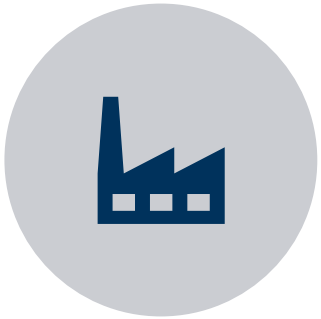
Configurable Industrial Control Solutions, featuring power efficiency and diagnostics, enables future looking platform designs

Michael Collins

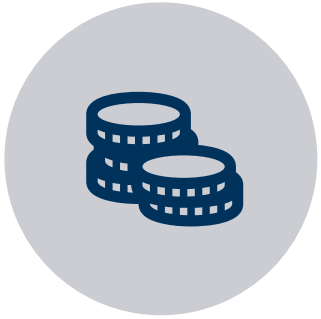
Oct 2025

Industrial Control Macro Trends



Higher Factory Uptime

Low power



Reduction in Bill of Materials

Reuse of Platform

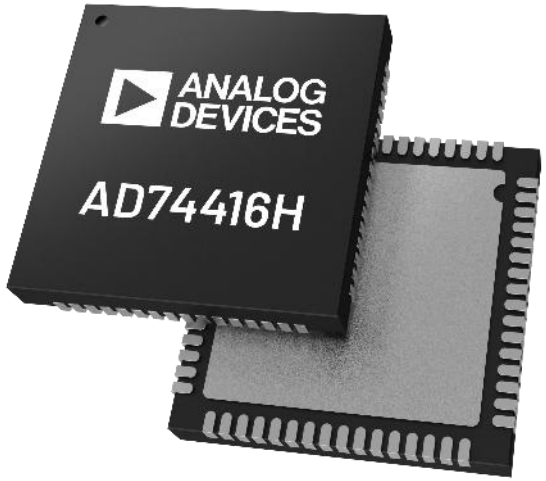
Configurable Solutions

SOFTWARE CONFIGURABLE OUTPUT

- Configurable Analog Output
  - 0 mA to 25 mA current range
  - ±12 V voltage range
- Advanced diagnostic features
- Integrated Power Efficiency

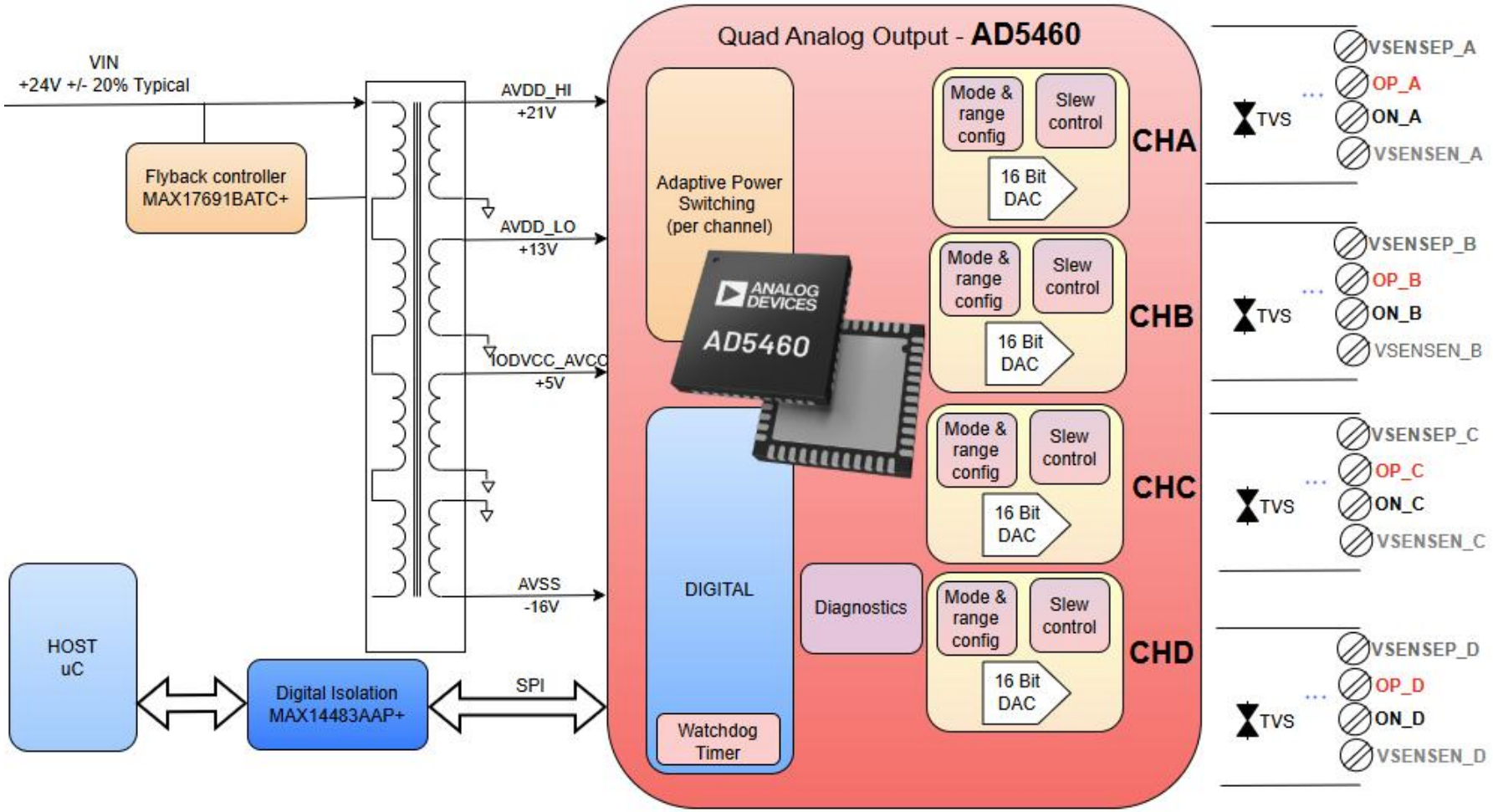
SOFTWARE CONFIGURABLE INPUT/OUTPUT

- Multiple Configurations
  - Input or output
  - Analog or digital
  - Current or voltage



