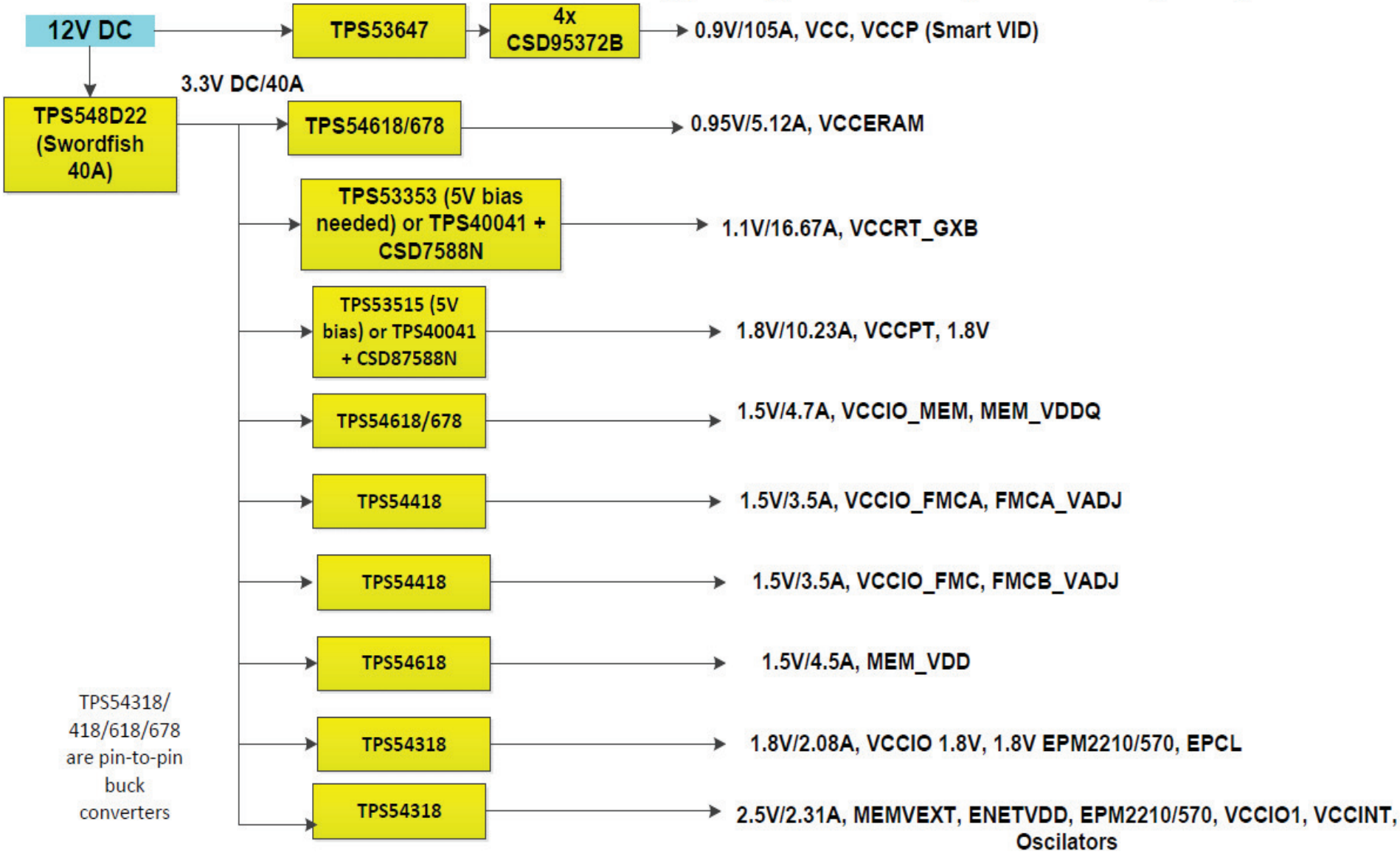
Altera Arria 10
Power Delivery

Altera Arria 10 switching regulator power proposal



Altera Arria 10 SmartVID (for AVS) w/PMBus

1. To implement Smart VID with PMBus customers have to enable with Quartus Prime software version 15.1 (contact Altera)
2. Only VCC and VCCP rails can use Smart VID – option to combine VCC/VCCP with VCCERAM but then Smart VID is not possible
3. PMBus AVS (Adaptive Voltage Scaling) between 0.9V nominal and 0.83V. 400KHz PMBus speed
4. The regulator must support the ***PMBus VOUT_MODE(0x20, R) command.*** The PMBus Master uses the VOUT_MODE command to interrogate the regulator to discover the data format for the VOUT_COMMAND values. The PMBus Master can be the FPGA or a system power manager.
5. The regulator must support the PMBus VOUT_COMMAND (0x21, R/W) command. The PMBus Master uses the VOUT_COMMAND instruction in the data format retrieved from VOUT_MODE to write VID values tothe regulator. The PMBus Master can be the FPGA or a system power manager.
6. The VID voltage will change by no more than ***10 mV per step.***
7. The regulator must accept a VID update rate of 10 ms, and the voltage must reach within the +/-30 mV tolerance envelope within 10 ms of the last STOP symbol for transmitting VOUT_COMMAND.
8. Voltage change for 10 mv should be between 20 µs and 45 µs for each step.
9. The regulator(s) must meet the static and ripple and dynamic power tolerances listed in the *Arria 10GX, GT, and SX Device Family Pin Connection Guidelines* https://www.altera.com/content/dam/altera-www/global/en_US/pdfs/literature/dp/arria-10/pcg-01017.pdf during all phases of power delivery after the boot voltage is reached.
10. Line Regulation <0.4%
11. Load Regulation <1.2%
12. +/-5% in the auxiliary rails (non-Vcore)

Altera Arria 10 Technical Documents

1. https://www.altera.com/content/dam/altera-www/global/en_US/pdfs/literature/ug/ug_smartvid.pdf - Smart VID Controller IP User Guide

