

Technical Proposal for Backup Equipment

January, 2025
Technical Support Department
Ni-MH Battery Division
FDK CORPORATION

Reliable & Innovative Line-up

Our Ni-MH batteries can be used in a wide range of applications.

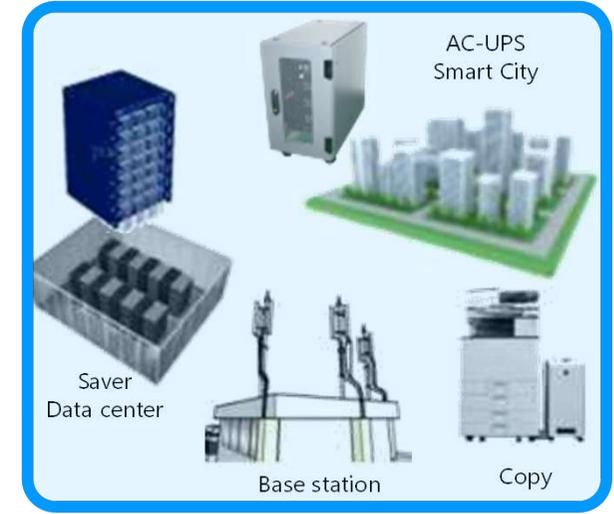
Dry cell compatible



Standard



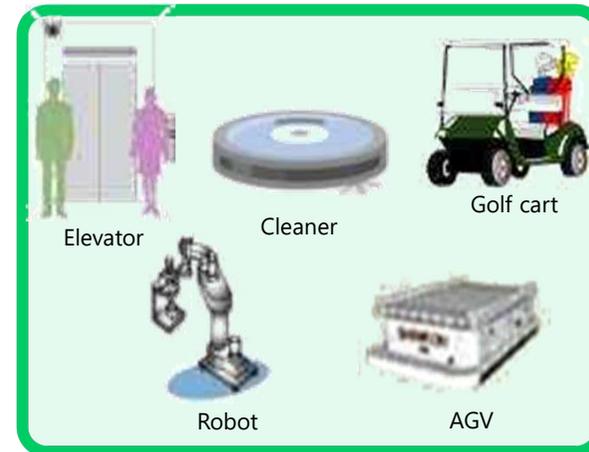
Long Life & High Reliability



High Durability



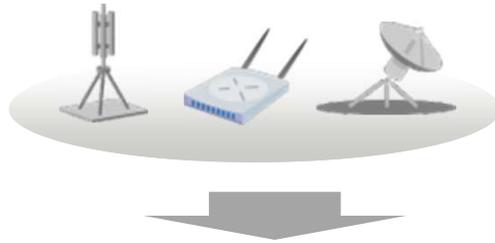
Powerful & Durable



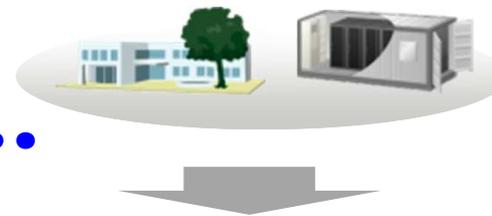
Required scene of backup applications

⚡ Sudden blackout and disaster ➡ stop electrical supply
 ⚡ If backup battery isn't installed, You are not able to use facilities.

■ Outdoor facilities/Meters



■ Facilities without emergency power system



Required item for backup battery

- ① Can it work
- ② Safety
- ③ Reliability
- ④ Installation space
- ⑤ Maintenance cost
- ⑥ Life cycle cost

Secondary battery might need safety and reliability.

➡ We suggest FDK's high durability Ni-MH.

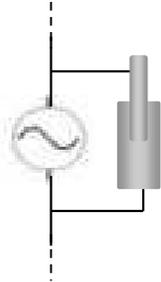
For Back Up usage(Replacement of Ni-Cd Battery etc.)

Required Characteristics

Need to backup waiting

Back-up power application

- Long life at continuous charge condition



Emergency light

- Long life at continuous charge condition
- High temperature charge



Recommend models

High Durability

Low self-discharge Type

High Durability

High Durability Ni-MH Batteries

Suitable for backup usage applications!

High Durability

For emergency lights, emergency exit lights, security equipment, communication base stations, medical equipment, ATMs, POSs, traffic road studs and various backup power supplies.

Model No.	Capacity(mAh)		Dimensions(mm) ^{*3}	
	Typ. ^{*1}	Min. ^{*2}	Diameter	Height
HR-2/3AAAUTU	220	200	10.5	30.0
HR-AAAUTU	500	460	10.5	44.5
HR-AAULTU	780	700	14.2	49.0
HR-AAULT	1050	1000	14.2	49.0
HR-AATU New	1280	1200	14.5	50.0
HR-AAUT	1580	1500	14.2	50.0
HR-4/5FAUPT	1650	1500	18.1 ^{*4}	43.2 ^{*4}
HR-AUT	2200	2000	17.0	50.0
HR-5/4SCUT	3250	3000	23.0	50.0
HR-4/3FAUT	3700	3500	18.0	67.5

*1. Typical discharge capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16hours.
 *2. Minimum discharge capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16hours.
 *3. Including heat shrink tube. *4. Including paper tube / heat shrink tube.

Standard Ni-MH Batteries

Contributes to longer running time of devices!

Standard

For home appliances (shavers, electric toothbrushes), measuring instruments, elevator B/U, UPS, server backup systems, vending machines and various backup power supplies.

Model No.	Capacity(mAh)		Dimensions(mm) ^{*3}	
	Typ. ^{*1}	Min. ^{*2}	Diameter	Height
HR-AAAUC Long Life type	700	650	10.5	44.5
HR-AAUC Long Life type	1200	1100	14.2	50.0
HR-AAUE	1400	1250	14.2	50.0
HR-AAU	1650	1500	14.2	50.0
HR-4/5AU	2150	1950	17.0	43.0
HR-AUE	2700	2450	17.0	50.0
HR-4/3AU	4000	3600	17.0	67.5
HR-4/3FAU	4500	4100	18.0	67.5

*1. Typical discharge capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16hours.

*2. Minimum discharge capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16hours.

