Design Guide: TIDA-011055

100/1000Base-T1 TSN Connected Humanoid Motor Control Reference Design

Description

This reference design features a 100/1000Base-T1 Single Pair Ethernet (SPE) with Time Sensitive Network (TSN)-connected motor drive powered by the TI Sitara™ AM261x MCU, utilizing the DP83TC815 or DP83TG721 PHYs to enable low-mass routing directly through hollow humanoid robot joints. Integrated onto a compact 70mm diameter PCB, this platform combines three high-power-density DRV7167 half-bridges GaN motor driver power stages, a 500MHz dual-core AM2612 MCU control stage, and AMC0106 isolated delta-sigma modulators to drive a robot joint (48V, 1KW motor) with precision real-time performance.

Resources

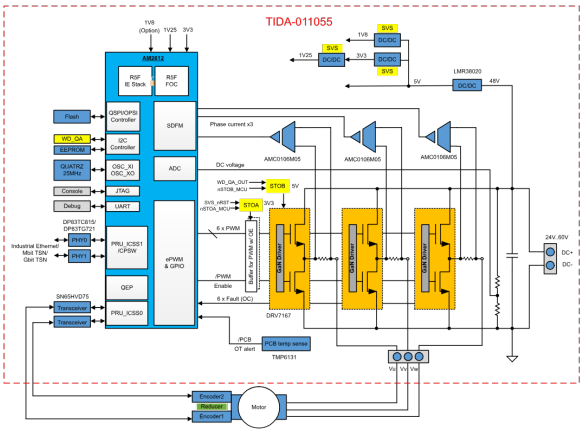
TIDA-011055	Design Folder
AM2612, DRV7167, AMC0106	Product Folder
DP83TC815, DP83TG721R	Product Folder
AM261x Motor Control SDK	Tool Folder
AM261x IND-COMMS SDK	Tool Folder

Features

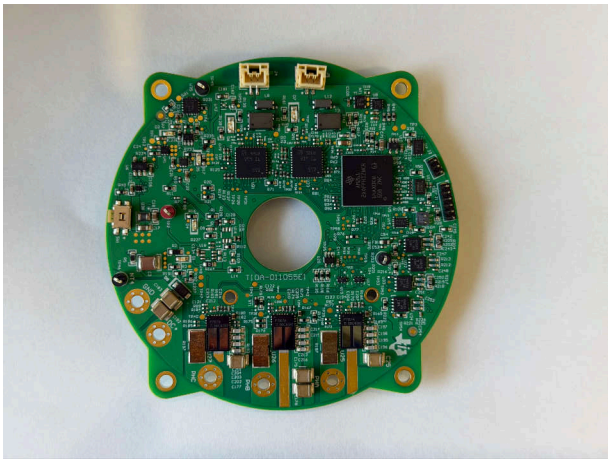
- By replacing bulky wiring with a single flexible twisted pair, SPE slashes cable mass and volume for seamless routing through hollow, high-mobility robot joints. Compact design with highly integrated ICs facilitating a 70mm diameter PCB
- High-bandwidth with Gbit TSN and precise time synchronization with hardware time stamping for real-time motor control
- Small form factor DRV7167 half-bridge GaN motor driver power stage
- Precision phase current sense using 1mΩ shunt and the AMC0106M05 functional isolated modulator

Applications

- Humanoid robot joint motor control
- Collaborative robot servo drive
- Mobile robot motor control
- Robot communication module
- Servo drive power stage module



Block Diagram



Top of Board

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