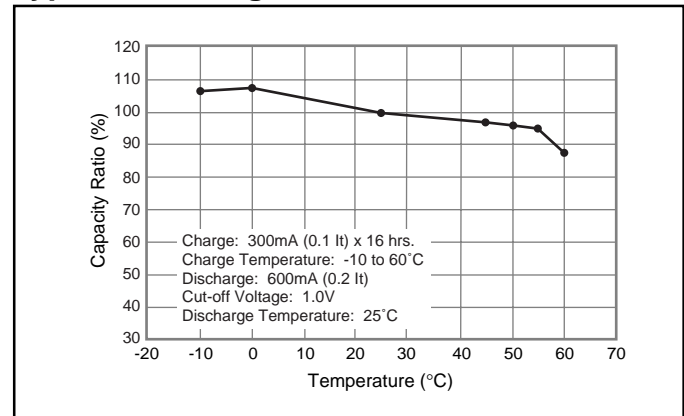
⁴ With control system

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

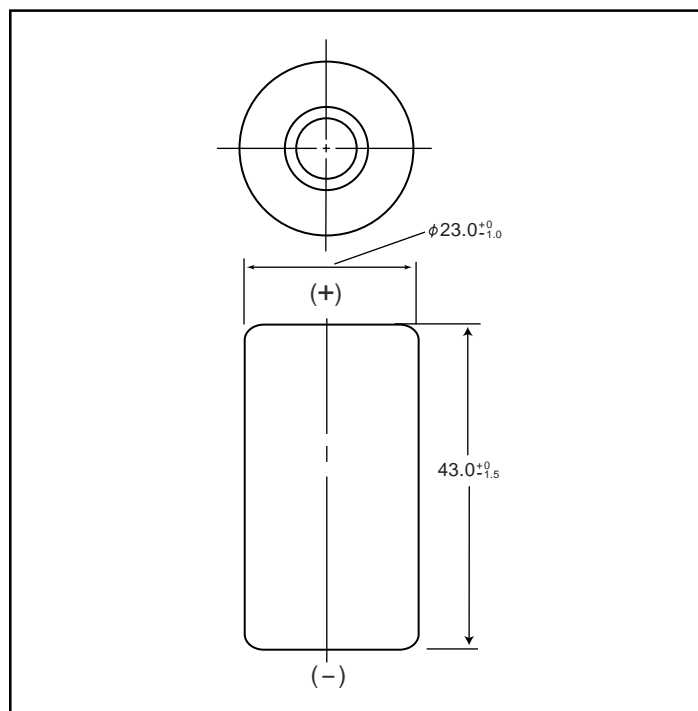
• [Cn] is the rated capacity of the cell or battery in Ampere-hours.

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

NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR300SCP Cylindrical SC size (HR 23/43)

Dimensions (with Tube) (mm)



Specifications

	mm	inch
Diameter	23.0+0/-0.1	0.91+0/-0.04
Height	43.0+0/-1.5	1.69+0/-0.06
Approximate Weight	Grams	Ounces
	57	2.01

Nominal Voltage		1.2V	
Discharge Capacity*	Average**	3050 mAh	
	Rated (Min.)	2800 mAh	
Approx. Internal impedance at 1000Hz at charged state.		4mΩ	
Charge	Standard	300mA (0.1It) x 16hrs.	
	Rapid	3000mA (1It) x 1.2 hrs.	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		°C
			°F
	Discharge		°C
			°F
Storage	< 2 years	-20°C to 35°C	-4°F to 95°F
	< 6 months	-20°C to 45°C	-4°F to 113°F

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

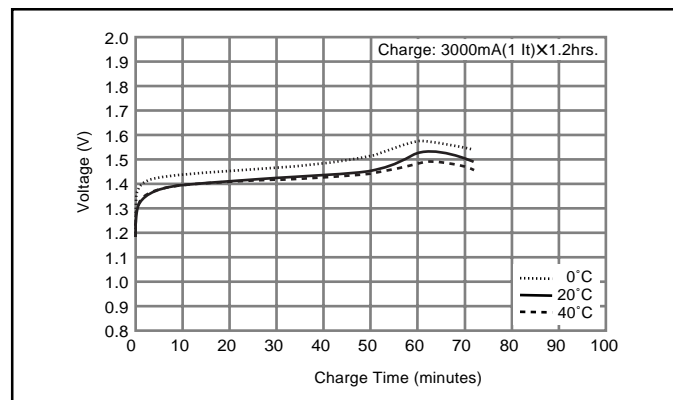
** For reference only.

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.

