For systems requiring a regulated 28 to 50 volt power bus a Sequential Switching Shunt Switch Regulator (S4R) module can be provided. The S4R module accommodates four independent shunt cells. The design is targeted at any types of solar array technology.

The power regulation is based on sequential shunt switching techniques. One module provides four independent shunt cells, controlled by one common Main Error Amplifier (MEA) control signal.

Each shunt cell has the means to either shunt the section current by a “parallel” switch, to feed the section current to the main bus via two series diodes or to feed the section current to the battery via a series switch and two series diodes.

The regulation method is based on sequential switching, that is:

- N cells are continuous off and provide full section current to the bus.
- # N+1 cell alternates on/off according to MEA control signal.
- Four – (N+1) are continuous on and the section current is either shunted or feed to the battery.

The modules can be cascaded for increased power capability.

One cell failure can lead to the loss of power from one solar array section only.

Each shunt cell is a self contained function deriving its own supply voltage from the main bus. This secures a system always able to recover bus voltage regulation from any unforeseen condition.

References:

- One module onboard each of the four Galileo IOV spacecrafts. The first two spacecrafts were launched in October 2011.
Specifications:

Dimensions (L x W x H) 193 x 150 x 24 [mm]
Mass 472 gram
Bus voltage 28 - 50 volt
S4R cells 4
Maximum solar array section current 5 ampere
Maximum solar array section capacitance 0.5 µF
Battery voltage 0 to 48 volt
Output power capability 600 Watt
Maximum power dissipation @ Pout = 600 W < 24 Watt
Internal consumption < 2 Watt
Current TM inaccuracy < 2 %
Shunt cell switch status TM 2 x 4
Transfer efficiency > 97.8 %
Solar Array Simulator input up to 4 x 5 Ampere