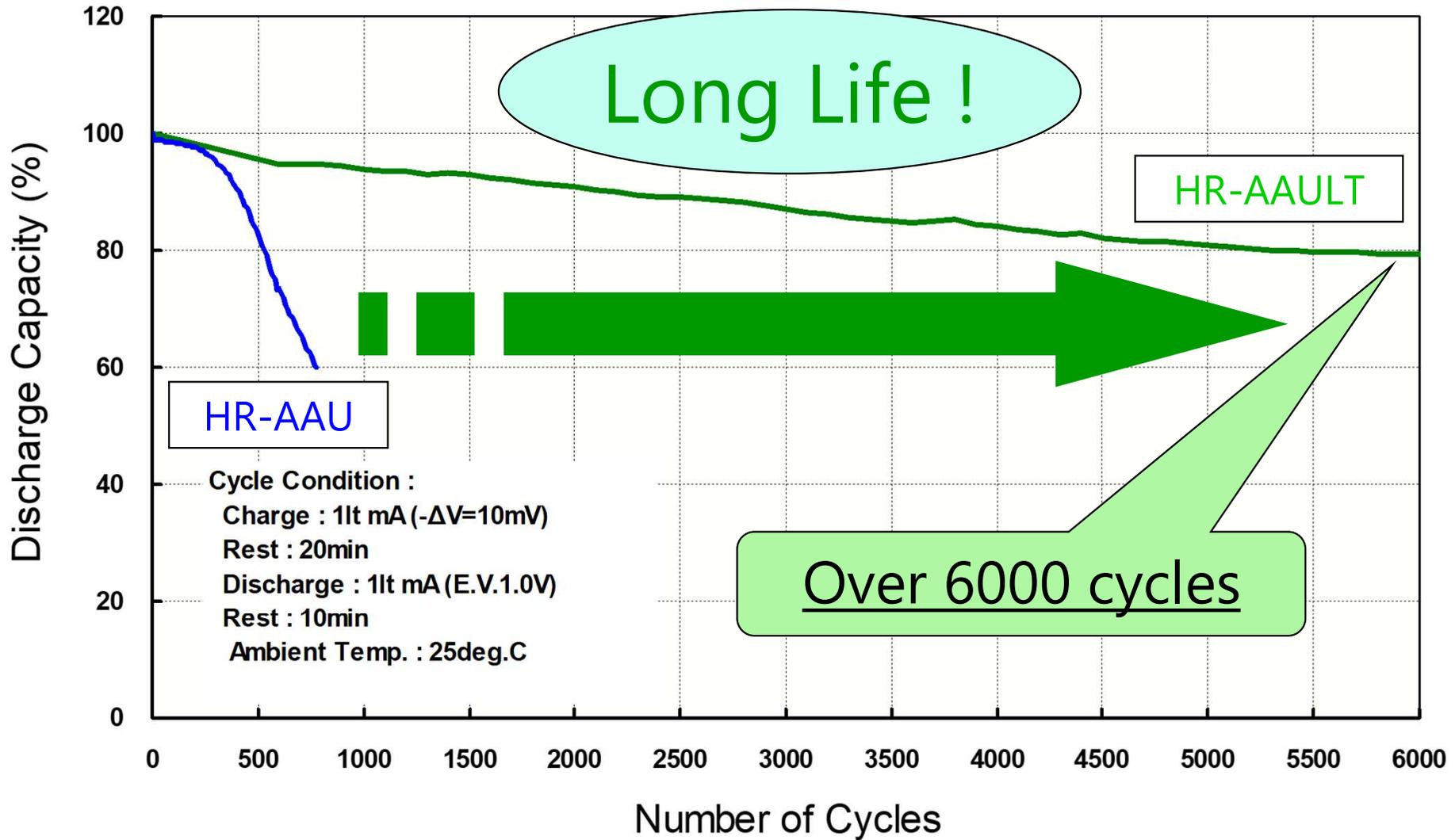
*3. Including heat shrink tube. *4. Including paper tube / heat shrink tube.

• Battery performance and lifespan are greatly affected by usage and temperature conditions. • Test results vary depending on individual batteries. • Specific values included in this material are intended to describe performance. They are not guaranteed.

Characteristics of High durability models

Superior long cycle life performance!

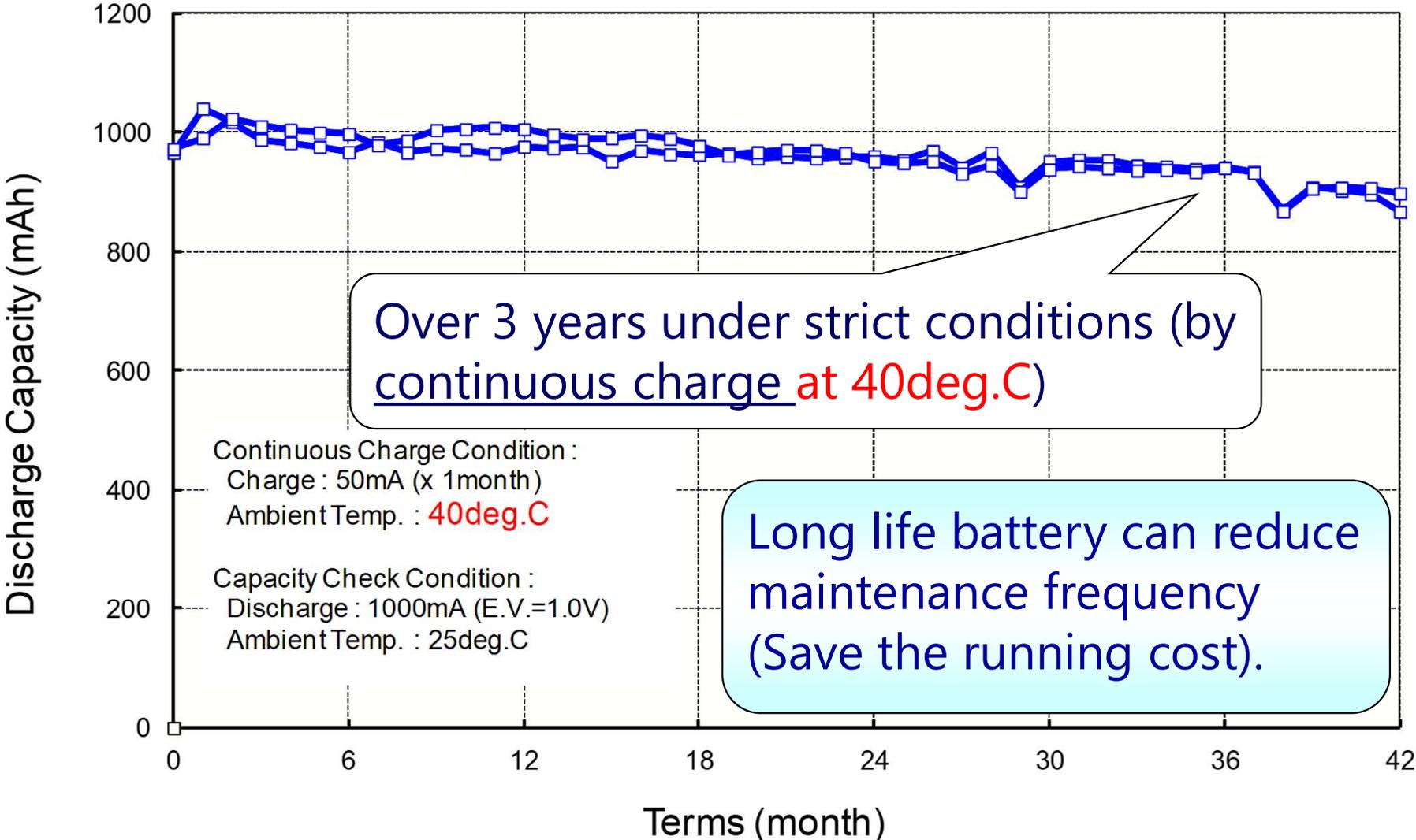
Cycle Characteristics of Ni-MH (AA size)