AD5460

AD5460: Subsystem Diagram

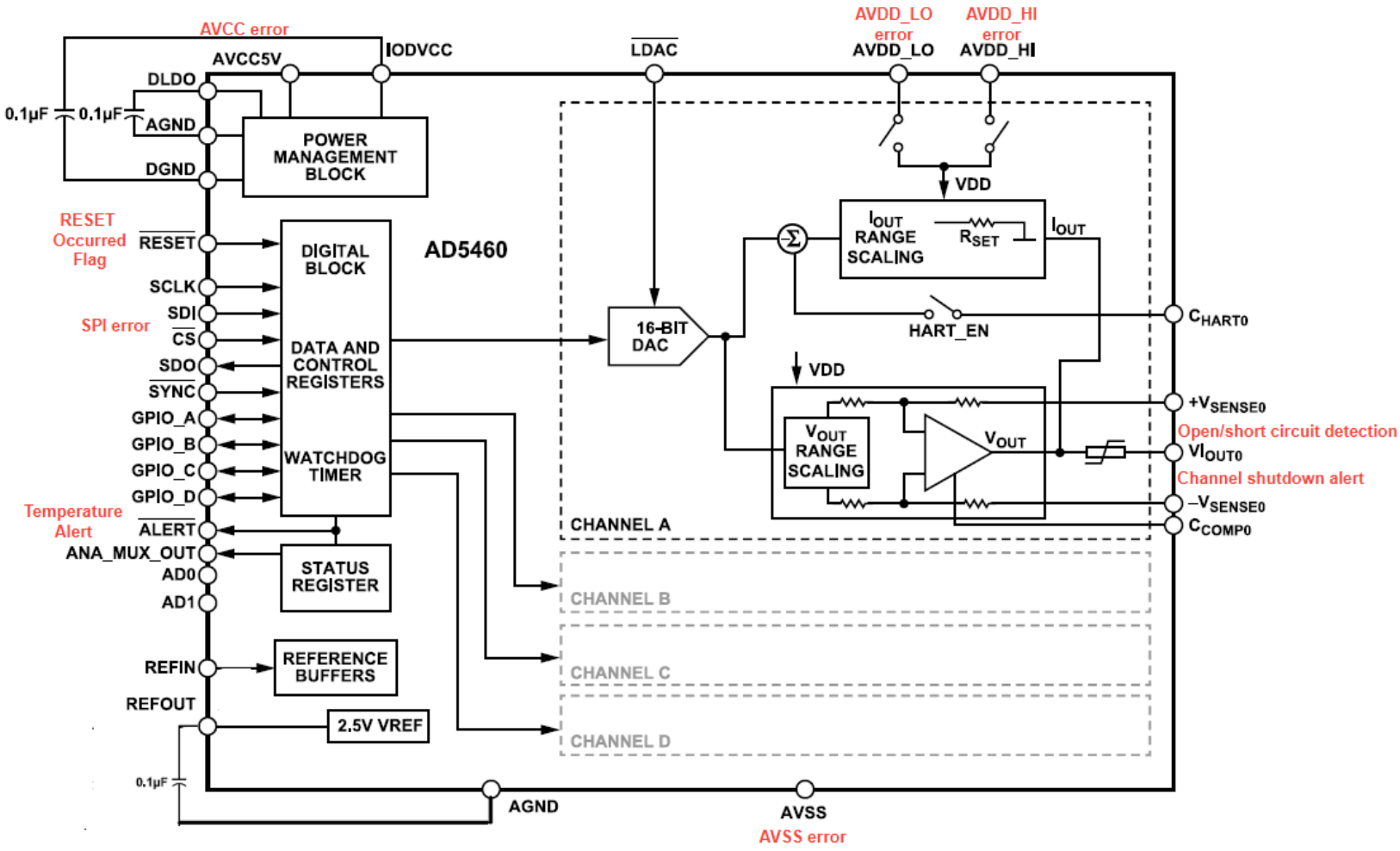


AD5460: Extensive Diagnostics Coverage

Alerts and Status Indicators

Internal signal voltage chosen by the user is monitored, scaled, and given to a single multiplexed output pin.

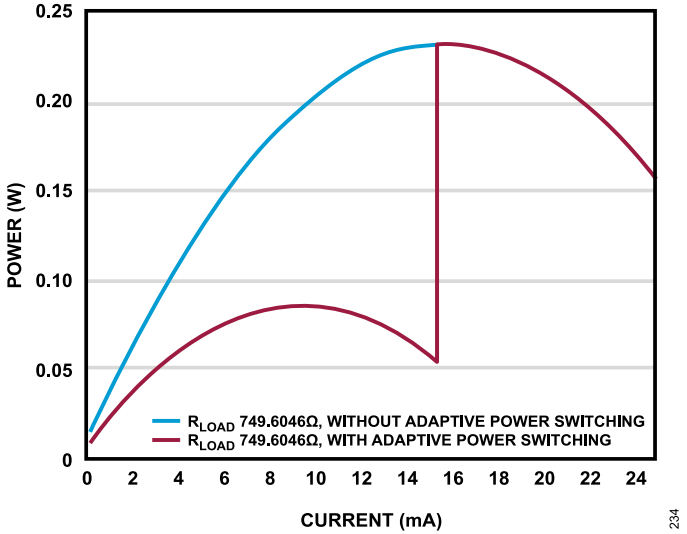
Alerts and Status are indicated in registers and ALERT pin.



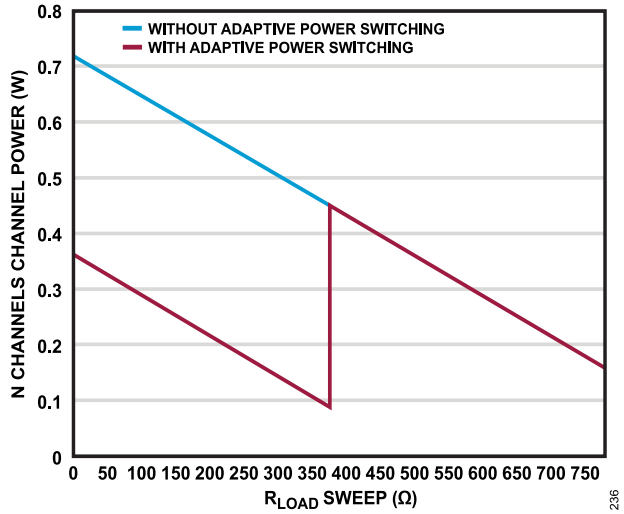
AD5460: Adaptive Power Switching (APS)

When the AD5460 is configured in current output mode, the sourcing current level determines which supply rail is providing power to the load. The relevant supply rail (AVDD_HI or AVDD_LO) is automatically switched to the connected load based on power saving optimization.

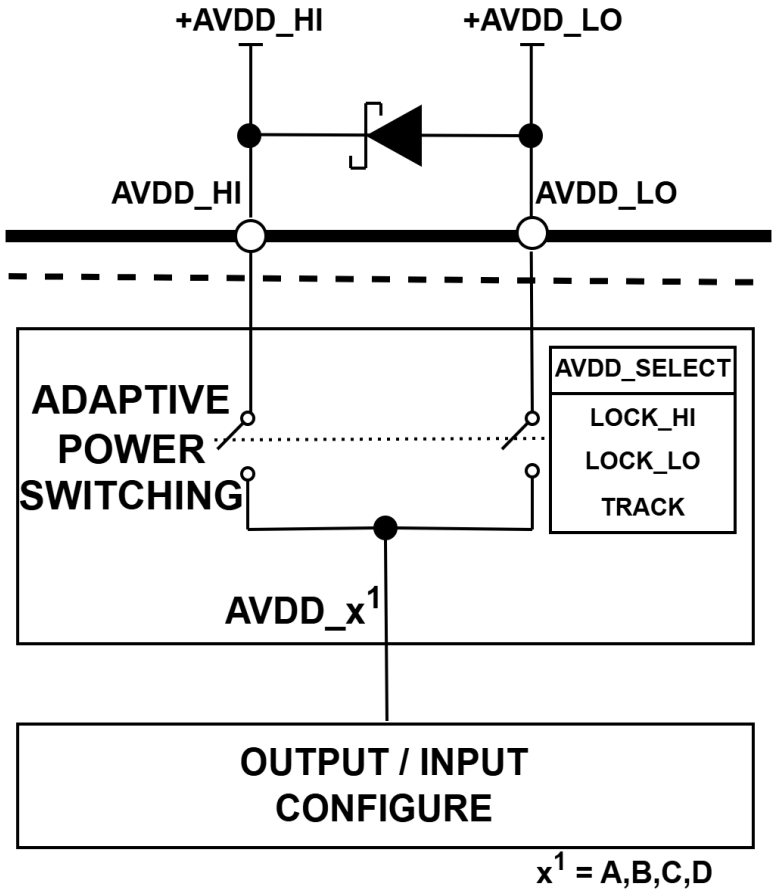
- There is smooth transition during supply switch over.
- Power dissipation is reduced by 40% in current output mode.



