Secondary Side Control With Inde-Flux™

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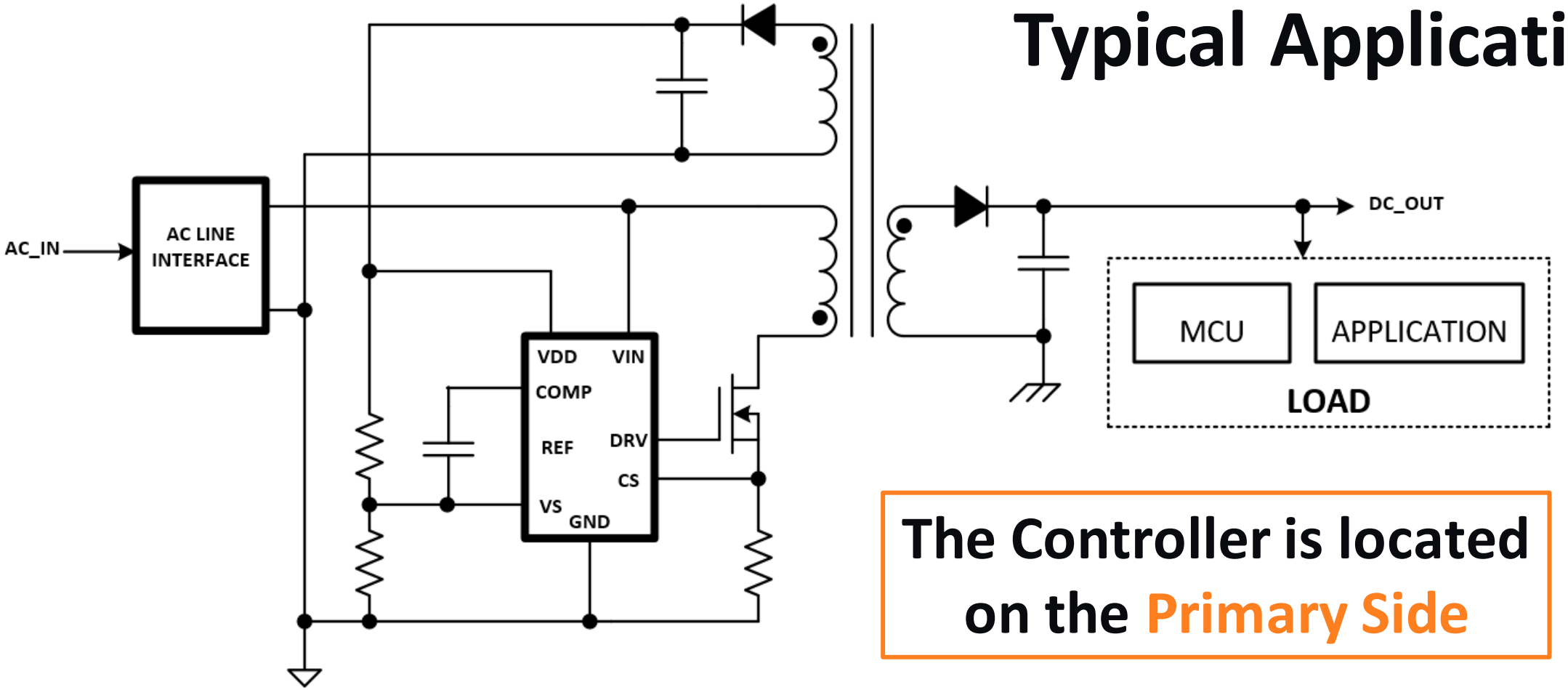
Benefits Of Secondary-Side Control



