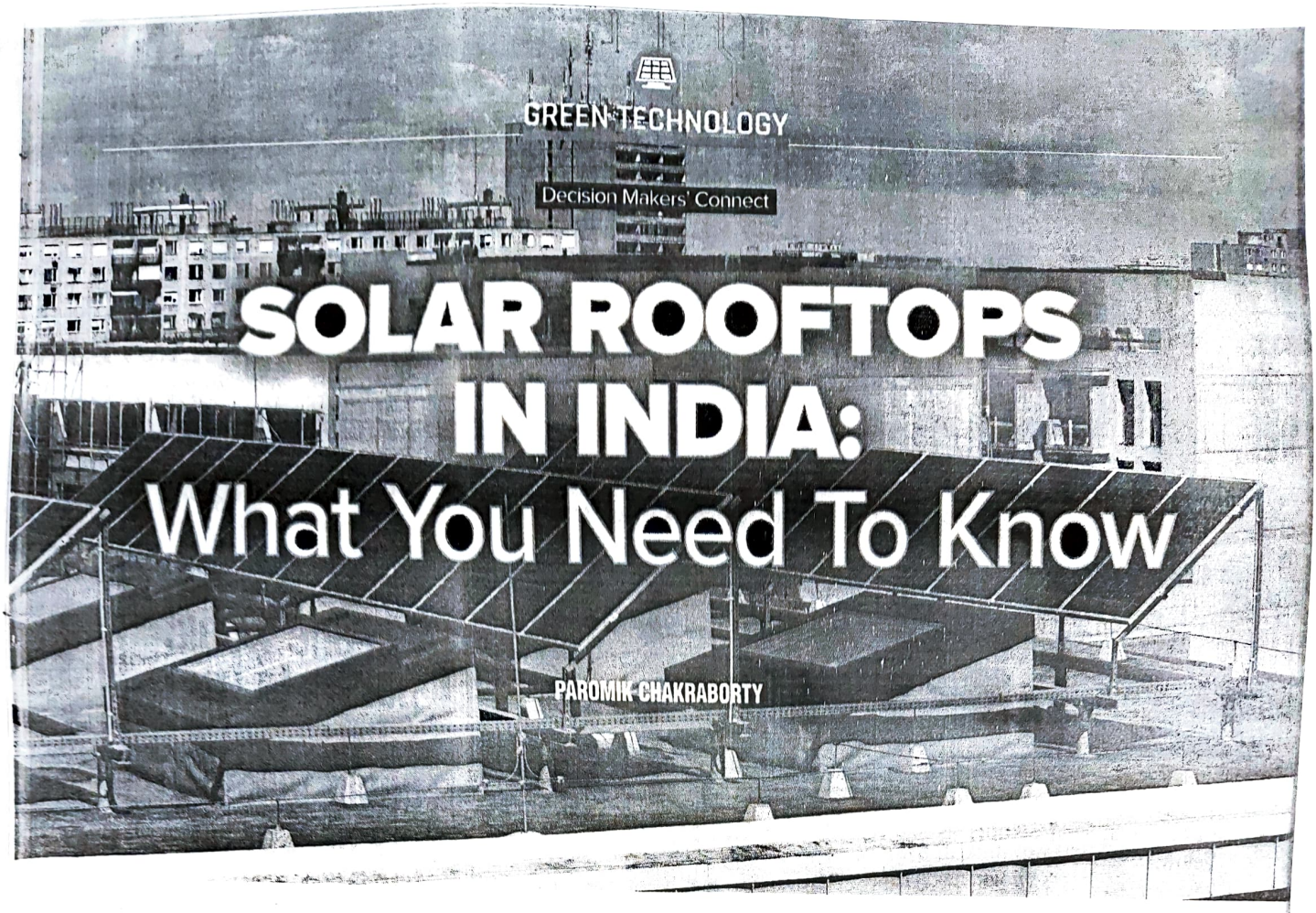

Decision Makers' Connect

SOLAR ROOFTOPS IN INDIA: What You Need To Know

PAROMIK CHAKRABORTY

This article takes a look at the various benefits that solar rooftops provide and some crucial factors that must be considered before investing in these

A few days ago, two men on the streets of New Delhi were talking about installing solar panels in their homes. One of them expressed, "I will install solar panels only when the rest of the city does; once I have a guarantee that it is a good investment." This statement got me thinking about whether solar rooftops make monetary sense or these are still a far-cry.

Solar energy is not just a beneficial source of power anymore. It is seen as the most viable alternative to the constantly-reducing non-renewable fuels. India has been remarkably active in promoting solar usage, and many solar projects are already underway. Through solar parks, industrial installations and deployments in large commercial areas, India has set its wheels in motion towards achieving nearly 200GW solar capacity by 2022. But is the enthusiasm the same down to the grass-root level, that is, among domestic and small- and medium-scale consumers?

The most viable solar solutions for homes and small offices is to install these on the rooftops of buildings. Land is another natural resource that will become scarce in the future. While India's major focus so far has been on ground-mounted solar solutions, the intense requirement of land for solar solutions cannot be met this way.

On the other hand, India has a massive potential for rooftop solar installations. Experts suggest that utilising barely five to ten per cent of India's rooftop capacity can offset the necessity for ground-mounted panels.