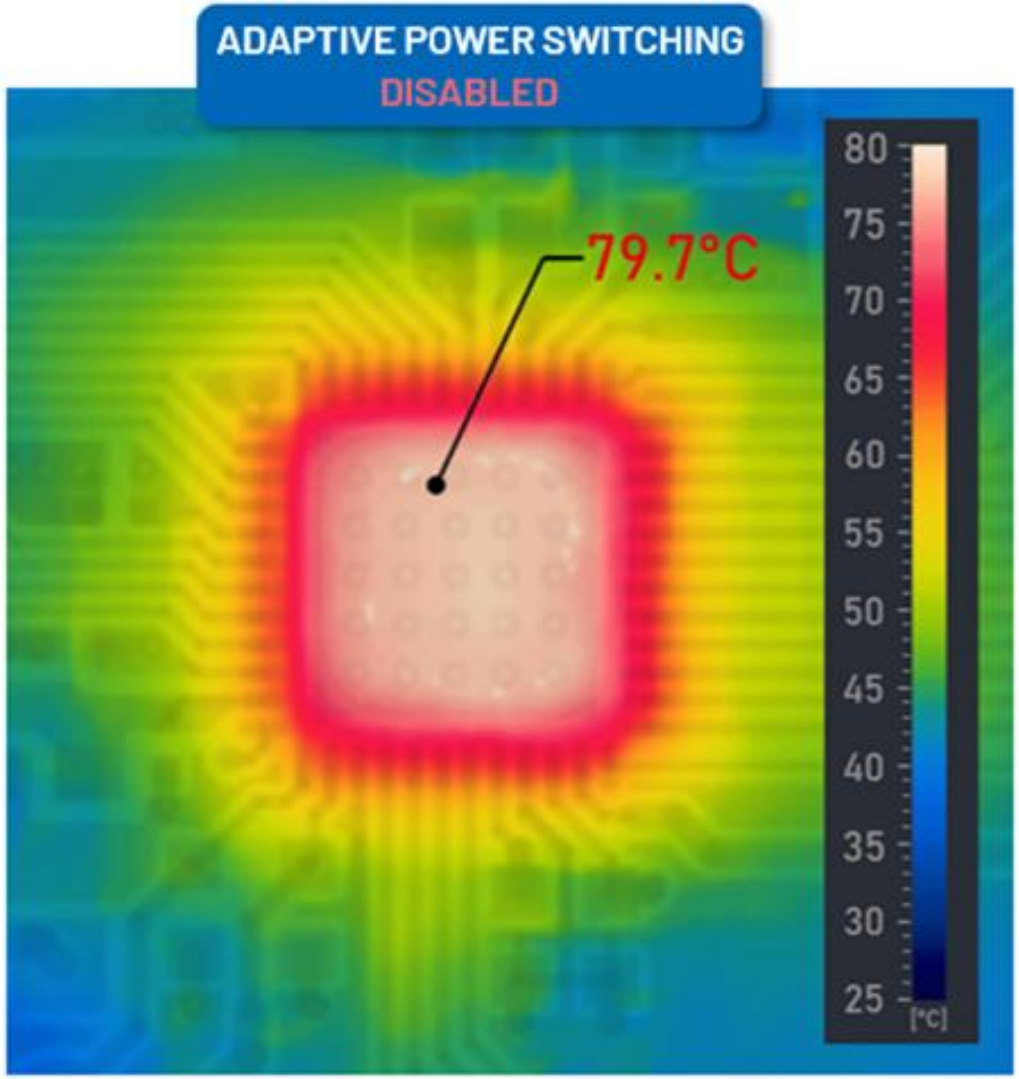
Power Dissipation with RLOAD = 750 Ω, Current Swept from 0 mA to 25 mA

