

Economical mosfet-multi-level-converter

Reference No: B77014

CHALLENGE

Power converters are used to convert different types of current, e.g. DC to AC or vice versa (AC / DC, 220-800V). In an electric car, for example, inverters convert direct current from the battery into a 3-phase alternating current for the electric motor or, conversely, during braking, the alternating current into direct current (recuperation). While the traditional IGBT-based converters operate at partial loads with losses of 20% and higher, Modular Multilevel Converters (MMC) also work almost lossless even in the partial load range. In the case of MMC technology, high voltages are realized by intelligent connection of many modules with low voltage. The necessary semiconductor switches (MOSFETs) are widespread and suitable for the mass market. MOSFET-based MMC technology offers many efficiency advantages and new applications compared to conventional converter technology.

INNOVATION

The presented MMC technology works with a much smaller number of switches by connecting a small number of capacitors with different voltages, ideally in the ratio 1: 2: 4: 8 ... to each other. In order to realise e.g. 15 (generally $2^{n+1}-1$) voltage levels in a traditional design 7 (generally 2^n-1) identical modules are required. According to the present invention, only 3 (generally n) modules would be required.

COMMERCIAL OPPORTUNITIES

- Economical MOSFET-based Power Converter
- High Efficiency Electromobility
- Broad Range and Flexibility of Conversion Applications

DEVELOPMENT STATUS

Prototype

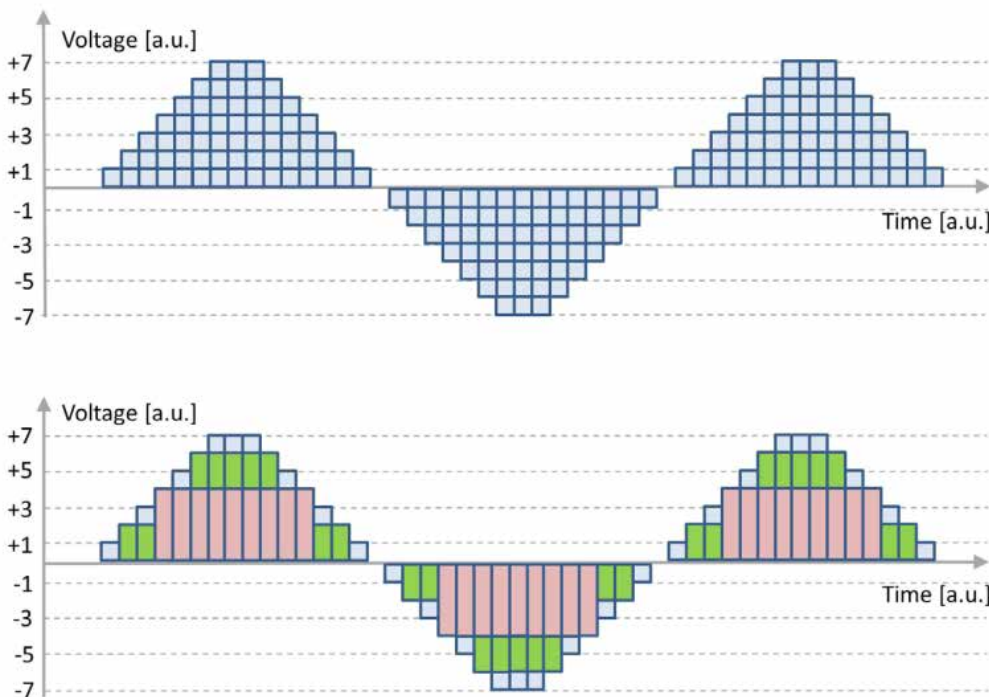


Figure: Alternating current. A conventional MMC requires 7 identical modules for the realization of an alternating current represented by 15 voltage levels (top). Using the new power converter, only 3 modules are required to reproduce the same voltage curve.

REFERENCE:

1 DE 20 2017 102 722 U1



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