2. https://www.altera.com/content/dam/altera-www/global/en_US/pdfs/literature/an/an711.pdf - Power Reduction Features in Arria 10 Devices

3. *https://www.altera.com/content/dam/altera-www/global/en_US/pdfs/literature/dp/arria-10/pcg-01017.pdf - Arria 10 GX, GT, SX Device Family Pin Connection Guidelines (includes VCC/VCCP – core – supply tolerance, as well as tolerance of all the rails)*

TPS53647

TIDesigns

4.5V-17V, 4-phase, DCAP+ Driverless PWM Buck Controller with PMBus Monitoring of Input/Output Voltage, Current, Temperature, and Power

Features

•4.5V to 17V Input Voltage, 0.5V to 2.5V Output Voltage with 5mV step programming

•DCAP+ Control Mode

•Driverless configuration; supports in excess of 240A IOUT

•PMBus 1.1 telemetry on voltage, current, temperature, and power

•Differential mode Vsense; ±0.7% Accurate Vref from 0C to 85C,

•Configurable with Non-Volatile Memory (NVM) or Pin-Strapping

•40-pin, 6x6mm QFN package with Powerpad

•AutoBalance™ Phase-to-Phase Current Sharing

Benefits

- Works with 5V and 12V bus, Addresses DSP and ASIC core rails
- Ultra-fast load transient response and accurate load regulation with minimal external components
- Optimized with TI Smart Power Stages in PowerStack™ QFN for High Efficiency and Power Density; scalable output power
- Increased reliability
- Tight voltage regulation; spec includes error amp offset; more headroom to meet tight overall tolerance specs
- Customizable solution with easy board bring up
- Small footprint for 4-phase controller
- No need to over-design each phase inductor, lower BOM cost

Applications

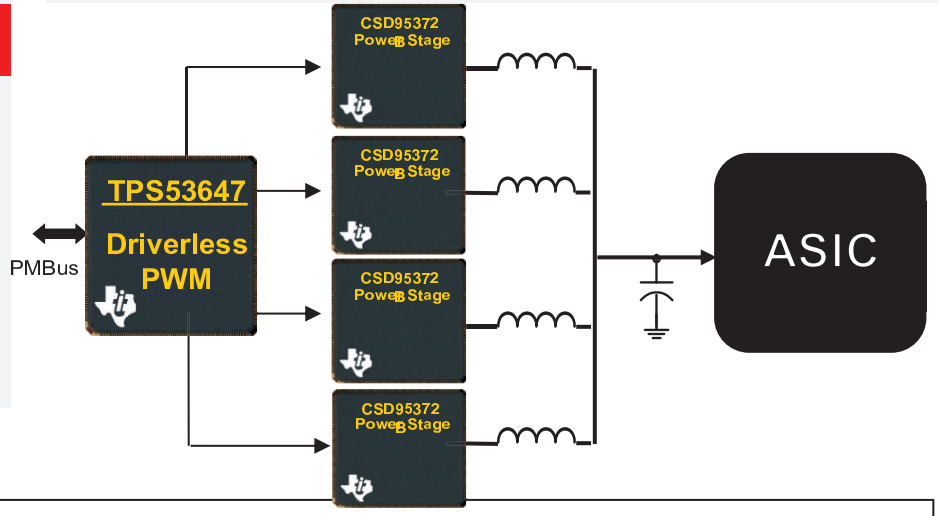
- Enterprise Server/Storage Systems
- Ethernet Switches, Base Stations, and Routers
- Video Surveillance
- Industrial and Embedded computers
- Software Defined Radios
- Factory Automation
- High-End Programmable Logic Controllers
- Voltage Regulator Modules (VRMs)

TPS53647 TI Designs:

PMP11184 = 1V/120A, 30A, 30A

PMP11312 = 1V/120A

PMP10962 = 1V/90A



Texas Instruments