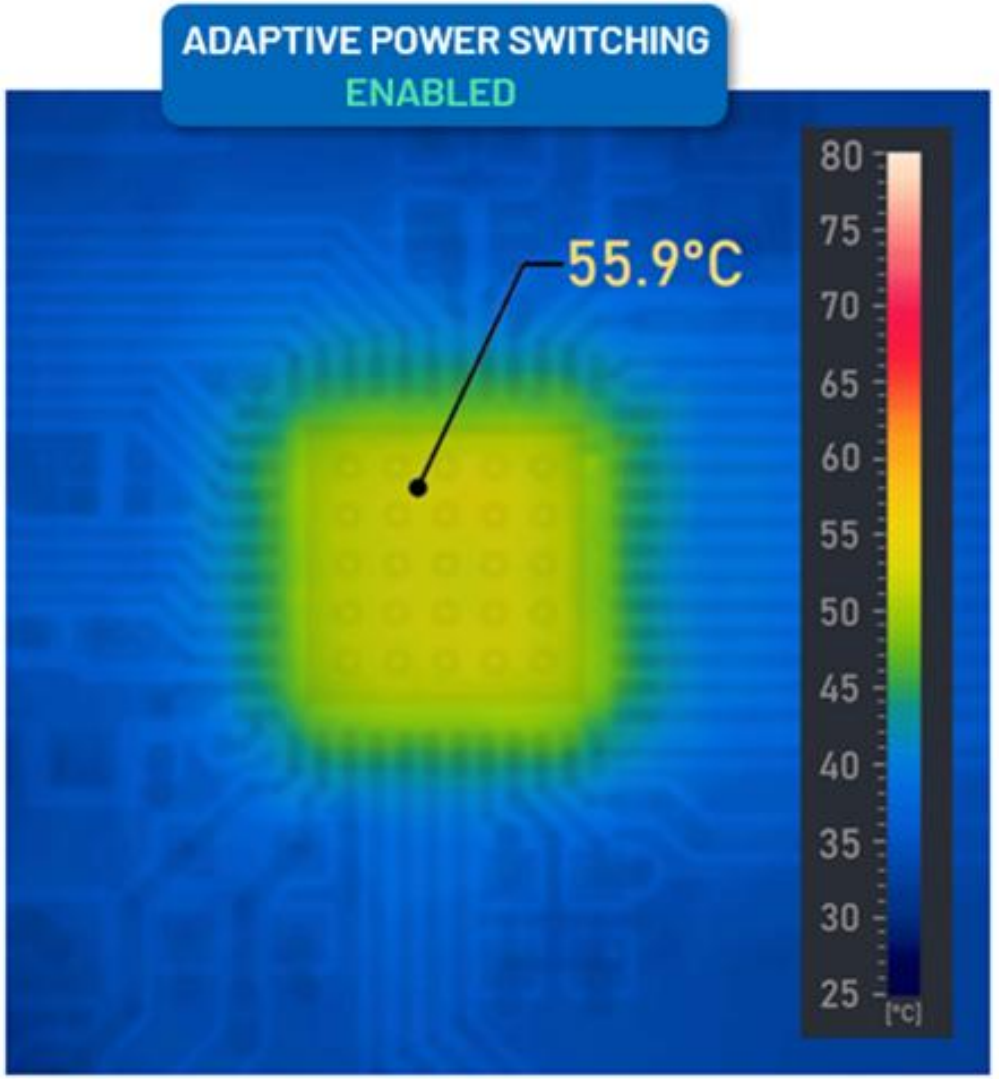


Power Dissipation with IOUT = 25 mA, RLOAD Swept from 0 Ω to 750 Ω



AD5460: Thermal Measurements





AD74416H

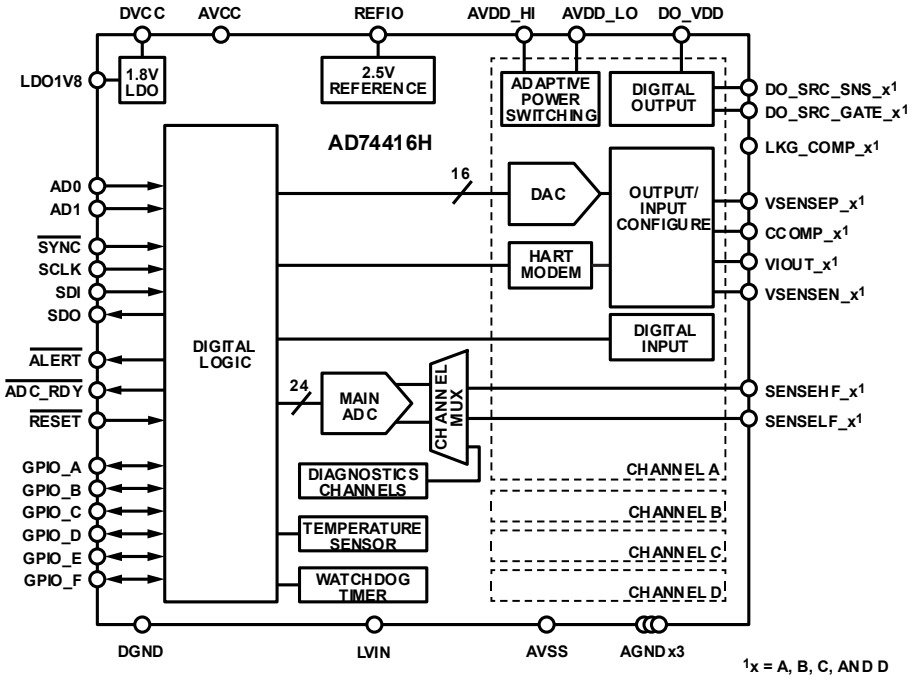
AD74416H: Quad-Channel, Software Configurable Input and Output with HART Modem

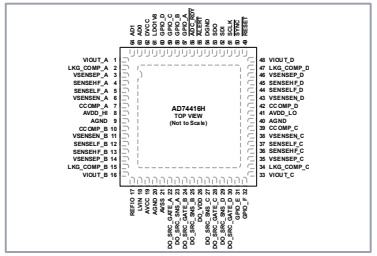
Value Proposition

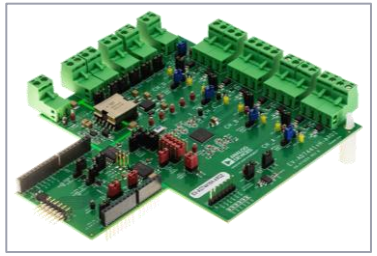
- Multiple configurable modes to a single pin (AO, AI, RTD, DO, DI).
- Integrated HART® modem per channel.
- Adaptive power switching feature reducing power dissipation by 40%.

Key Benefits

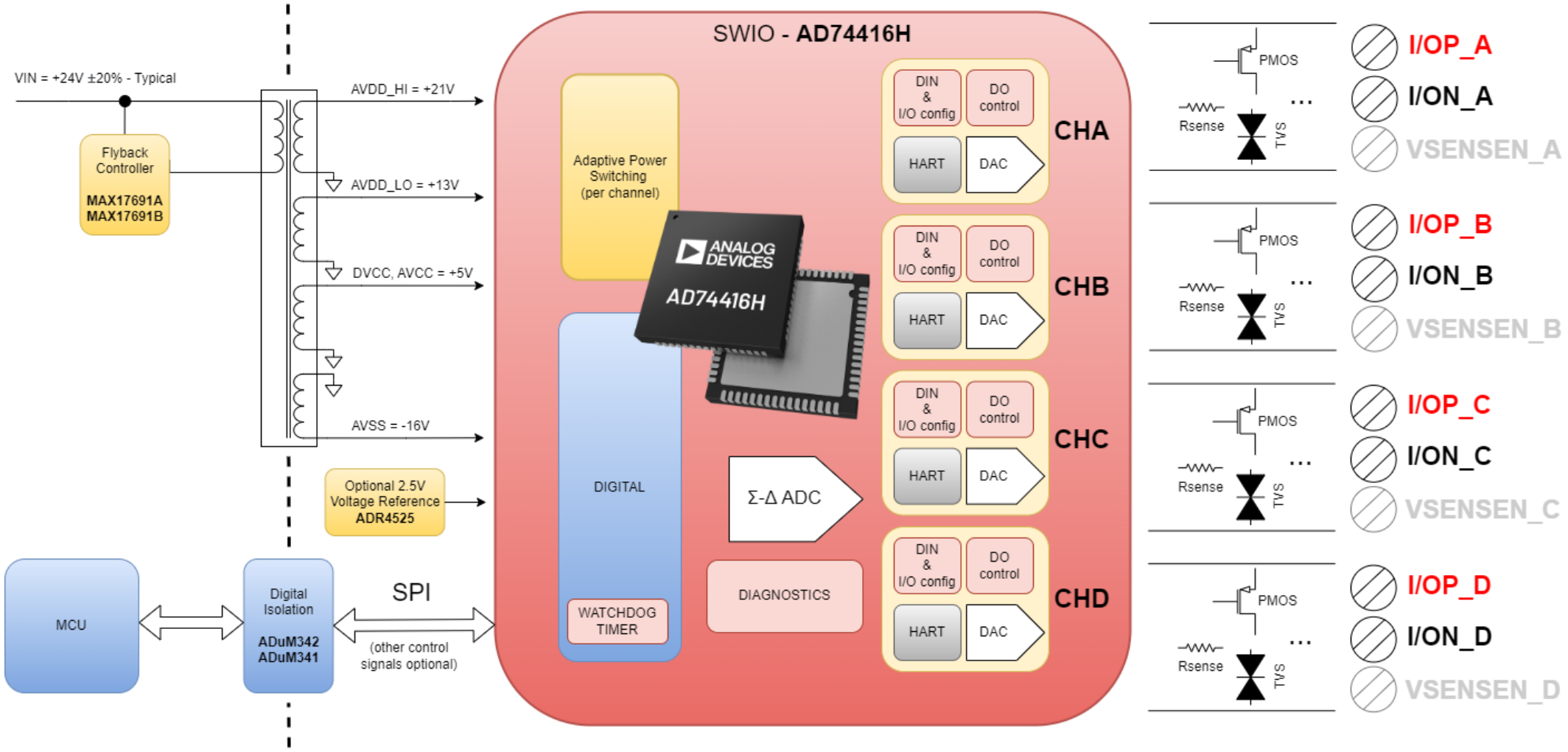
- Seamless configuration enabling scalability of modules, any function to any pin, any time.
- Integrated HART—reduces cost and board space, simplifies communication, streamlined architecture.
- Diminishes the need for derating in high channel density solution. This means power reduction, lower costs, improved thermal management, enhanced reliability.