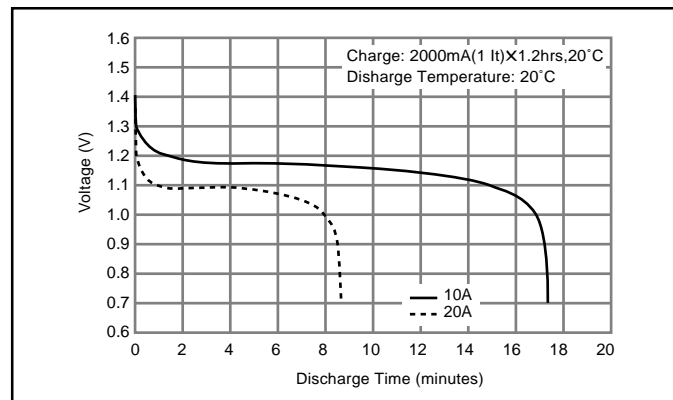
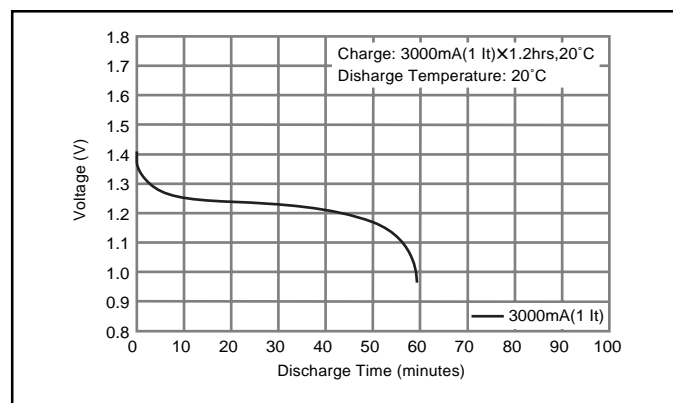
Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:
 $It(A) = Cn (Ah)/1h.$

- [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

Typical Charge Characteristics



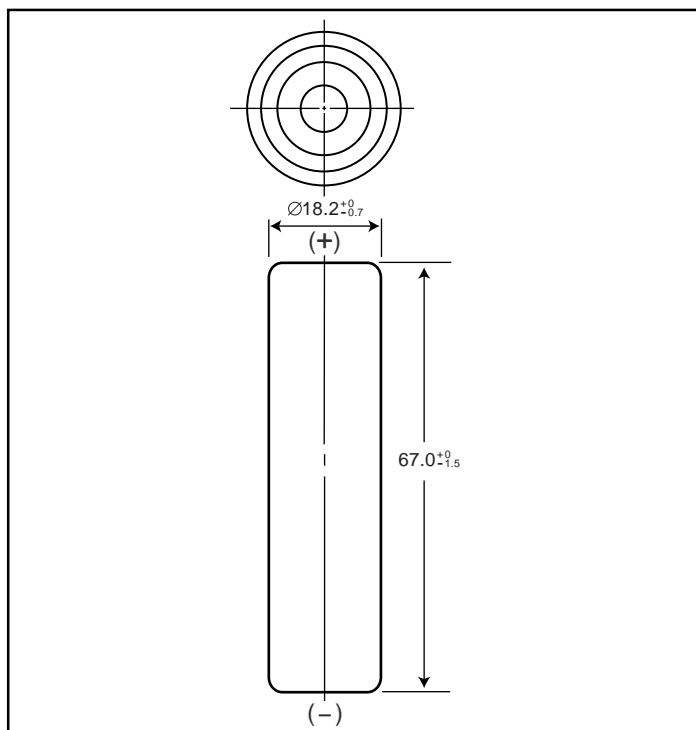
Typical Discharge Characteristics



NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR330APH 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	3300 mAh	
		Rated (Min.)	3200 mAh	
Approx. Internal impedance at 1000Hz at charged state.			5.5mΩ	
Charge		Standard	330mA x 16hrs.	
		Rapid ³	1650mA x 2.4 hrs. ⁴	
		Low Rate	165mA x 32 hrs. 110mA x 48 hrs.	
Ambient Temperature	Charge	Standard	°C	°F
			-10°C to 60°C	14°F to 140°F
		Rapid	-10°C to 45°C	14°F to 113°F
	Discharge		-10°C to 60°C	14°F to 140°F
	Storage	< 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

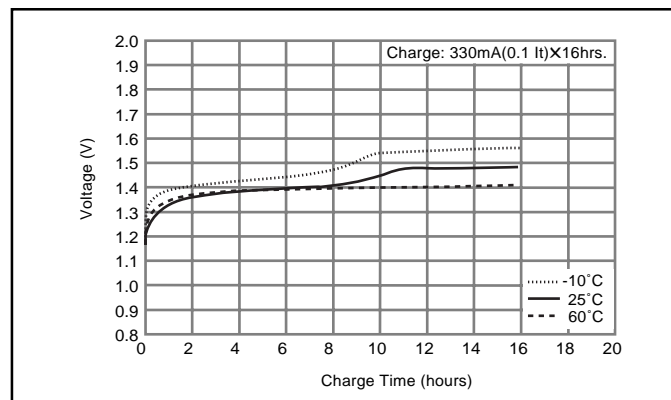
Rapid charger timer; 2.4h (at 1.25a)

