

## VRLA Battery Characteristics - Charging

The constant voltage charge method is recommended to charge our battery. When charging, the lead sulfate of the positive plate becomes lead dioxide. As charging continues, the positive plate begins to generate O<sub>2</sub> causing a sudden rise in battery voltage. A constant voltage charge, therefore, gives rise to detection of this voltage increase and control of the charge amount. This type of charging generally employs a constant-voltage constant-current method with current limitation to prevent the initial current (at low battery voltage) from increasing.

Table 1 shows the charge voltage and maximum charge current. Figures 1 and 2 shows the constant-voltage charging characteristics of the GP1272. Figures 1 and 2 show a constant-voltage charge initially made with a current limited to 0.1CA, with the constant-voltage charge following after the battery voltage reaches a certain level. The battery was charged at the 100% discharge state and the 50% discharged state. A charge quantity of 110-120% of the discharge quantity is needed to fully charge the battery.

The charge voltage of the battery decreases with increasing temperature and vice versa. Accordingly, charging with a given voltage requires an increased charge current when the temperature is high and decreased charge current at a lower temperature. Temperature compensation is not necessary when the battery is charged at an ambient temperature between 5°C (41°F) to 35°C (95°F). At temperatures below 5°C (41°F) or above 35°C (95°F), temperature compensation for charging voltage is necessary.

The temperature coefficient is:

- (1) For cycle service  
-5m V/°C Cell
- (2) For standby use (trickle charge or float charge)  
-3.3mV°C Cell

Refer to Figure 3 in order to prevent a poor charge under low temperatures and overcharge under high temperatures, the charging voltage must be set at the appropriate value according to the battery temperature. For the charging voltage of each VRLA battery, refer to Table 1.

Table 1 - Charging voltage and maximum charging current

Applications	Charging voltage (V/cell)			Max. charging current (A)
	Temperature	Set point	Allowable range	
Cycle service	25°C (77°F)	2.45	2.40~2.50	0.3C
Standby	25°C (77°F)	2.275	2.25~2.30	0.3C

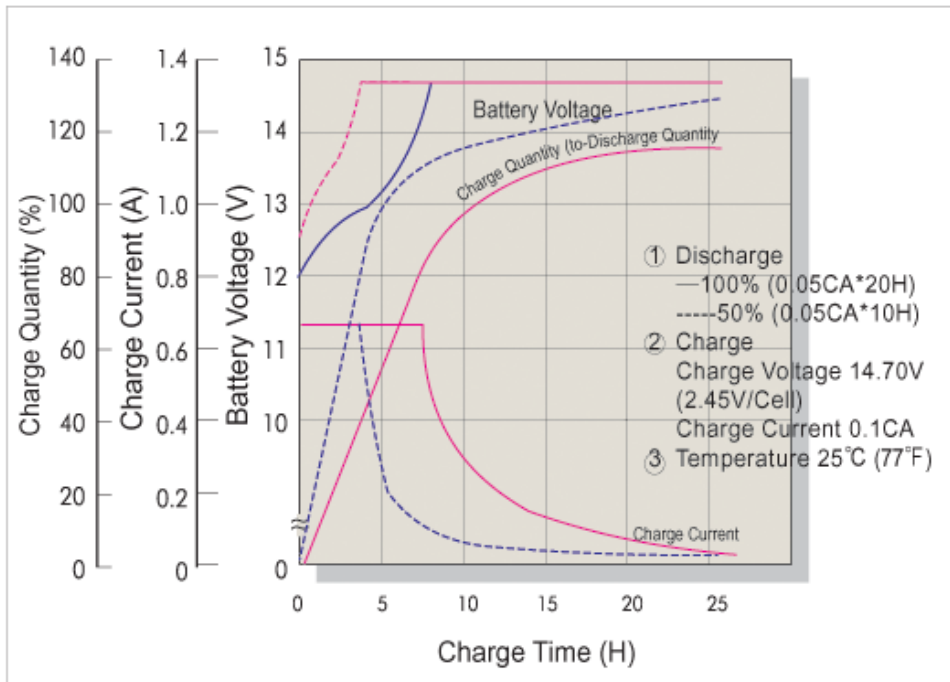


Figure 1 - GP1272 charging characteristic for constant voltage 14.7V (2.45 V/cell)  
(Example of the charging characteristics for the cycle use of GP series battery.)