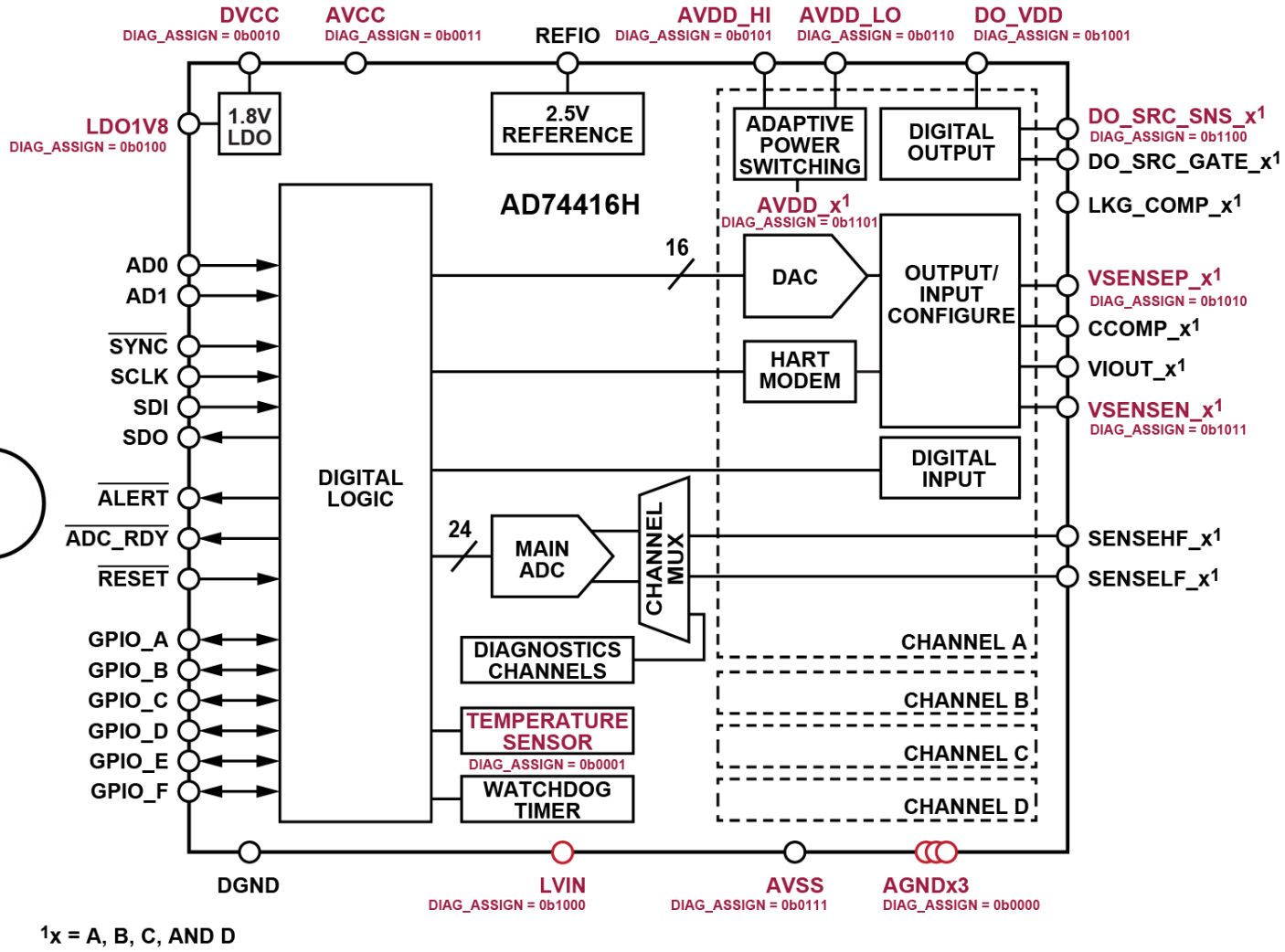
AD74416H: Subsystem Diagram



AD74416H: Extensive Diagnostics Coverage

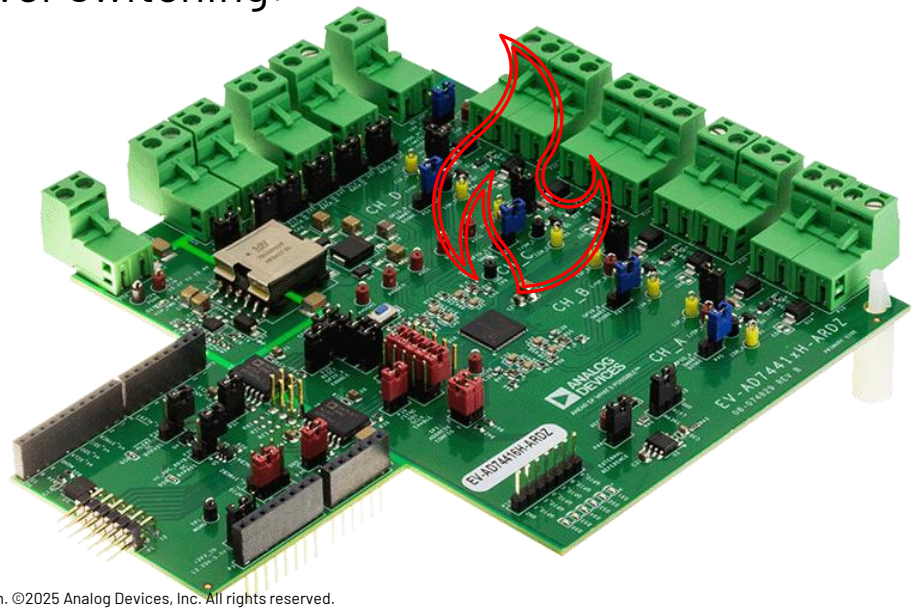
Features and Specifications

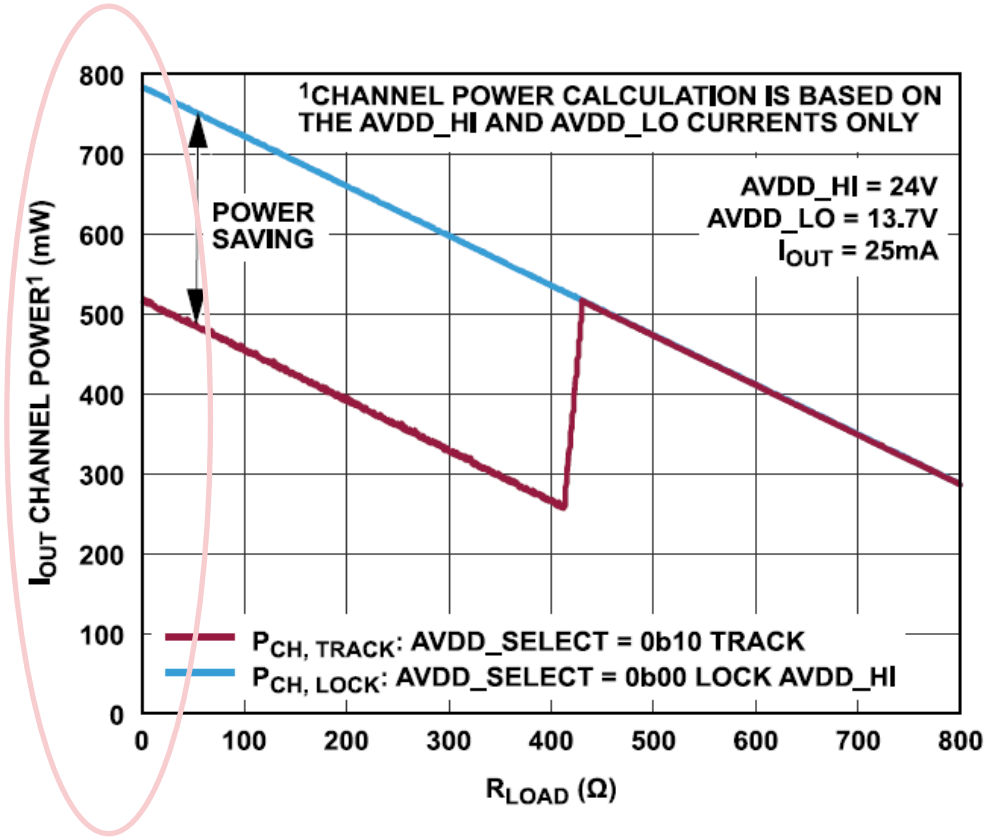
- Extensive diagnostics coverage includes
  - Voltage monitoring of internal and external nodes
  - Open-circuit and short-circuit detection
  - Auxiliary channel measurements suitable for redundant applications
