

Automotive I.MX6 Quad Core Processor Power Solution



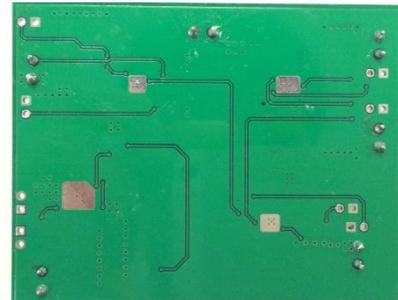
System Description

This design is a low-cost discrete power solution to power I.MX6 quad core. All the DCDC regulators are running at 2MHz to avoid the AM band interference and provide small solution size. The first stage DCDC converter can support wide Vin range from 6V to 42V, which can support start-stop system as well as load dump. The second stage DCDC provides all the necessary power rails to power up I.MX6 quad core. I.MX6 is very loose on the power sequencing of the different rails so no sequencer is necessary for this design. It uses a 4 layer board with 2oz copper to have better thermal characteristic at 2MHz switching frequency and 85C ambient.

even the highly atypical condition which is dual 1080p video playback plus one 3D graphics

- All the power rails powering I.MX6 ripple are below 5%

Board Photo



Featured Applications

- Infotainment Head Unit Systems
- Instrumental Cluster

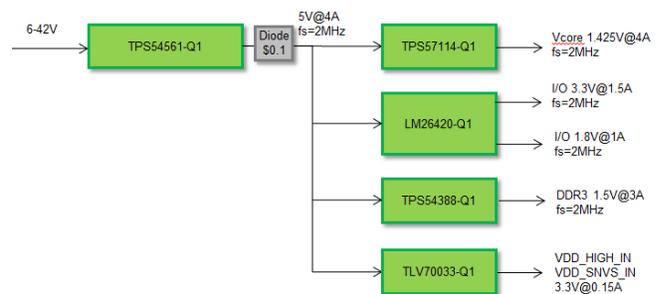
Design Resources

- Block Diagram and Schematic
- Test Data
- Gerber Files
- Design Files
- Bill of Materials and Design Considerations
- Wiki Page

Design Features

- Wide input voltage range: off battery 6V to 42V power supply to support start-stop system and load dump
- The DCDC regulator all run at 2MHz to avoid AM band interference and very small form factor
- No sequencer is needed since I.MX6 is very loose on the power rails sequencing
- First stage wide Vin async DCDC converter, TPS54561-Q1, can run at 4A, 5V out at 2MHz to allow users to avoid using controller to save cost, area and avoid voltage shoot through
- I.MX6 vcore voltage can run at 4A, it can provide the current at least 30% higher than

Block Diagram



Jump start system design and speed time to market

Comprehensive designs include schematics or block diagrams, BOMs, design files and test reports by experts with deep system and product knowledge. Designs span TI's portfolio of analog, embedded processor and connectivity products and supports a board range of applications including industrial, automotive, medical, consumer, and more. To explore the designs, go to <http://www.ti.com/tidesigns>

TI Designs: PMP4442

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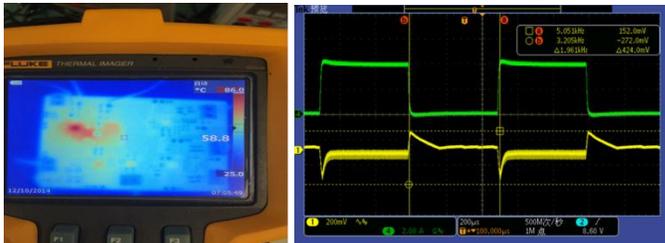


Associated Part Numbers

Part Number	Part Description	EVM
TPS54561-Q1	Automotive 4.5V-60V Input 5A Step Down Converter with Soft-Start	EVM
TPS57114-Q1	Automotive 2.95V-6V Input 4A, 2MHz Synchronous Step Down Converter	EVM
LM26420-Q1	Dual 2.0A High Frequency Synchronous Step Down Regulator	EVM
TPS54388-Q1	Automotive 2.95V-6V Input 3A, 2MHz Synchronous Step Down Converter	EVM
TLV70033-Q1	Automotive 200mA, Low Iq, Low Dropout Regulator	EVM

Design Considerations and Test Data:

- TPS54561-Q1 is a wide Vin 5A async step down regulator, which can run at >2MHz to avoid the AM band interference and to minimize solution size. It can save board area without letting users to use controller to save cost, area and avoid voltage shoot through. It can sync to external clock source to avoid beat frequency. It also has a power good signal to indicate the output voltage has settled within 93% to 106% intended voltage. In addition, it has a slow start pin to adjust the output voltage rise time to control the in-rush current.
- TPS57114-Q1 is a low voltage 4A, fully sync step down regulator, which can run at 2MHz to avoid the AM band interference and to minimize foot print. It can sync to external clock source to avoid beat frequency. It also has a power good signal to indicate the output voltage has settled within 93% to 107% intended voltage. In addition, it has a slow start pin to adjust the output voltage rise time to control the in-rush current.
- LM26420-Q1 is a dual low voltage 2A, fully sync step down regulator which can run at >2MHz to avoid the AM band interference and to minimize solution size. It utilizes current-mode control and internal compensation to provide high-performance regulation over a wide range of operating conditions. In addition, it has included internal soft-start circuitry to reduce inrush current, power good indicators, precision enables, and output overvoltage protection.
- TPS54388-Q1 is a low voltage 3A, fully sync step down regulator, which can run at 2MHz to avoid the AM band interference and to minimize foot print. It can sync to external clock source to avoid beat frequency. It also has a power good signal to indicate the output voltage has settled within 93% to 107% intended voltage. In addition, it has a slow start pin to adjust the output voltage rise time to control the in-rush current.
- The reference design uses a 4 layer board with 2oz copper to pass thermal characteristic with TPS54561-Q1 running at 5V, 4A, 2MHz switching frequency and 85C ambient.
- Below is a graph to show the heat diagram at TPS54561-Q1 running at 5V, 4A, 2MHz switching frequency and TPS57114-Q1 transient testing results at Vout=1.425V with load from 0A-4A



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