Trickle timer; within 2h

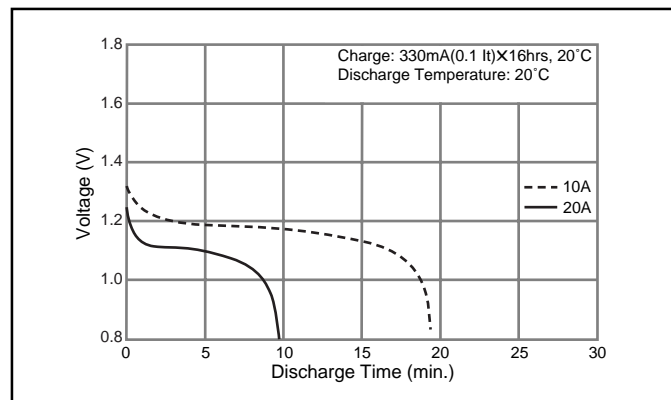
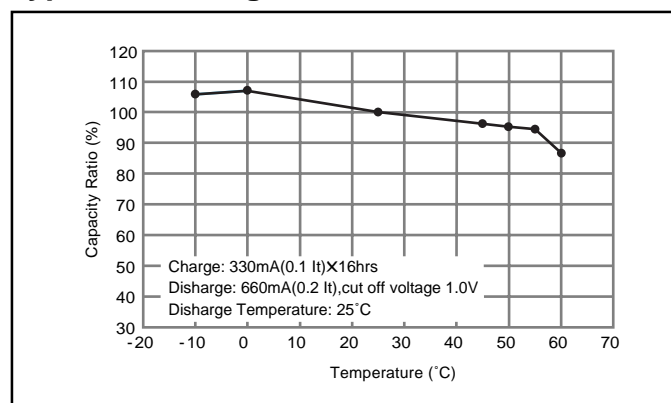
⁴ With control system

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



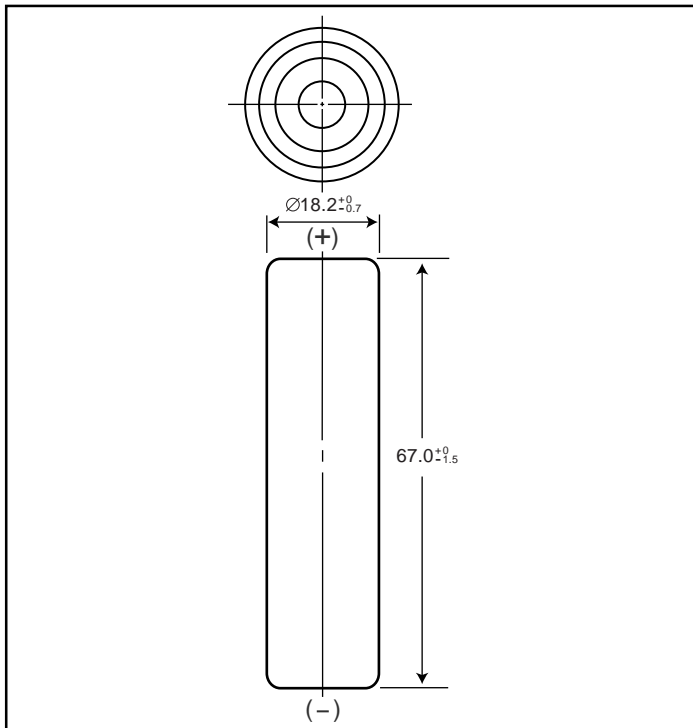
Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:
It(A) = Cn (Ah)/1h.

- [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

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	°F
			-10°C to 60°C	14°F to 140°F
		Rapid	-10°C to 45°C	14°F to 113°F
	Discharge		-10°C to 60°C	14°F to 140°F
	Storage	< 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

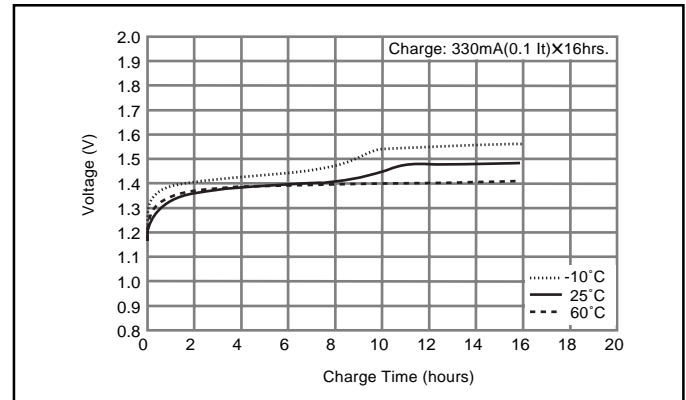
Rapid charger timer; 2.4h (at 1.25a)

Trickle timer; within 2h

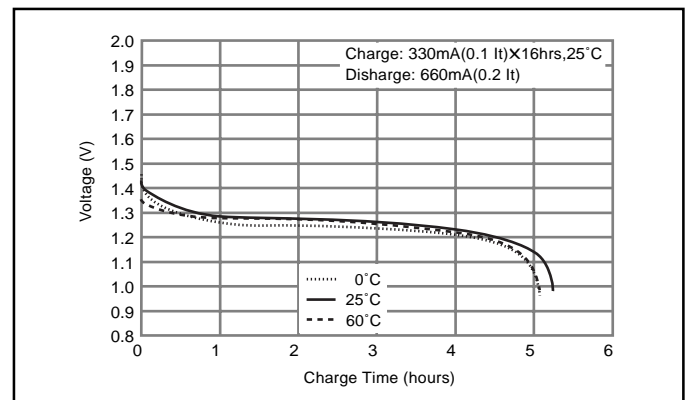
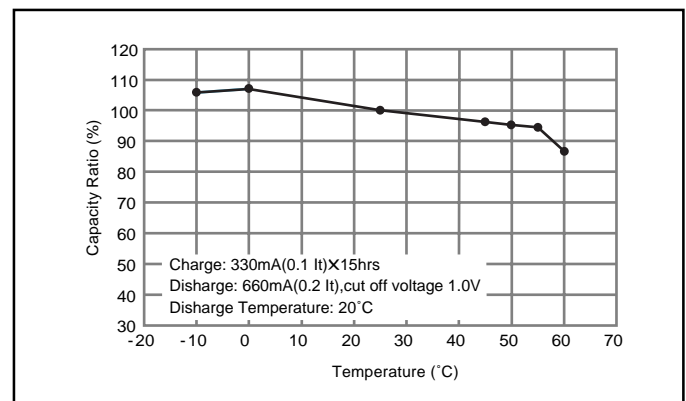
⁴ With control system

