1. Scope

Appropriate „InputCurrent()" and „ChargeCurrent()" settings are important for a failure-less operation of the PMM240. This document describes how to set "InputCurrent()" and "ChargeCurrent()".

2. Setting „InputCurrent()"

In PMM240, „ChargeCurrent()" and „InputCurrent()" can be set according to the applications power demand and the capabilities of the power supply. Check [AN] for information on how to set these parameters via SMBus.

The most important parameter is the "InputCurrentLimit()" setting. PMM240 will automatically reduce the charge current down to zero when the sum of application current and charge current is higher than the InputCurrent() setting:

```
I_Charge_max = InputCurrentLimit() – I_Application
```

When the application current becomes higher than the InputCurrent() setting, no charge is possible. Under certain conditions (described in [AN]), the battery supports the increased power demand through the "TurboBoostMode".

PMM240 will **not** limit the application current to the value set in "InputCurrent()".

The recommended maximum ChargeCurrent() shall be set to a value close to the maximum allowed InputCurrent() decreased by the typical application power demand:

```
ChargeCurrentLimit() = InputCurrentLimit() – I_Application_Typical
```

3. Inrush current behavior

Since PMM240 does not limit the application current, it will also not limit any inrush current. In addition, PMM240 will forward the DC input voltage to the application output as soon as a valid DC input voltage is recognized. A valid DC input voltage depends on the requested charge voltage of the battery. The DC input voltage must be at least 0.5V higher than the requested charge voltage of the battery.

When the battery requests a ChargeVoltage() equal to 0V or no battery is attached, any DC input voltage will be forwarded to the application.

4. Chosing an appropriate power supply

An appropriate power supply is able to maintain the minimum DC input voltage measured by the PMM240 even in the highest load condition.

To avoid any sudden switch-off during highest load operation, the DC input voltage shall not become lower than 0.5V of the requested ChargeVoltage() of the battery.

5. Typical failures

5.1 Power supply too weak and wrong InputCurrentLimit()

When the application exceeds the power supply rating and the InputCurrentLimit() is not appropriate, the PMM240 cannot reduce the charge power. As soon as the DC input voltage drops below 0.5V above the requested charge voltage of the battery, the PMM240 will try to switch off the DC input. Although the PMM240 stops charging before switching off, heavy load of the application may lead to a damage of the MOSFETs.

5.2 Excessive inrush current into the application

When the application requires a high inrush current and no battery or an empty battery (shut-off state) is attached, the DC input will be forwarded to the application output of the PMM240. In this case, it can happen that the inrush peak power may destroy the input MOSFET of the PMM240 due to its slow switch-on-capability.

A power supply, which is able to deliver much more power than needed, may be able to maintain the inrush peak power. This can lead to overstress of the input switch and may cause failures.

5.3 Using multiple PMM240 in parallel

Using multiple PMM240 in parallel is possible, when the following precautions are taken into account:

- You can put multiple PMM240 in parallel at the DC output connector. Do not use the battery connector!
- Use ideal diodes to avoid backdriving from one module into another.
- Use one dedicated PMM240 for one battery
- Set the ChargeCurrentLimit() and InputCurrentLimit() accordingly
- Take care of inrush currents. It may happen that the inrush current is not equally distributed among all PMM240's.

6. References

[AN] AN_RRC-PMM240, Application Note RRC-PMM240, RRC power solutions GmbH, March 2016

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