Typical Application

The Controller is located on the Primary Side

MICROCHIP

Benefits Of Secondary-Side Control

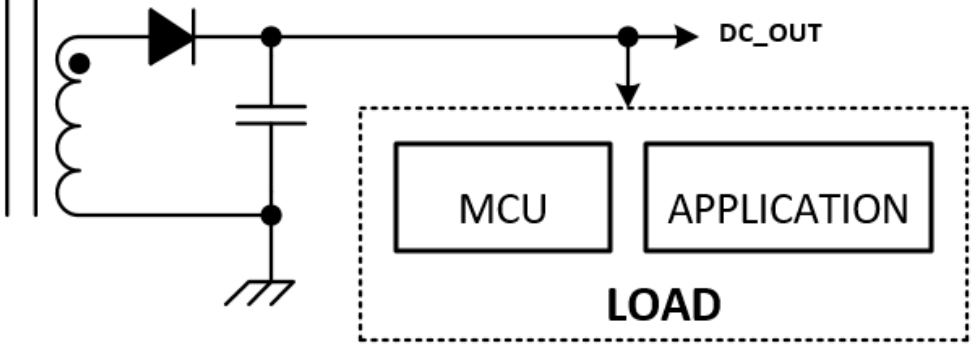
- **Typically, the "Load" is an application containing a microcontroller unit (MCU)**

  The Secondary-Side MCU does not have easy access to the Primary-Side Controller

- **Typically, the Primary-Side Controller is used to regulate either/or Secondary-Side output voltage and/or current**

  The Primary-Side Controller must infer output voltage and current via the transformer