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:

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

• [It] is the reference test current in amperes

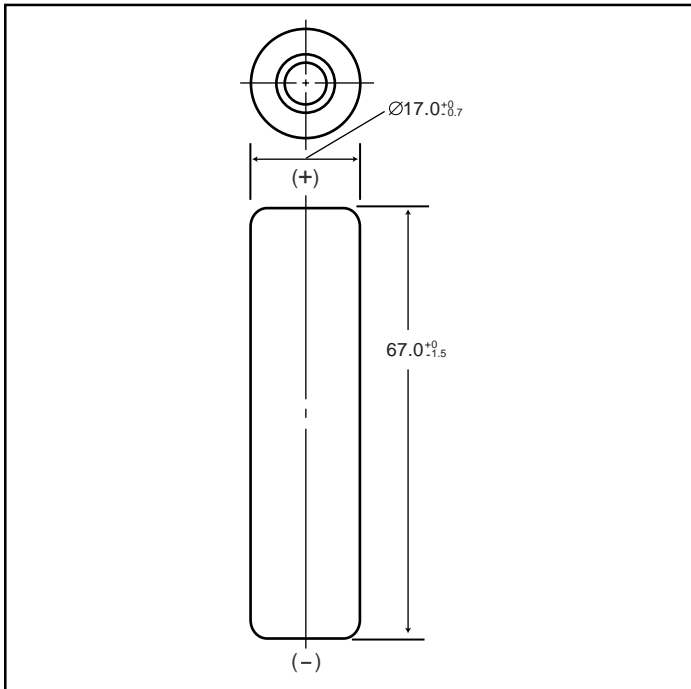
• [Cn] is the rated capacity of the cell or battery in Ampere-hours.

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

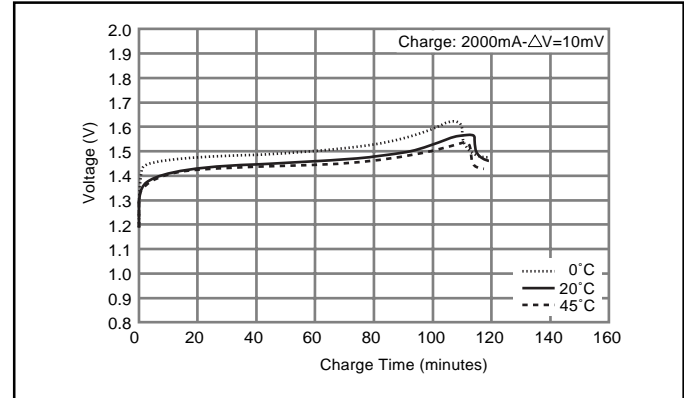
NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR380A Cylindrical L-A size (HR 17/67)

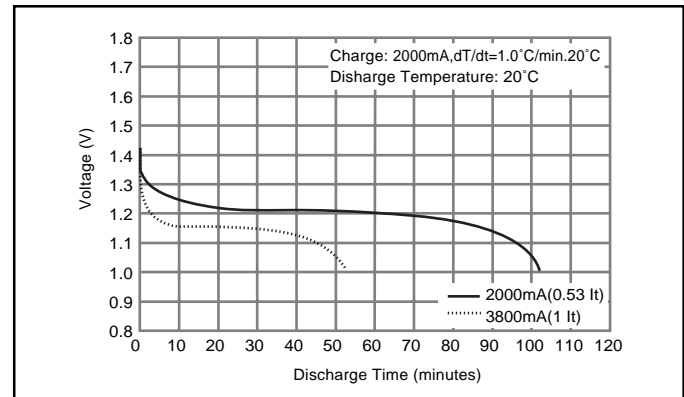
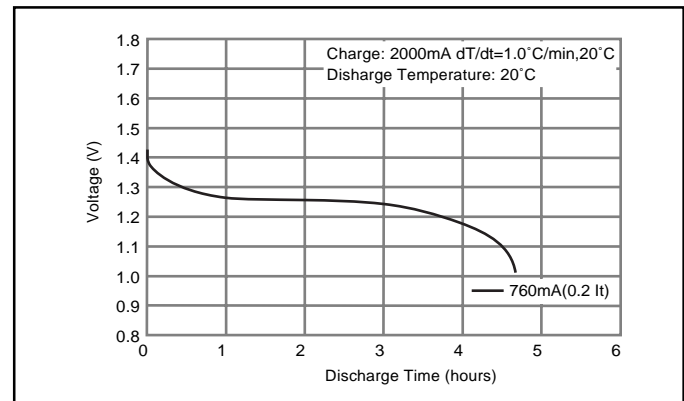
Dimensions (with Tube) (mm)