Reports from Solar Photovoltaic Installations (SPIN) program by Ministry of New and Renewable Energy (MRNE) suggest that India crossed 1GW solar rooftop installation in July 2018, with Maharashtra, Gujarat and Tamil Nadu as the top three states (in that order) with solar rooftops. However, experts believe that this is not even the tip of the iceberg, as India has a much larger potential.

How solar rooftops work

A solar rooftop system can be set up in two ways: completely off-grid or grid-connected. An off-grid system has no connections with the electricity grid, procuring or pushing back no electricity from or to the utility grid. Energy generated is stored in a battery system. Hence, separate investment has to be made for the battery—both in terms of capex and opex. The system does not require any additional legal permissions and the user's complete electricity needs can be met through renewable energy. However, in low-lit days, there is no other source of power.

Power supply with the same power PIN, the higher switching frequency fSW is,the smaller IPK MOSFET .is; in this way, the low current MOSFET can be used which will save more cost for user. To further verify above view, we test the VDS,IDS stress of two MOSFETs based on two different switching frequency.

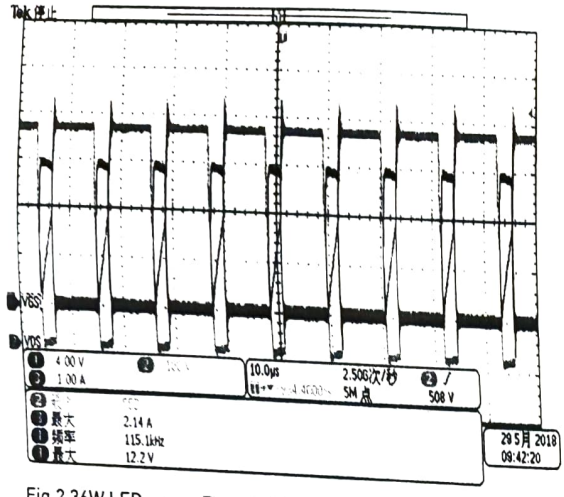

Fig.2 36W LED power Flyback Fsw=115KHz IPK MOSFET=2.14A

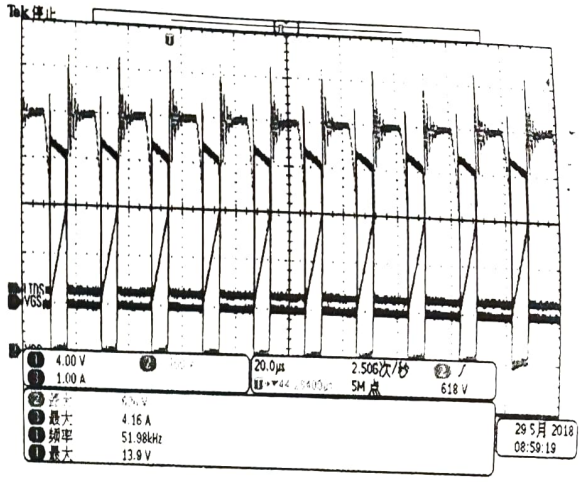

Fig.3 36W LED power Flyback Fsw=51KHz IPK MOSFET=4.16A

b. The high frequency transformer can be smaller size and lower cost

The primary side inductance Lp of transformer with IC controller UC3842 CCM is calculated as below:

$$L_P=\frac{1}{2}\times\frac{(V_{BULK(min)})^2\times\left(\frac{N_{PS}\times V_{OUT}}{V_{BULK(min)}+(N_{PS}\times V_{OUT})}\right)^2}{0.1\times P_{IN}\times f_{SW}} \qquad \text{(formula 6)}$$

From formula 6, fSW is negative proportion to Lp; the lower Lp is, the less transformer winding turns NP is, and the magnetic core size can be smaller and thinner. The ultra smaller size Power Supply become possible to be designed. The point is that the cost of more compact transformer is lower.

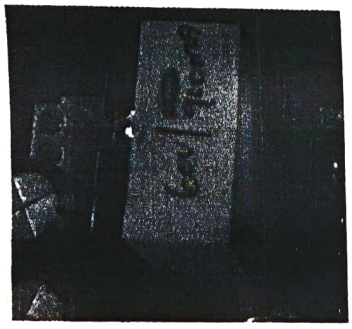

Fig.4 36W LED power Flyback Fsw=115KHz

PQ transformer size: 26.5mm*26mm*19

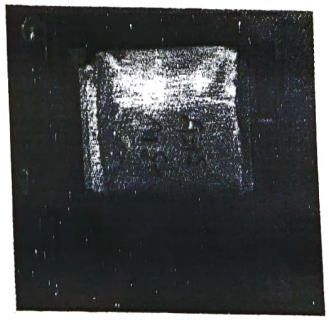

Fig.5 36W LED power Flyback Fsw=51KHz

EE transformer size: 32.5mm*30mm*20mm

Summary

Comparing with VD-MOSFET, SJ-MOSFET has smaller Ciss or Qg, smaller turn-off loss, which is more suitable for high switching frequency. If MOSFET at high frequency power supply primary side, there will be a smaller current stress, lower current specification components can become optional; In the mean time, the transformer in high frequency power supply can be smaller size and lower cost.

This article has been authored by
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