Technical Article

Skip Automotive Camera Module Power Circuit Redesign with Scalable PMICs

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Automotive camera module designers have to balance reducing time to market while creating ever-smaller camera module designs that are scalable and reusable for various types of image serializers and sensors. In this article, I will address several key design challenges for automotive camera module designs, including design simplification and platform scalability.

Simplify design and speed time-to-market with scalable PMICs

Maintaining a common power design platform helps engineers reduce design time, and therefore time to market. Pin-to-pin and programmable power-management integrated circuits (PMICs) with an integrated voltage supervisor can scale from nonfunctional safety applications (such as surround-view cameras) to functional safety applications (such as driver monitoring, e-mirrors and cameras in autonomous driving vehicles) without a power circuit redesign.

There are two types of programmable PMICs – software programmable PMICs and hardware programmable PMICs. Software programmable PMICs support fully scalable power management platforms while eliminating the need to redesign printed circuit boards (PCBs).

Let's illustrate this point with the TPS650330-Q1 software programmable PMIC, which has an integrated tool set to support design reuse and simplify design. The TPS650330-Q1 also enables platform scalability through electrically erasable programmable read-only memory programming for output-voltage and power-sequencing settings, as well as adequate electrical current headroom to support image sensors of various resolutions. Because there's no need for a power circuit redesign, engineers can reuse power designs from image sensor to image sensor.

The TPS650330-Q1 integrates a voltage supervisor and also supports pin-to-pin platform scalability from nonfunctional safety applications to functional safety applications without a power circuit redesign.

The same power board can support many types of image sensor boards with an approach that uses two stacked PCBs, found in some automotive camera modules. For example, engineers can upgrade the same power board to functional safety capable TPS650330-Q1 derivatives when the application must comply with the International Organization for Standardization's (ISO) 26262 functional safety standard by simply dropping in TPS650330-Q1 functional safety devices. For single PCB designs, engineers can also reuse the same power design by copying and pasting the same power design into multiple platforms.

Conclusion

In addition to solution size, thermal performance, electromagnetic compatibility concerns and power-supply rejection ratio performance, platform scalability is a critical factor to consider in automotive camera module power designs. Selecting a PMIC that allows platform scalability/reusability can reduce time to market and save development costs between platforms.

Additional resources

- Watch the "Design Challenges in Automotive Camera Modules" video.
- Review our available reference designs for the TPS650330-Q1.
- Review the image sensor selection options for the TPS650330-Q1 on the E2E power management forum.

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