Typical Charge Characteristics



Typical Discharge Characteristics



Specifications

	mm	inch
Diameter	17.0+0/-0.7	0.67+0/-0.03
Height	67.0+0/-1.5	2.64+0/-0.06
Approximate Weight	Grams	Ounces
	53	1.87

Nominal Voltage		1.2V	
Discharge Capacity*	Average**	3800 mAh	
	Rated (Min.)	3700 mAh	
Approx. Internal impedance at 1000Hz at charged state.		25mΩ	
Charge	Standard	370mA (0.1It) x 16hrs.	
	Rapid***	2000mA dT/dt	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		0°C to 45°C
			32°F to 113°F
	Discharge		0°C to 40°C
			32°F to 104°F
Storage	Storage	< 1 year	-10°C to 65°C
		< 3 months	14°F to 149°F
		< 1 month	-20°C to 35°C
		< 1 month	-4°F to 95°F

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

** For reference only.

*** For rapid charge: use dT/dt charge termination method. Refer to the Nickel Metal Hydride "Charge Methods" section for further details. 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.

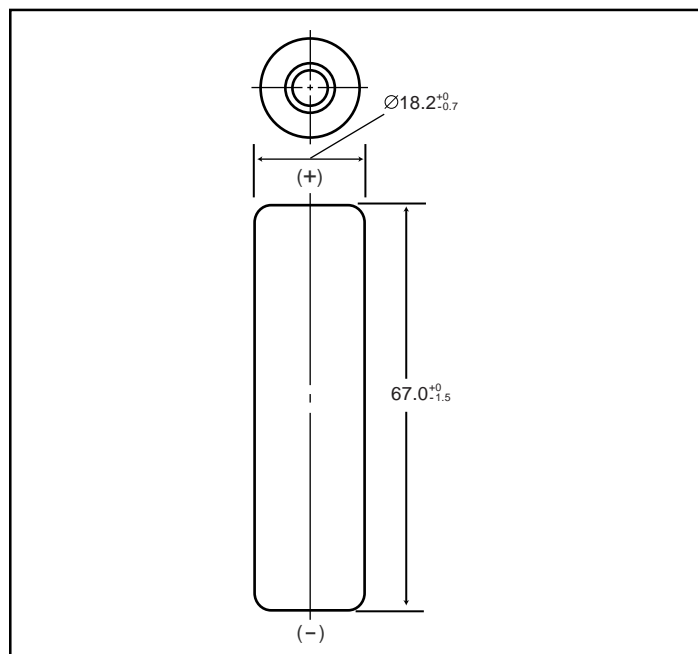
Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:
 $It(A) = C_n (Ah)/1h.$

- [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

HHR450A 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*	Average**	4500 mAh	
	Rated (Min.)	4200 mAh	
Approx. Internal impedance at 1000Hz at charged state.		25mΩ	
Charge	Standard	420mA (0.1It) x 16hrs.	
	Rapid***	2000mA dT/dt	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		°C
			°F
	Discharge		°C
			°F
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

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

** For reference only.

*** For rapid charge: use dT/dt charge termination method. Refer to the

Nickel Metal Hydride "Charge Methods" section for further details.

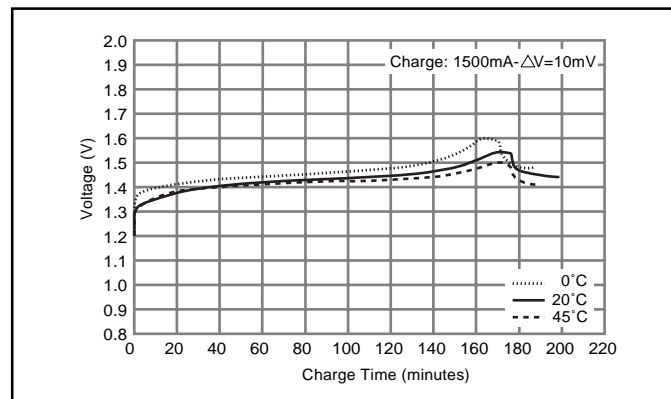
Battery performance and cycle life are strongly affected by how they are used. In order to maximize battery safety, please consult Panasonic when determining charge / discharge specs, warning label contents and unit design.

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:

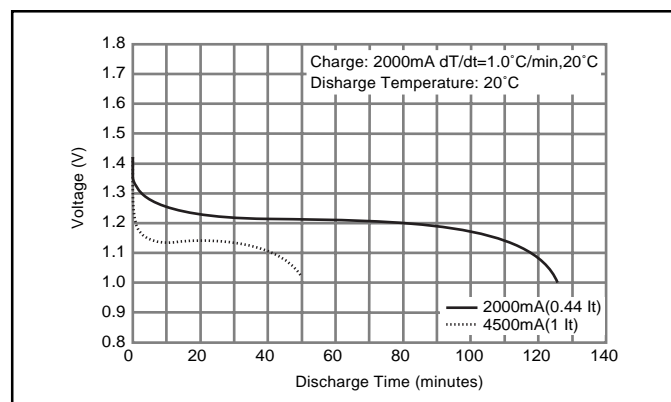
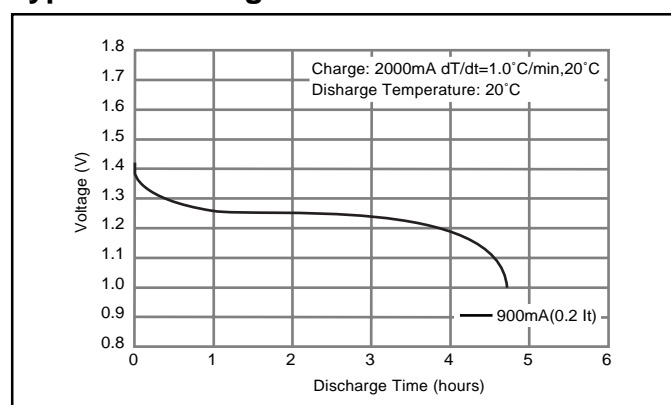
$It(A) = C_n (Ah)/1h.$