Typical Application



The Controller is located on the Primary Side

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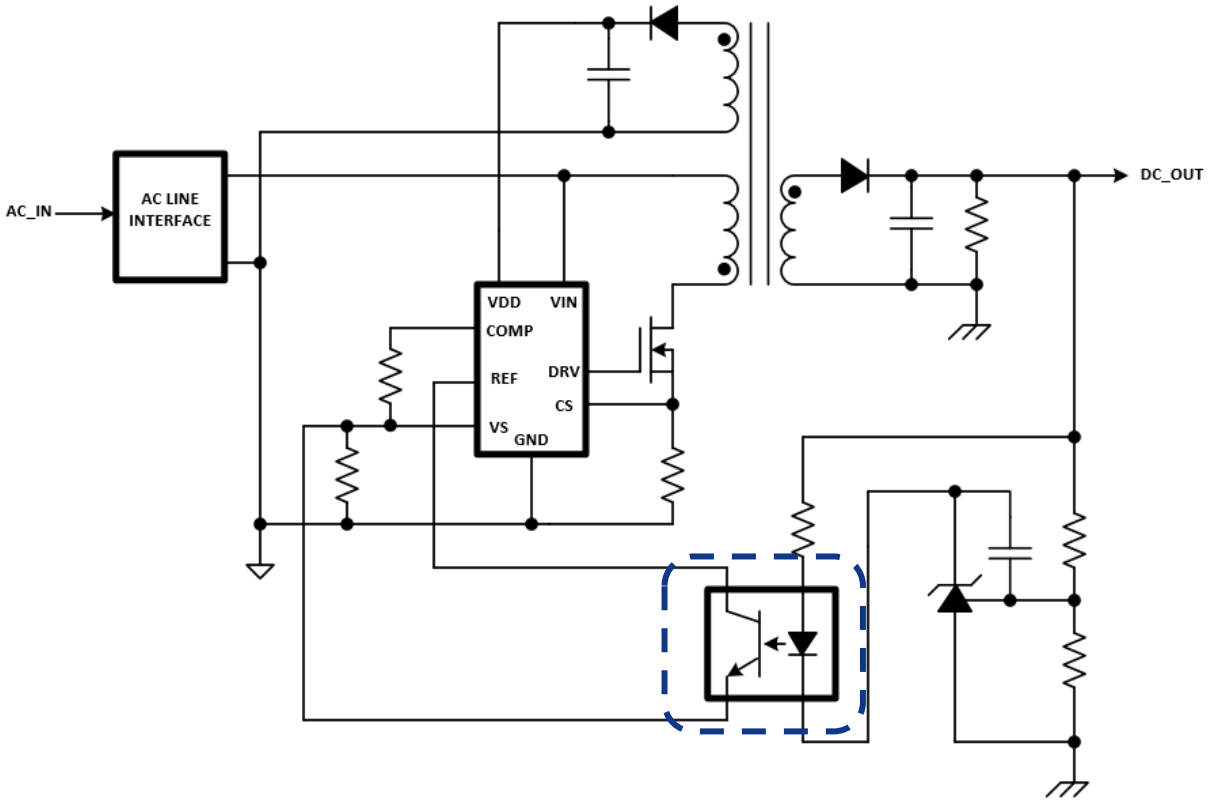
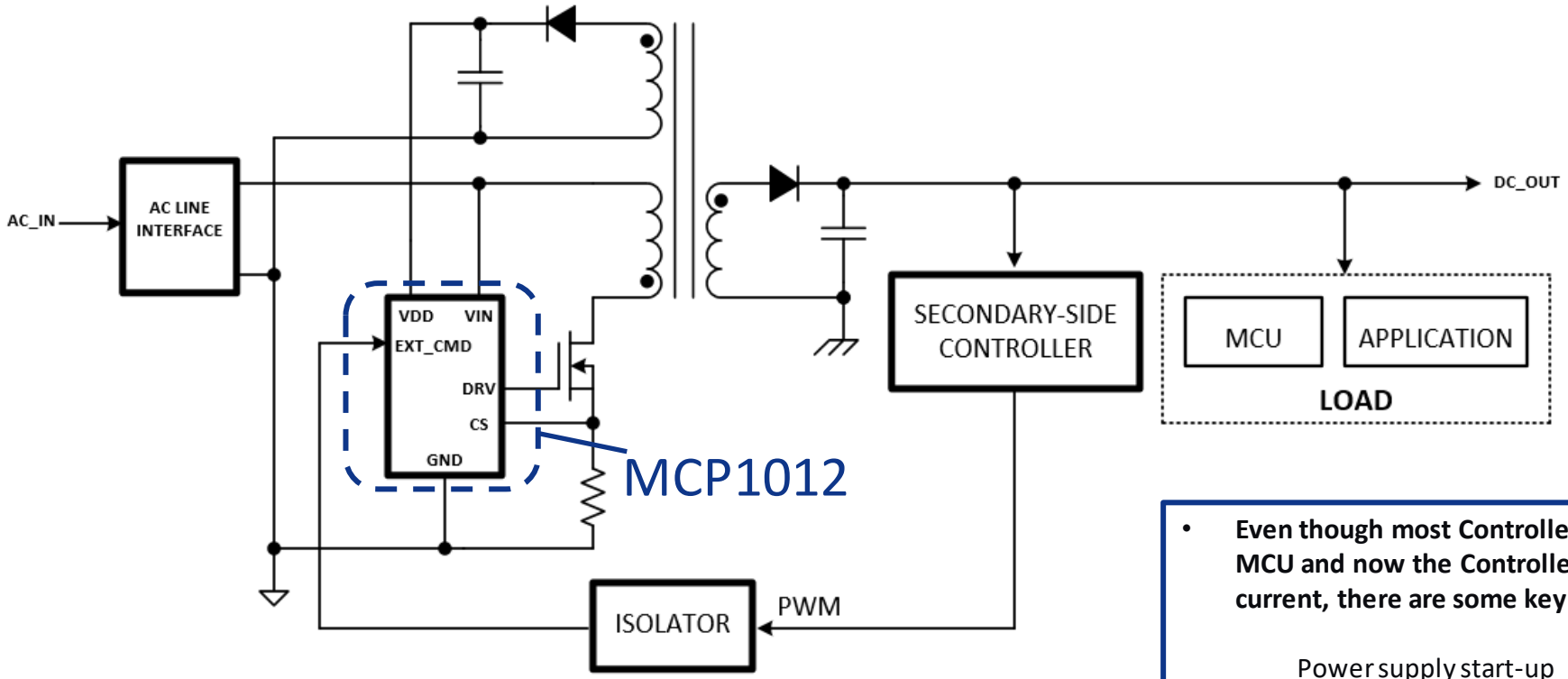
Typical Application With Improved Accuracy



- Typically, to improve output voltage regulator accuracy, the Compensator is moved to the Secondary Side
- Typically, an Optocoupler, operating linearly, transmits the output of the Voltage Error Amplifier from the Secondary Side to the Primary Side