Characteristics of High durability models

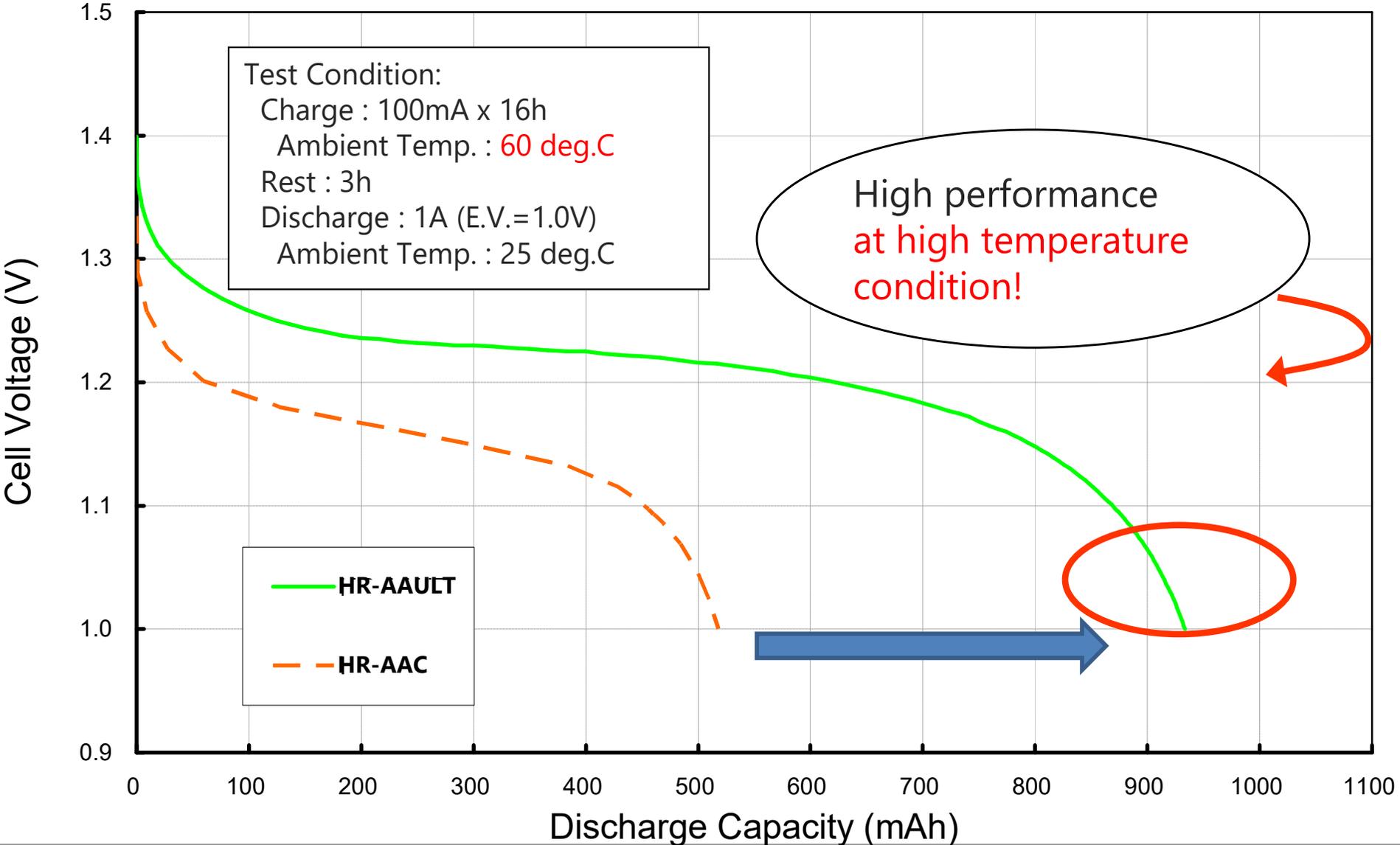
Superior long life performance!

Continuous Charge Characteristics of HR-AAULT



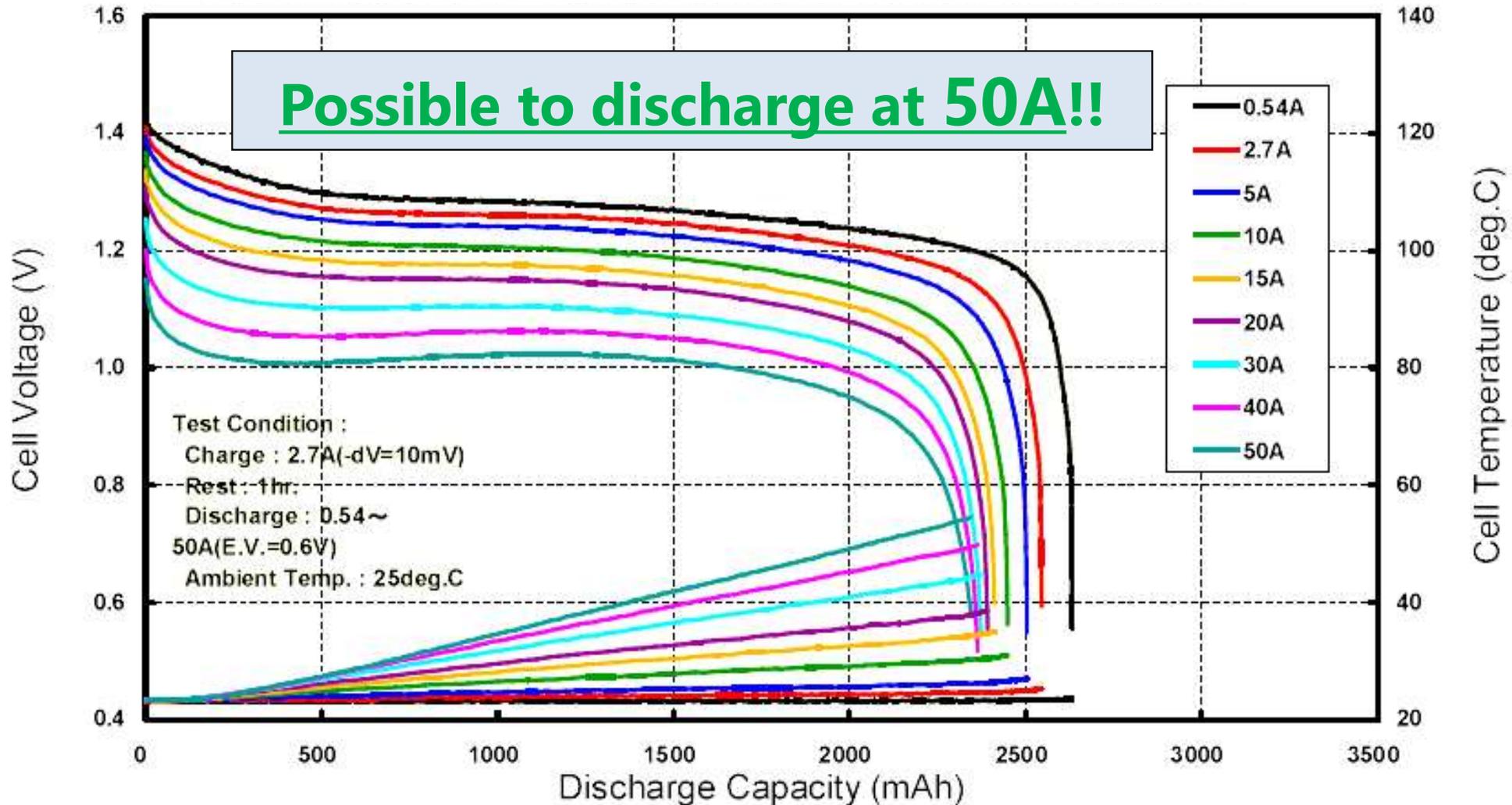
Characteristics of High durability models