- [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

Typical Charge Characteristics



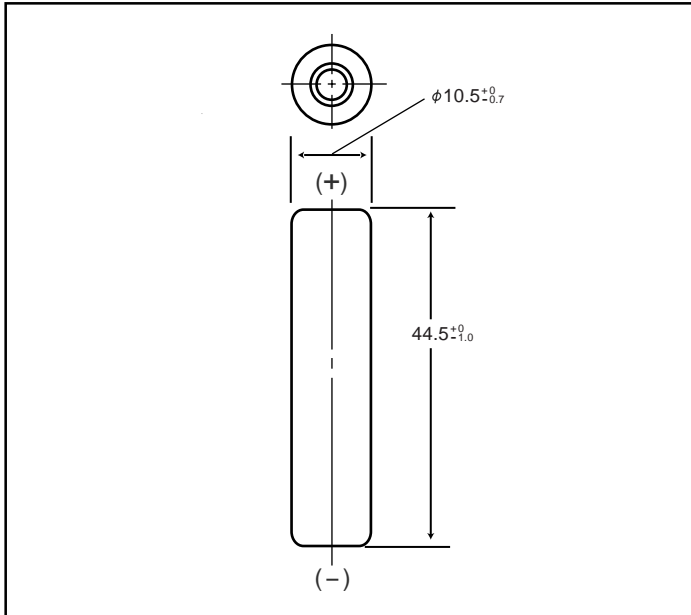
Typical Discharge Characteristics



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
	13	0.46

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	°F
			-10°C to 60°C	14°F to 140°F
		Rapid	-10°C to 45°C	14°F to 113°F
	Discharge		-10°C to 60°C	14°F to 140°F
	Storage	< 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

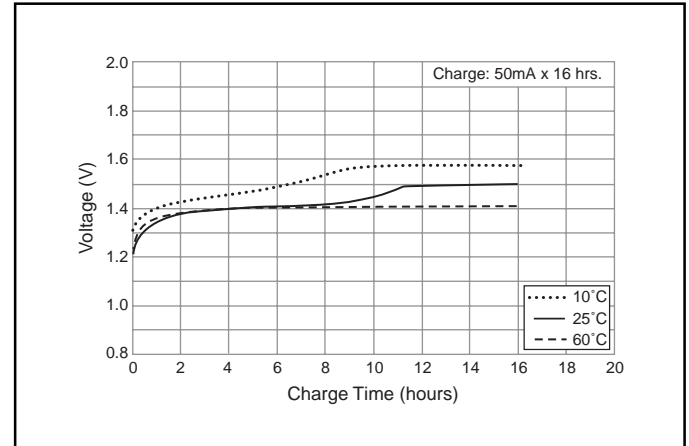
Rapid charger timer; 2.4h (at 1.25a)

Trickle timer; within 2h

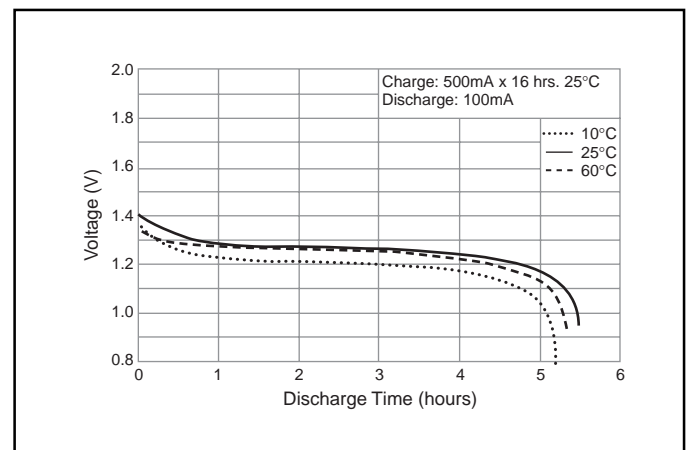
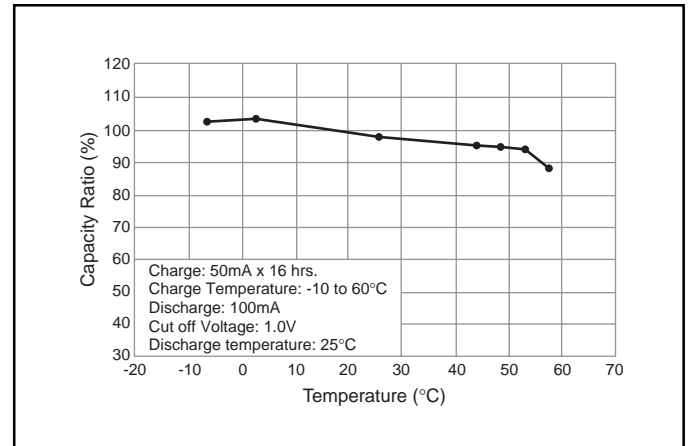
⁴ With control system