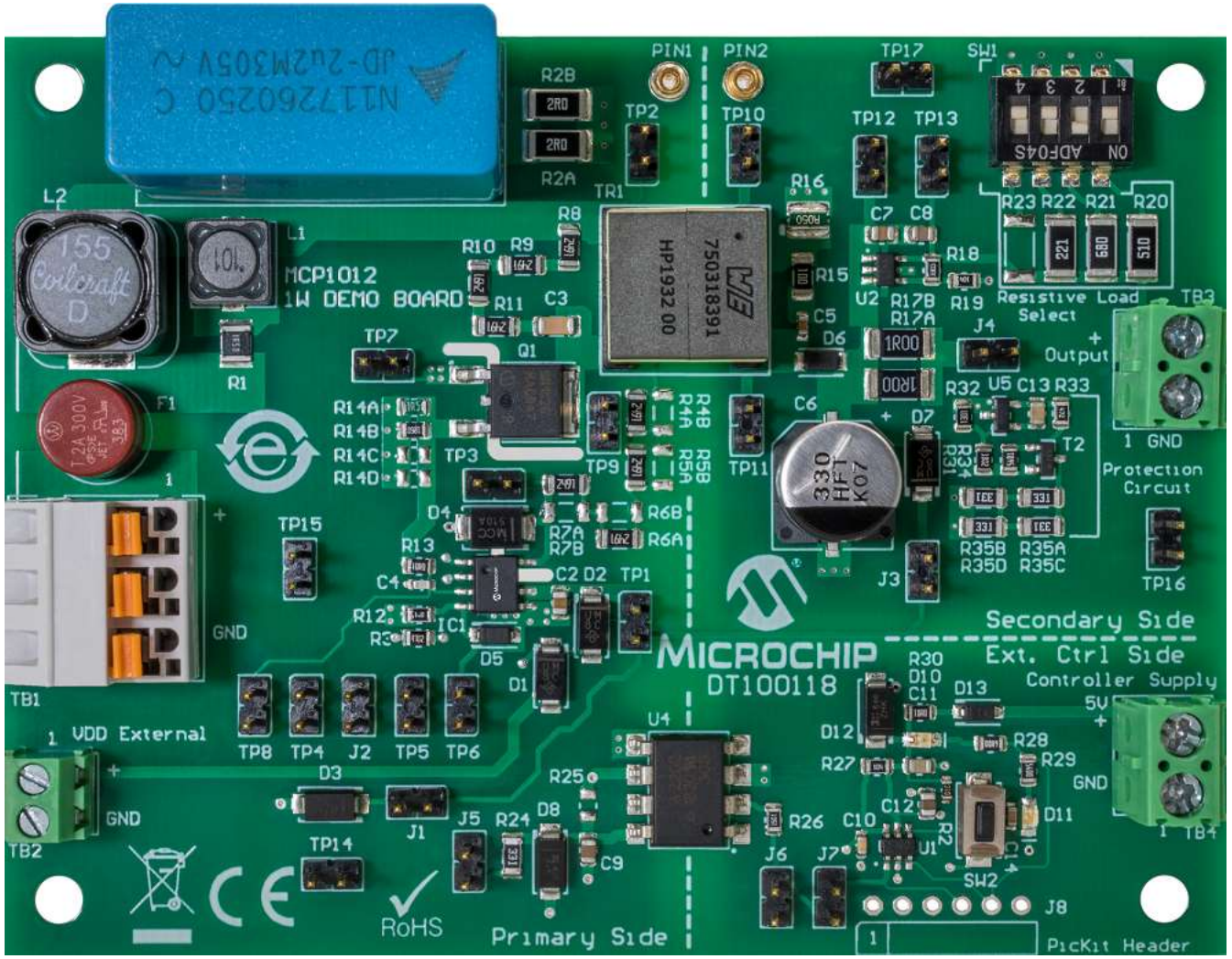
- Using a linearly-operating Optocoupler adds a gain stage to the Controller called the “Current Transfer Ratio” (CTR)
- CTR varies with both production tolerances and aging
- The variations in CTR must be considered when designing the Compensation Network, and usually results in less-than-optimal loop bandwidth (transient performance)