Superior high temperature charge performance!

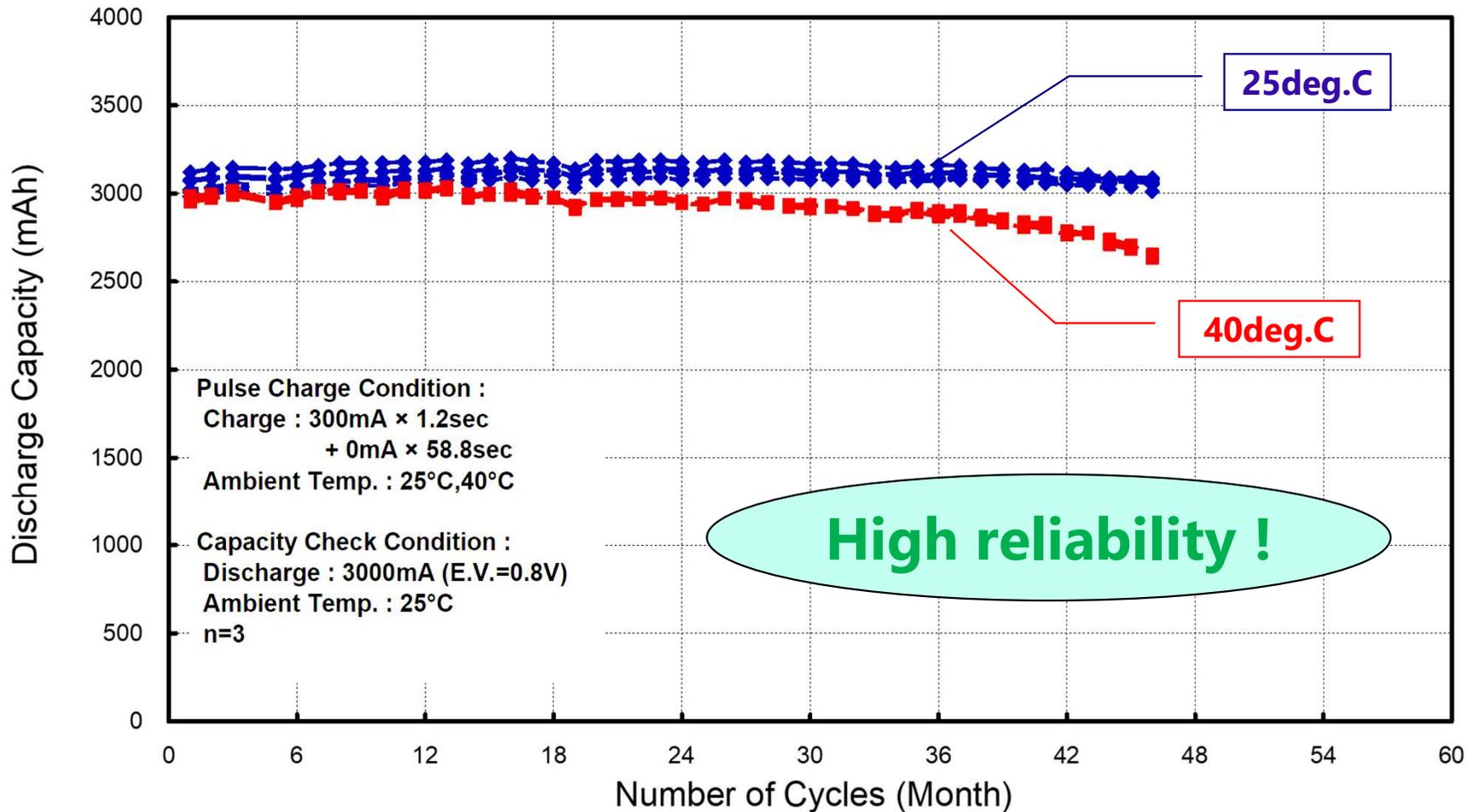


Discharge Rate Characteristics of HR-4/3FAUHPC

Superior high rate discharge performance!!



Pulse trickle charge characteristic of HR-5/4SCUT



Pulse trickle charge is recommended to protecting over charge.

FDK recommended charging method

Ni-MH batteries use constant current charging as a general charging method. Depending on the charging current, it can be divided into fast charging and low rate charging.

(1) Basic quick charging procedure

Generally, charging is performed using a constant current of 0.5 It A to 1 It A (*). Detects and controls changes in battery voltage and temperature when fully charged.