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:

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

* [It] is the reference test current in amperes

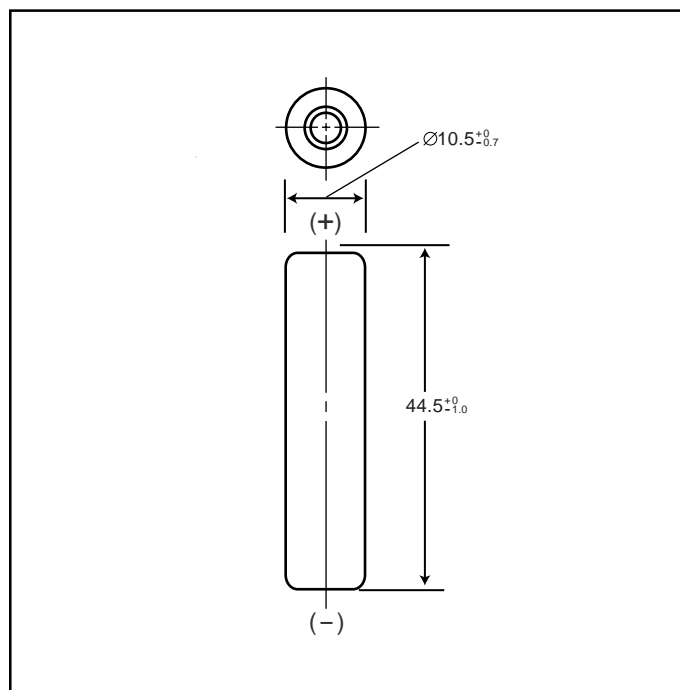
* [Cn] is the rated capacity of the cell or battery in Ampere-hours.

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

NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR70AAAJ Cylindrical HR 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
	13	0.46

Nominal Voltage		1.2V	
Discharge Capacity*	Average**	720 mAh	
	Rated (Min.)	700 mAh	
Approx. Internal impedance at 1000Hz at charged state.		30mΩ	
Charge	Standard	70mA (0.1It) x 16hrs.	
	Rapid	650mA (1It) x 1.2 hrs.	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		°C
			°F
	Discharge		°C
			°F
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

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

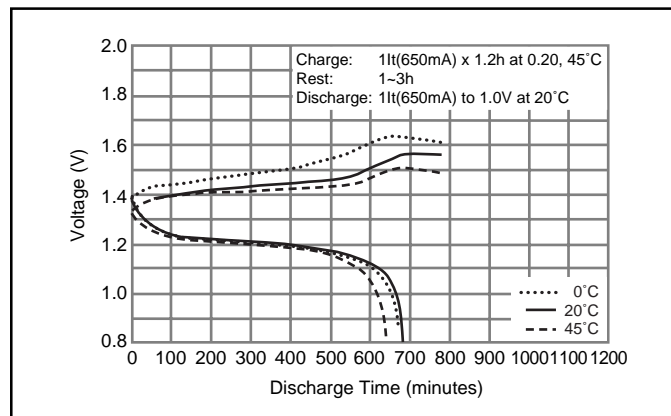
** For reference only.

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.

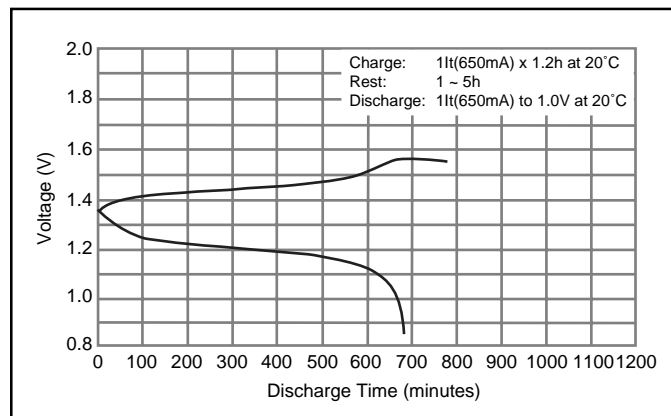
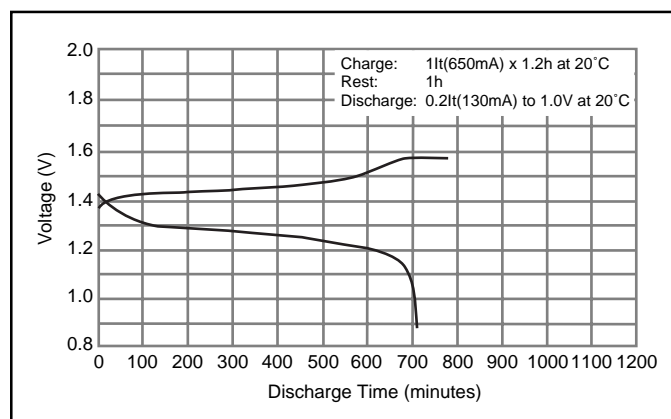
Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:
It(A) = Cn (Ah)/1h.