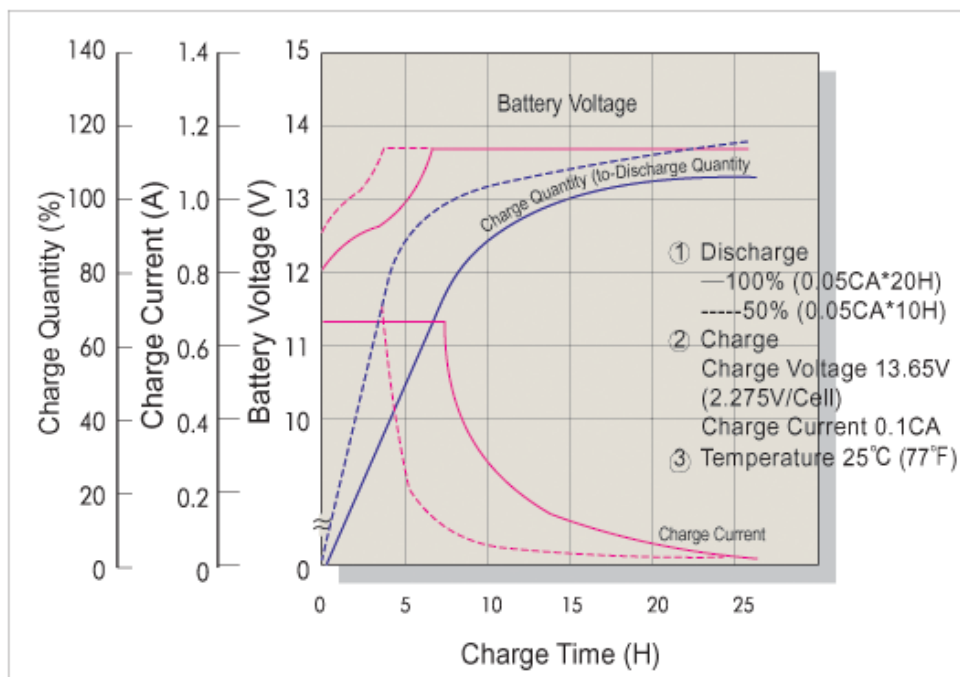


Figure 2 - GP1272 charging characteristics for the constant voltage 13.65V (2.275 V/cell)  
(Example of the charging characteristics for the standby use of GP series battery.)

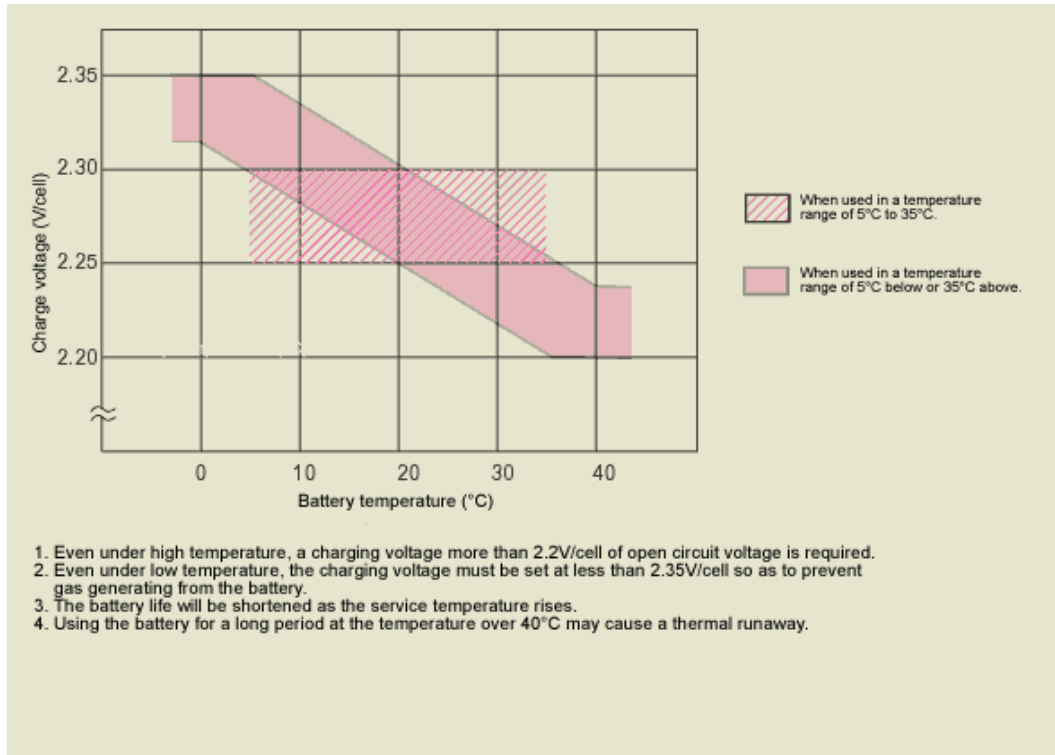


Figure 3: Relation between battery temperature and charging voltage for standby use