(2) Low-rate charging procedure

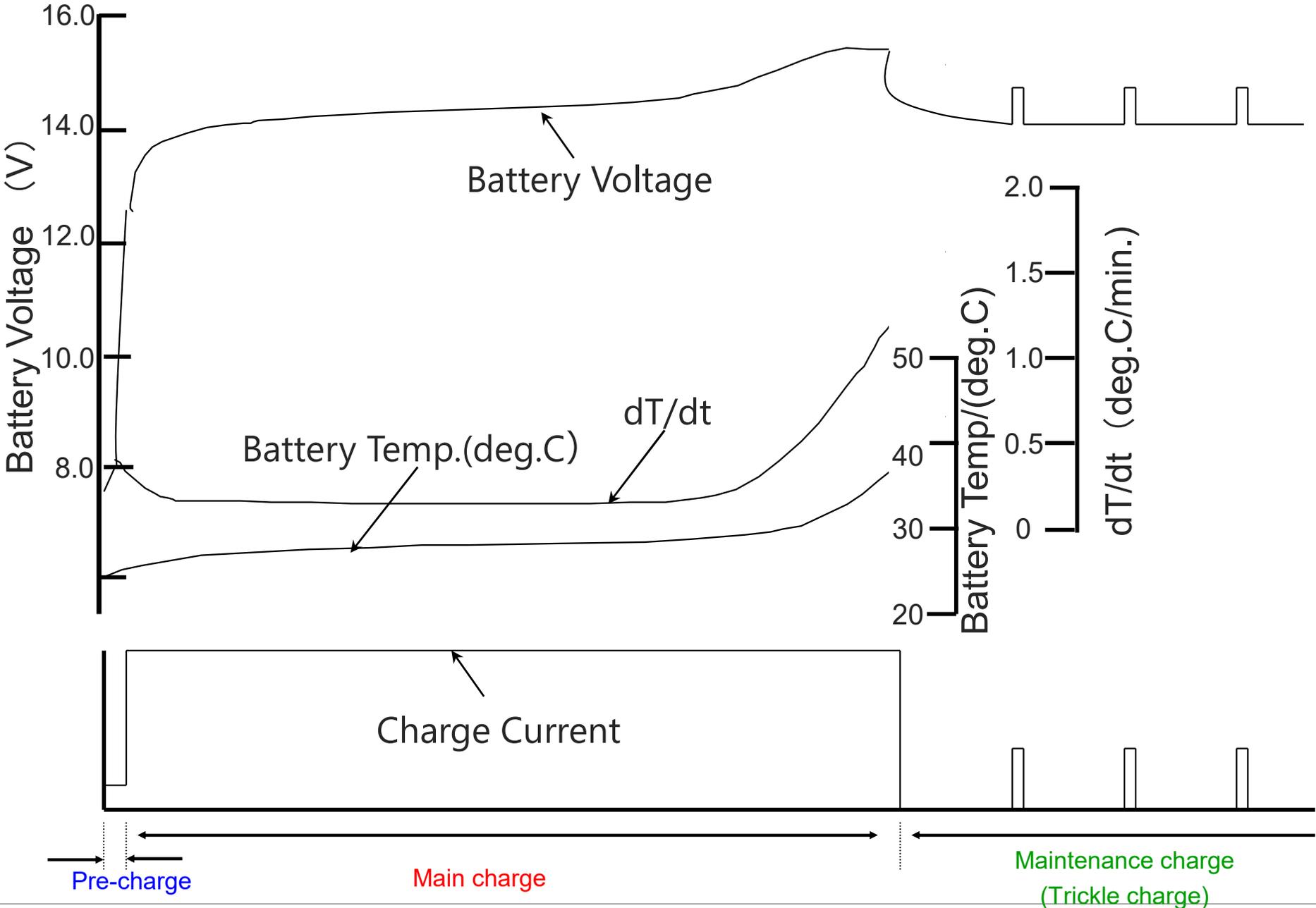
This method uses a constant current of around 0.1 It A, and is controlled mainly by the timer time. Battery life may be shorter depending on battery type.

(3) About auxiliary charge

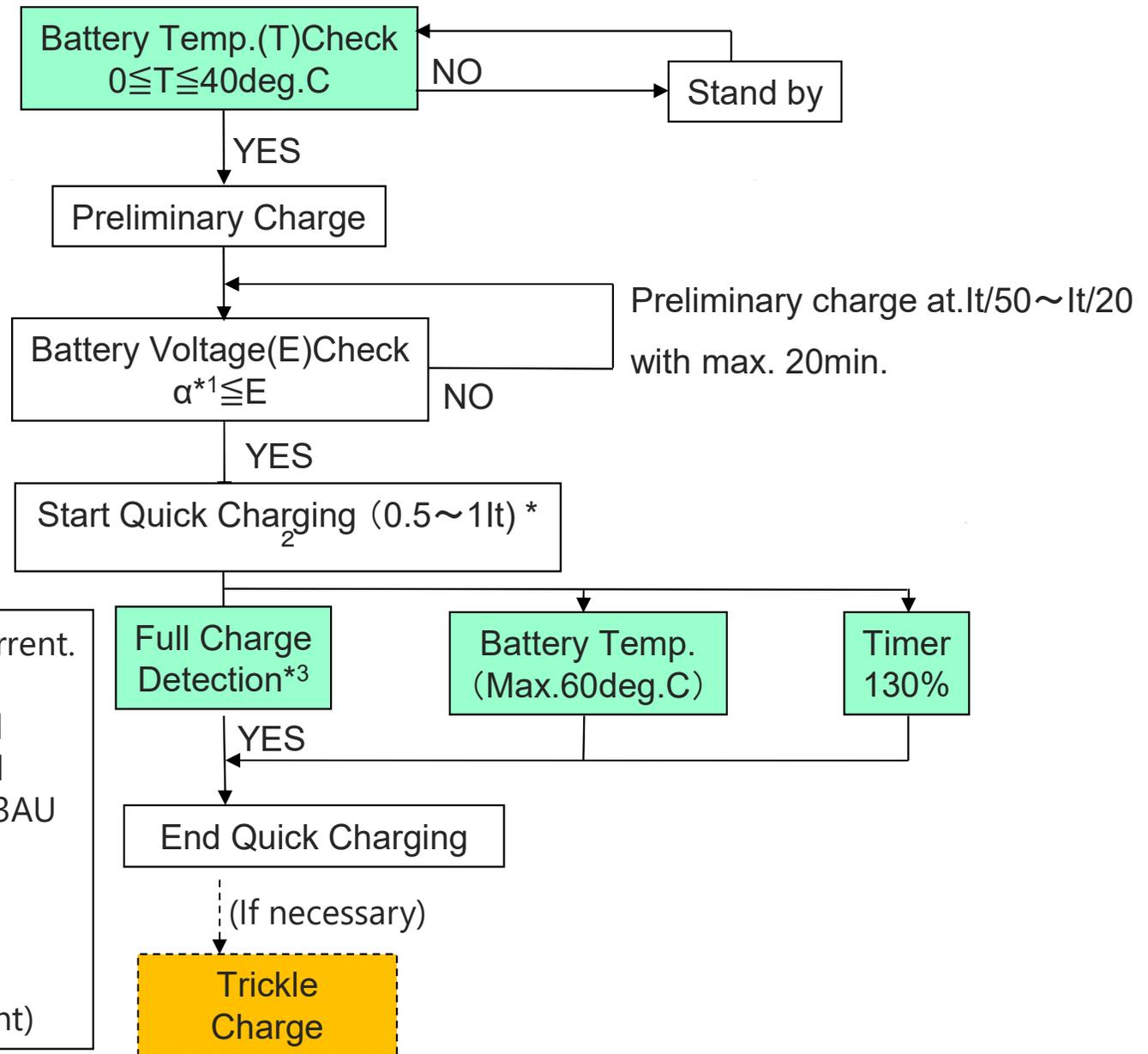
In order to maintain full charge, the decrease in self-discharge is continuously charged with pulse current (equivalent to 1/500 It A on average).