- [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

Typical Charge Characteristics



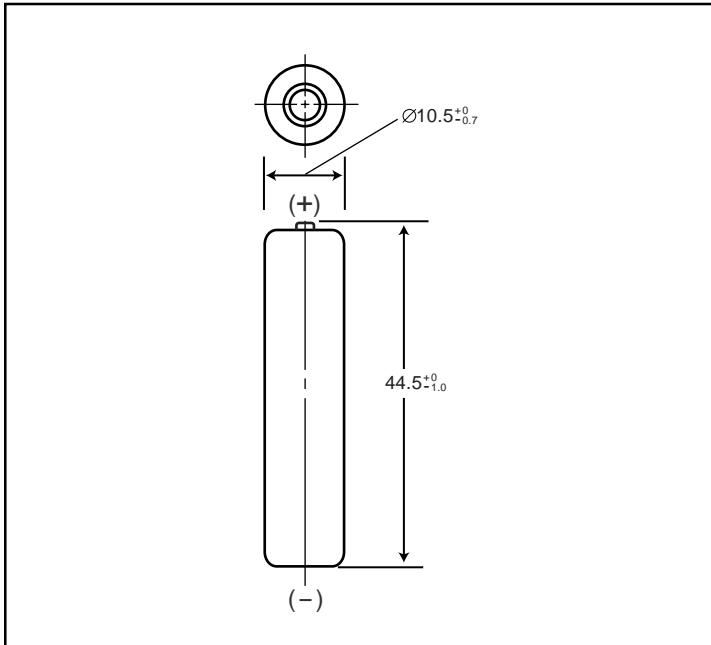
Typical Discharge Characteristics



NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

HHR75AAA/B 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*	Average**	730 mAh	
	Rated (Min.)	700 mAh	
Approx. Internal impedance at 1000Hz at charged state.		35mΩ	
Charge	Standard	70mA x 16hrs.	
	Rapid	450mA x 1.7 hrs.	
Ambient Temperature	Charge	Standard	°C
			°F
	Rapid		0°C to 45°C
			32°F to 113°F
	Discharge		0°C to 40°C
			32°F to 104°F
Storage	Discharge		-10°C to 65°C
			14°F to 149°F
	< 1 year		-20°C to 35°C
	< 3 months		-4°F to 95°F
Storage	< 1 month		-20°C to 55°C
			-4°F to 131°F

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

** For reference only.

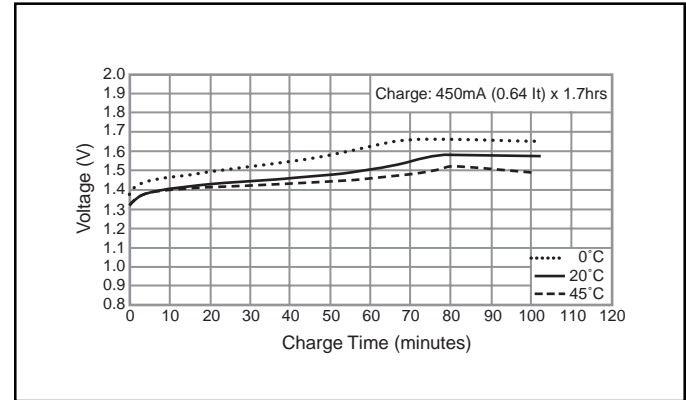
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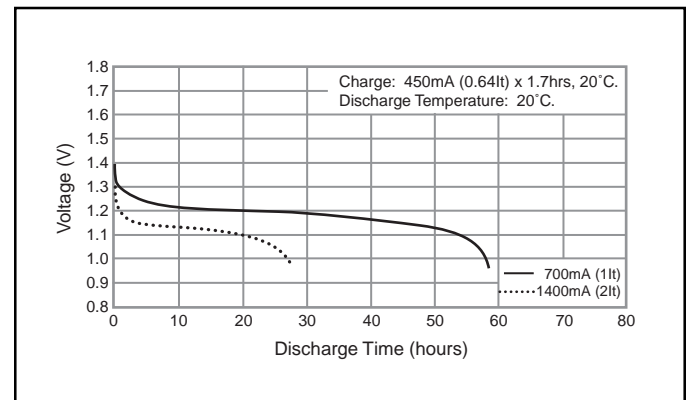
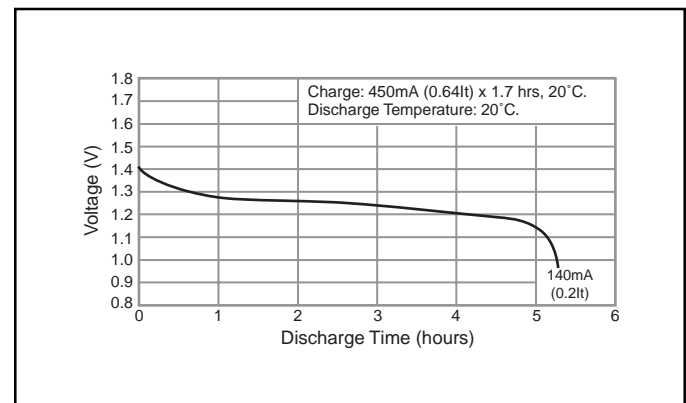
$$It(A) = Cn(Ah)/1h.$$

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

Typical Charge Characteristics



Typical Discharge Characteristics



Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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