  - Power supply measurements and monitors



AD74416H: Thermal Camera Measurement Setup

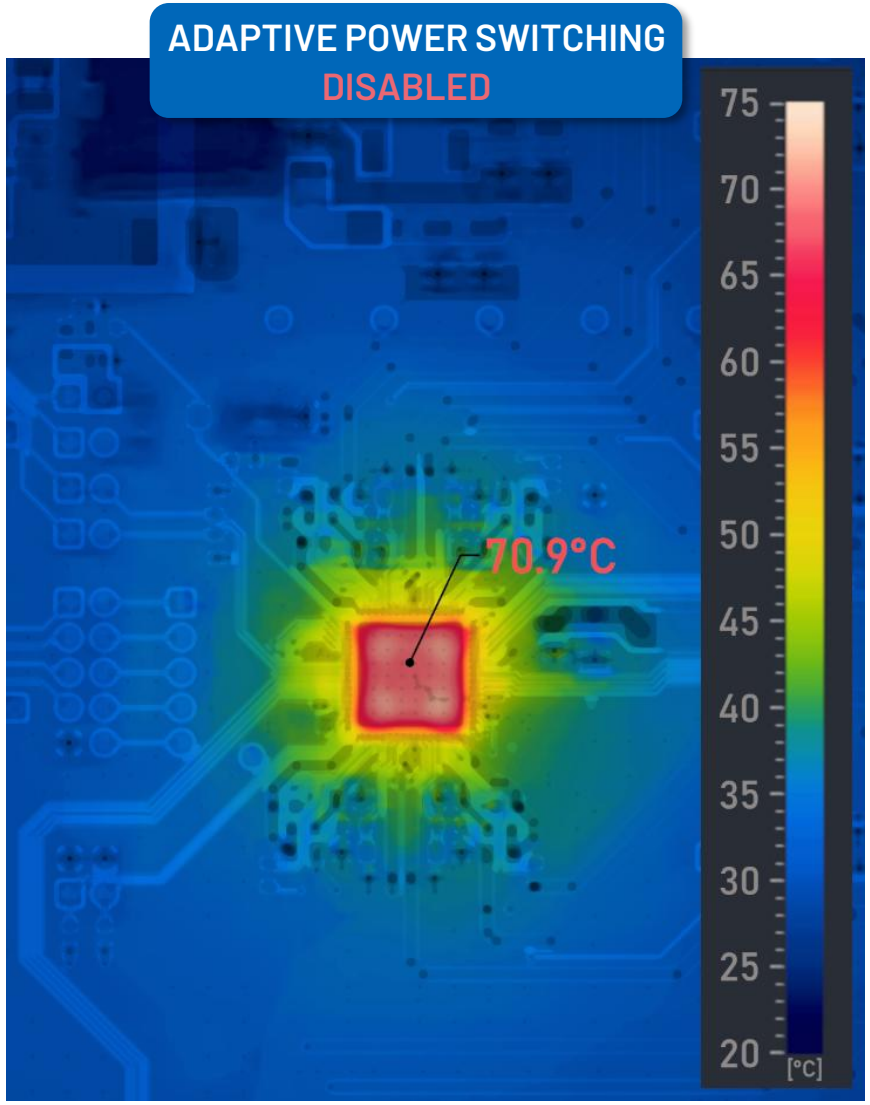
- Evaluation Board: EV-AD74416H-ARDZ—open air 22°C
  - Ext. Power: AVDD_HI = 24 V, AVDD_LO = 13.7 V
- Enabled internal temperature sensor
- All channels: 4 × current output 25 mA (0 mA for init.)
- Short-circuit condition at each screw terminal
- Settling time 10 minutes in each APS mode
- Adaptive power switching:
  1. Enabled
  2. Disabled