(*) 1It : Current value to fully discharge a fully charged battery in one hour.

(1) Basic quick Charging procedure for Ni-MH Battery (An Example; 10 series)



(1) Basic quick charging procedure for Ni-MH Battery

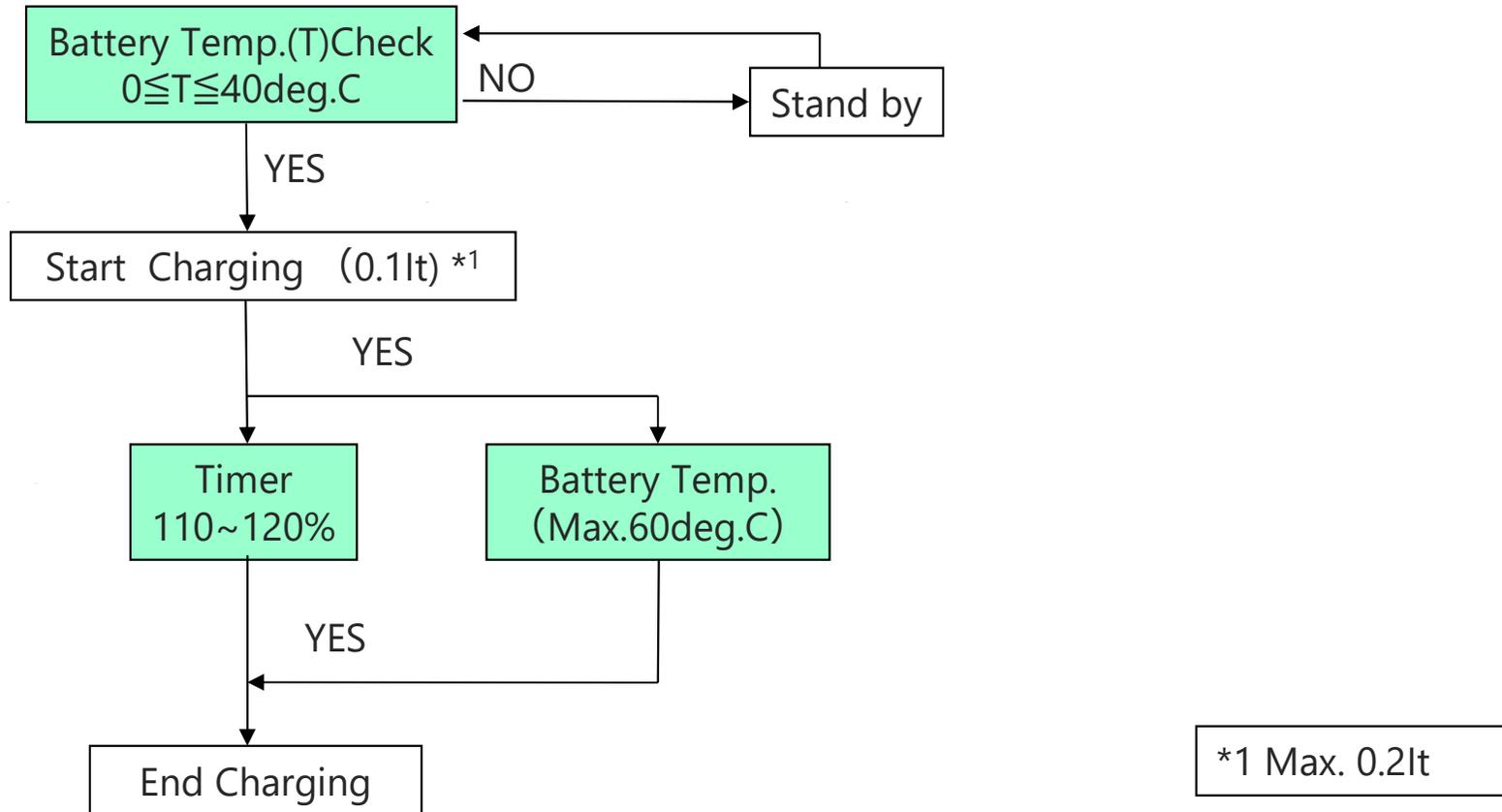


*1 The α is Varied with the charging current.
 Ex. charging current α value.
 $I_t/50$: 1.10V/cell
 $I_t/20$: 1.15V/cell

*2 Maximum charge current for HR-4/3AU and HR-4/3FAU is 3.0A

*3 Method of full-charge detection
 ① Peak Voltage cut off
 ② Δ Temp./ Δ time
 ③ Δ Temp.(Battery) – Δ Temp.(Ambient)

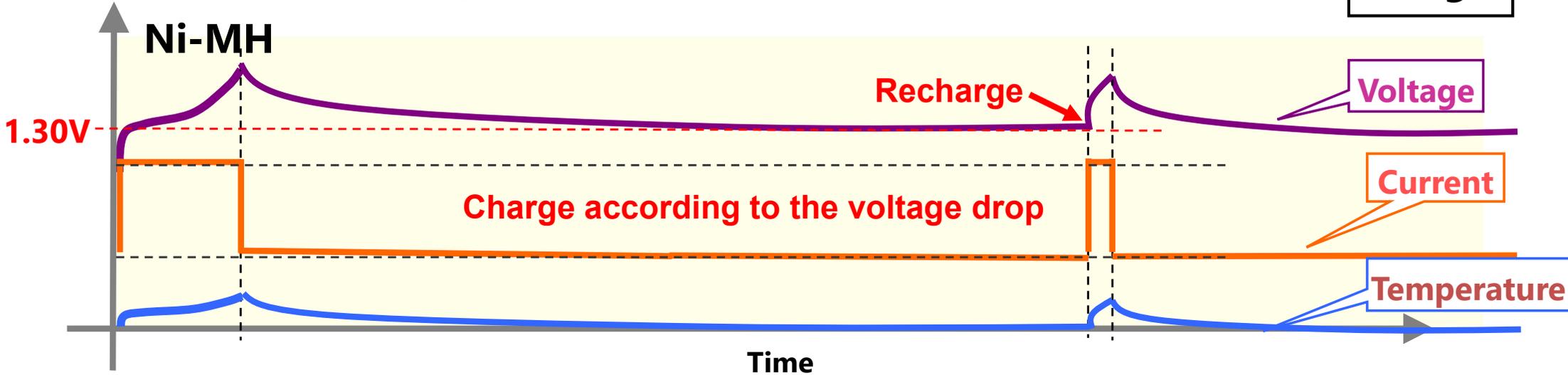
(2) Low-rate charging procedure for Ni-MH Battery