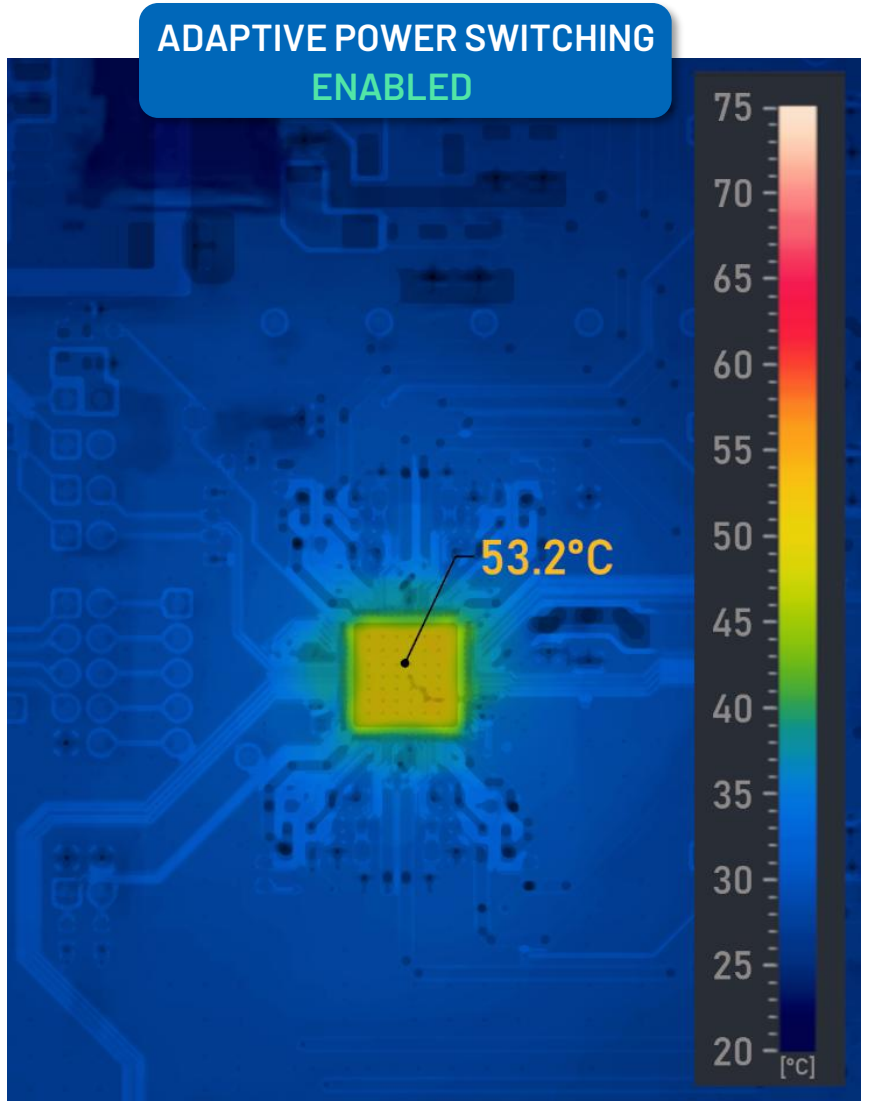




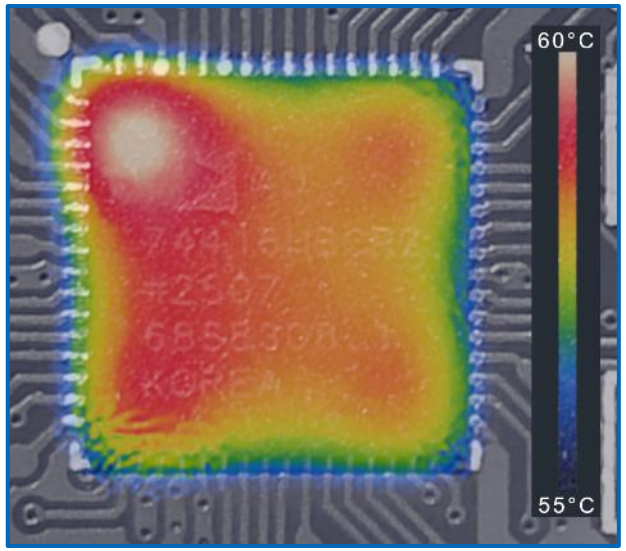
Advantage of Adaptive Power Switching in AD74416H Power Dissipation