(3) FDK Recommended charging system

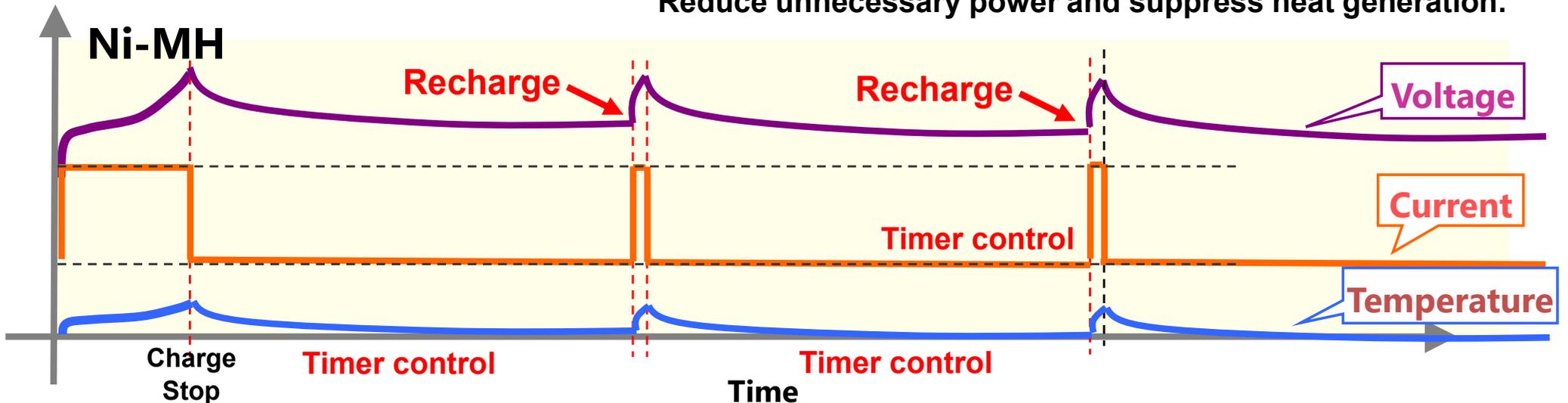
① Up down charge

Image



② Pulse trickle charge

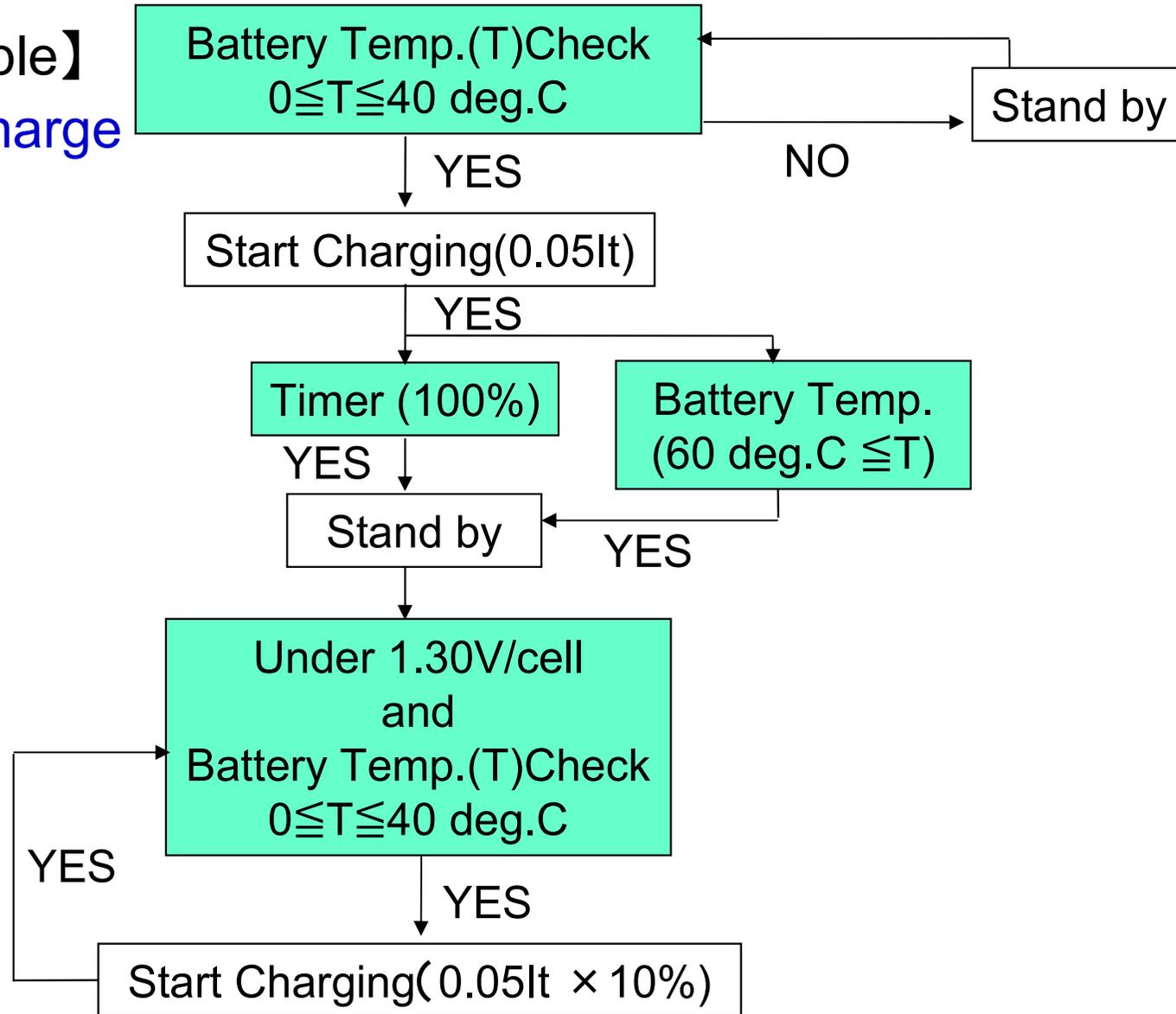
Charge only the necessary amount,
Reduce unnecessary power and suppress heat generation.