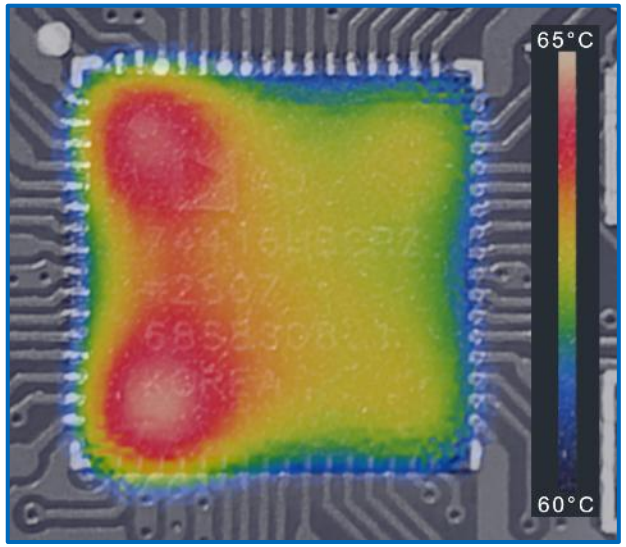
AD74416H: Thermal Camera Measurements



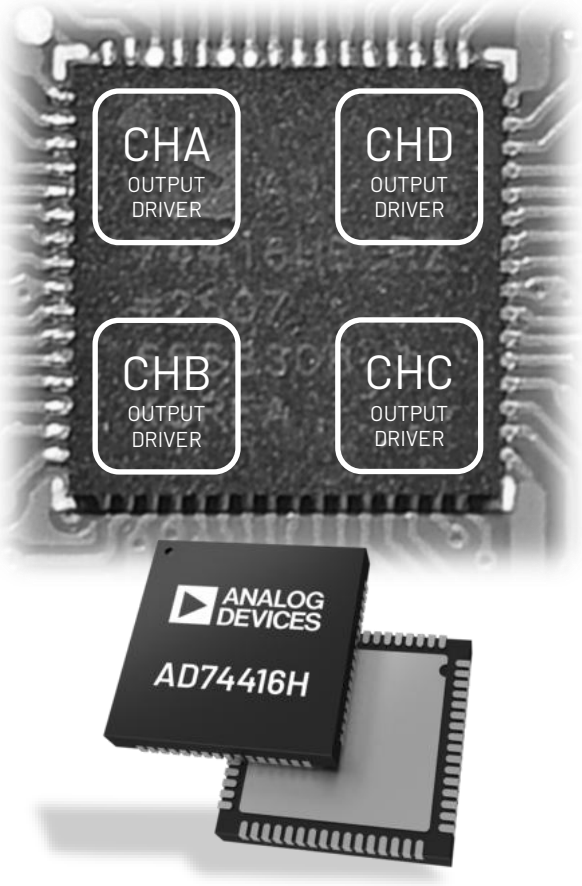


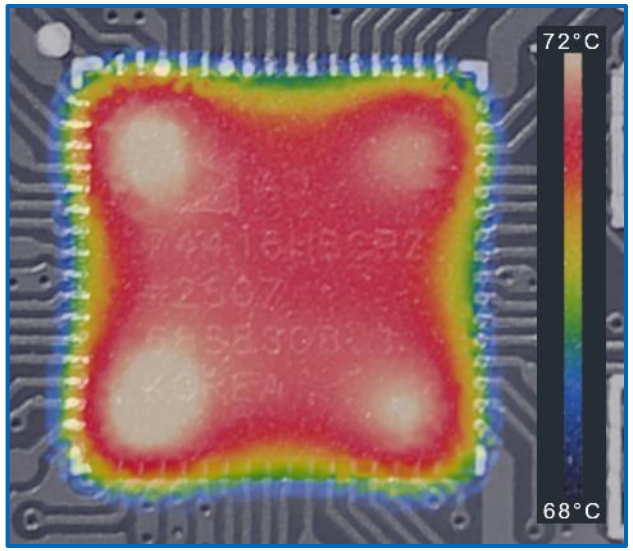
AD74416H: Chip Thermal Gradient

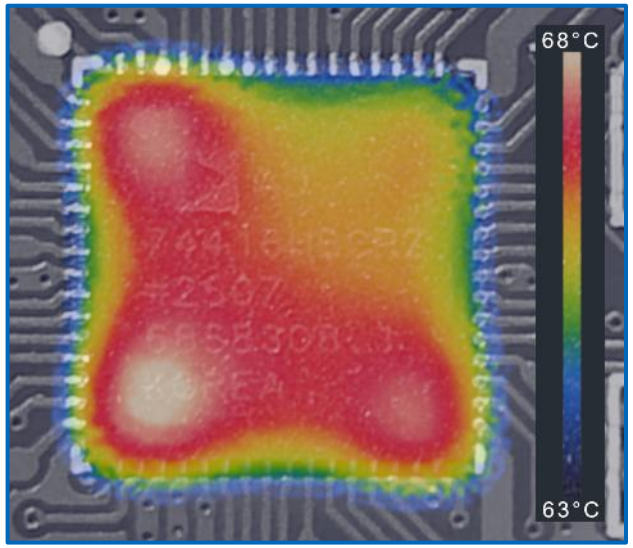




Adaptive Power Switching at AD74416H channels

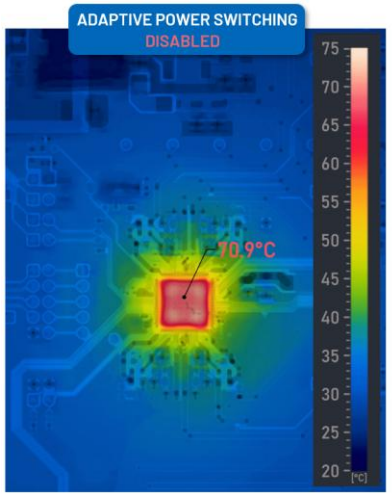


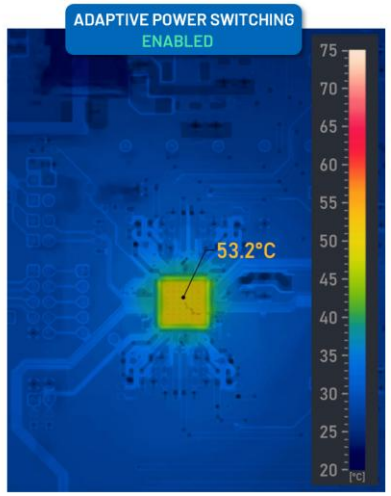


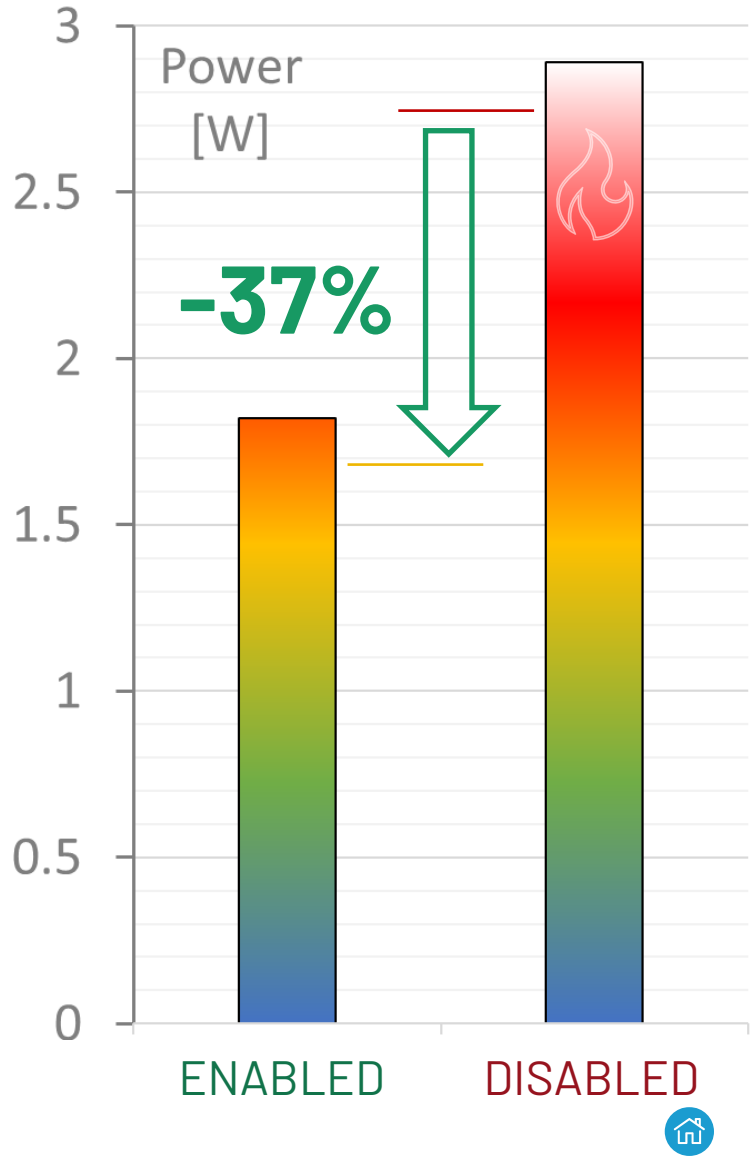


AD74416H: Adaptive Power Switching – APS example

Measurement	APS DISABLED	Difference	APS ENABLED
Thermal Camera Reading	70.9°C	- 17.7°C	53.2°C
Temp. Sensor Reading	75.6°C	- 18.2°C	57.4°C
Temp. Sensor Initial	33.6°C	- 0.5°C	33.1°C
Temp. Increase	42.0°C	- 17.7°C	24.3°C
Initial Measured Power	0.46 W	- 0.02 W	0.44 W
Measured Power	**2.89 W**	**- 1.07 W**	**1.82 W**

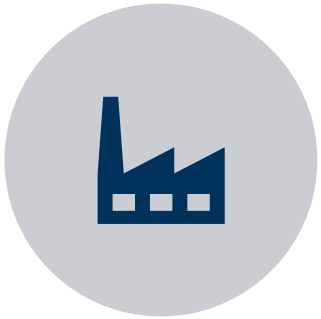






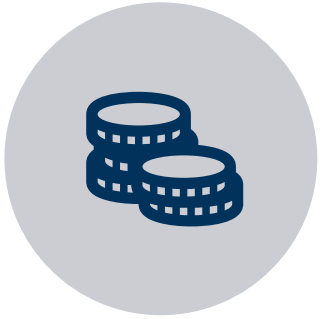
Recap

Industrial Control Macro Trends



Higher Factory Uptime

Low power



Reduction in Bill of Materials

Reuse of Platform

AHEAD OF WHAT'S POSSIBLE

analog.com