(3) ① Up down charge

Proposal for charge method

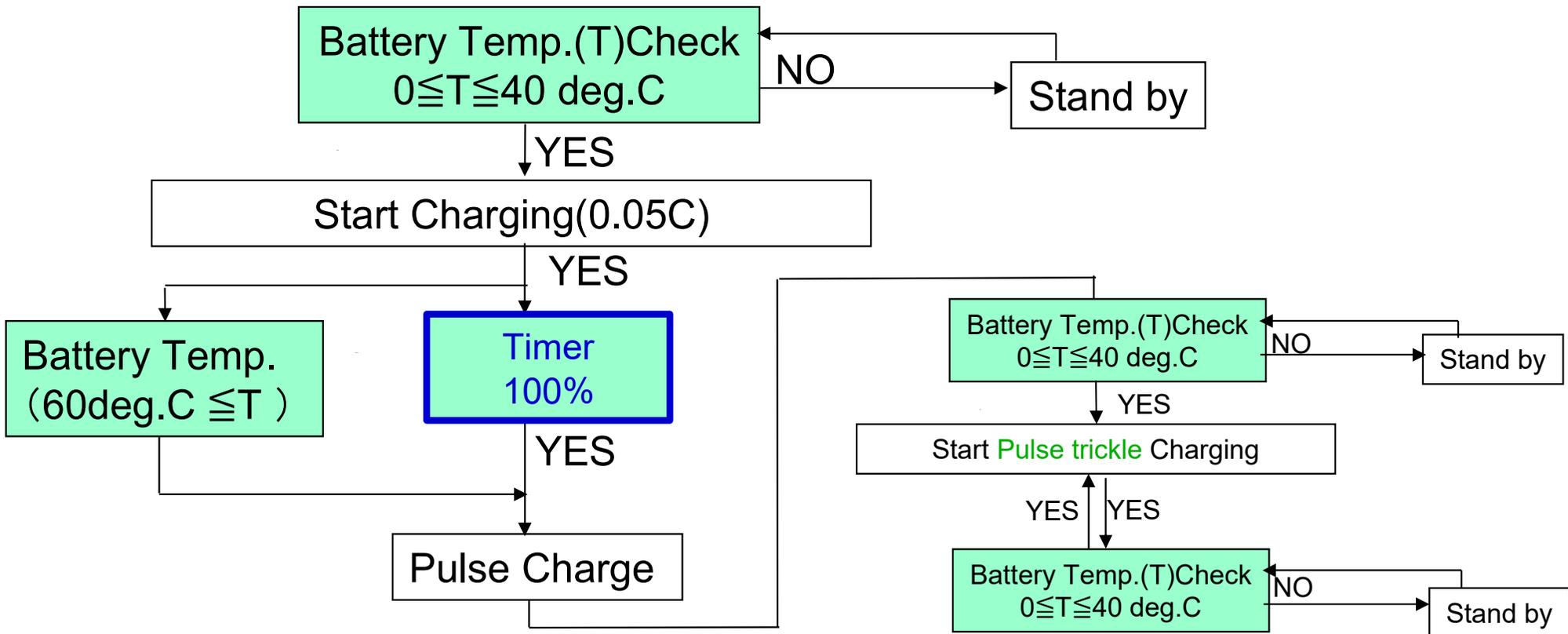
【Example】
① Up down charge



(3) ② Pulse trickle charge

Proposal for charge method (Pulse trickle charge)

【Example】② Pulse trickle charge

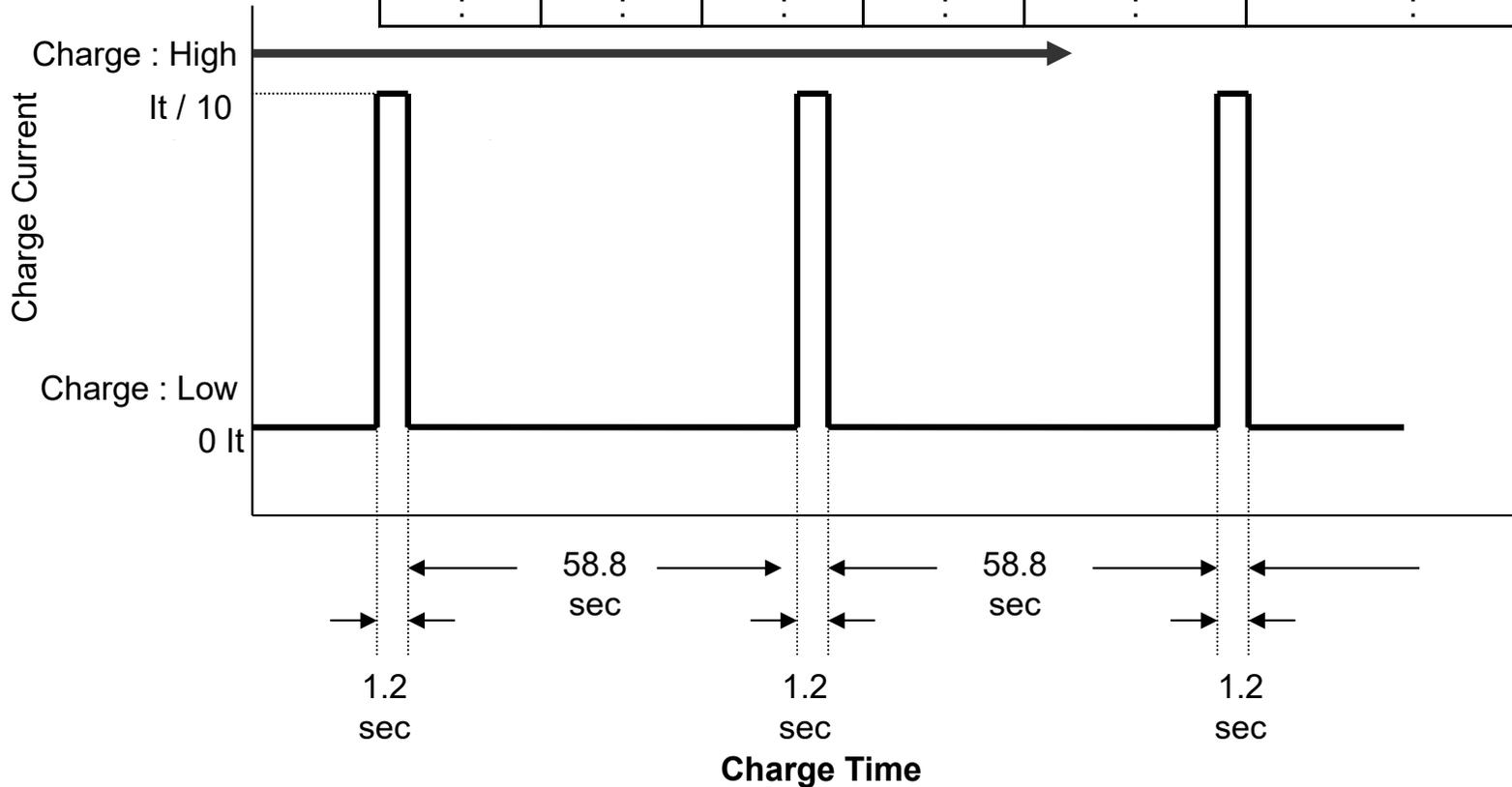


(3) ② Pulse trickle charge

Proposal for charge method (Pulse trickle charge)

Example of pulse trickle charge

Charge : High		Charge : Low		Pulse interval	Charge amount per day
Current	Time	Current	Time		
$I_t / 10$	1.2 sec	0 I_t	58.8 sec	60 sec	5% of rated capacity
$I_t / 20$	2.4 sec	0 I_t	57.6 sec	60 sec	5% of rated capacity
$I_t / 10$	0.6 sec	0 I_t	29.4 sec	30 sec	5% of rated capacity
⋮	⋮	⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮	⋮	⋮



FDK

Technology creating a better future