The Challenges Of Secondary-Side Control



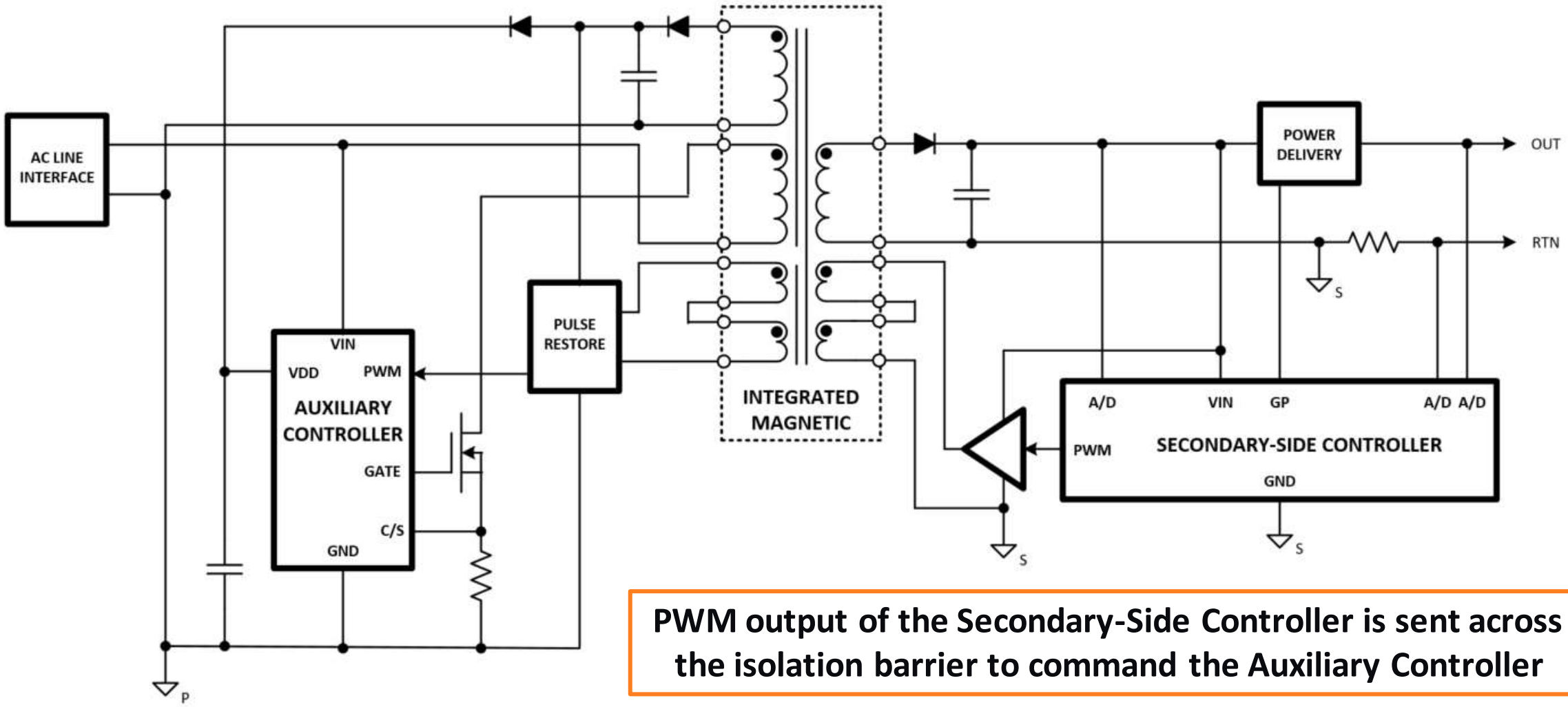
- **Even though most Controller functions are now easily accessible to the MCU and now the Controller can directly measure output voltage and current, there are some key obstacles to overcome**
  - Power supply start-up
  - Commanding and driving the Primary-Side MOSFET
  - Determining the primary winding current ramp
  - Protection against Secondary-Side Controller failure

DT100118: MCP1012 1W Development Kit



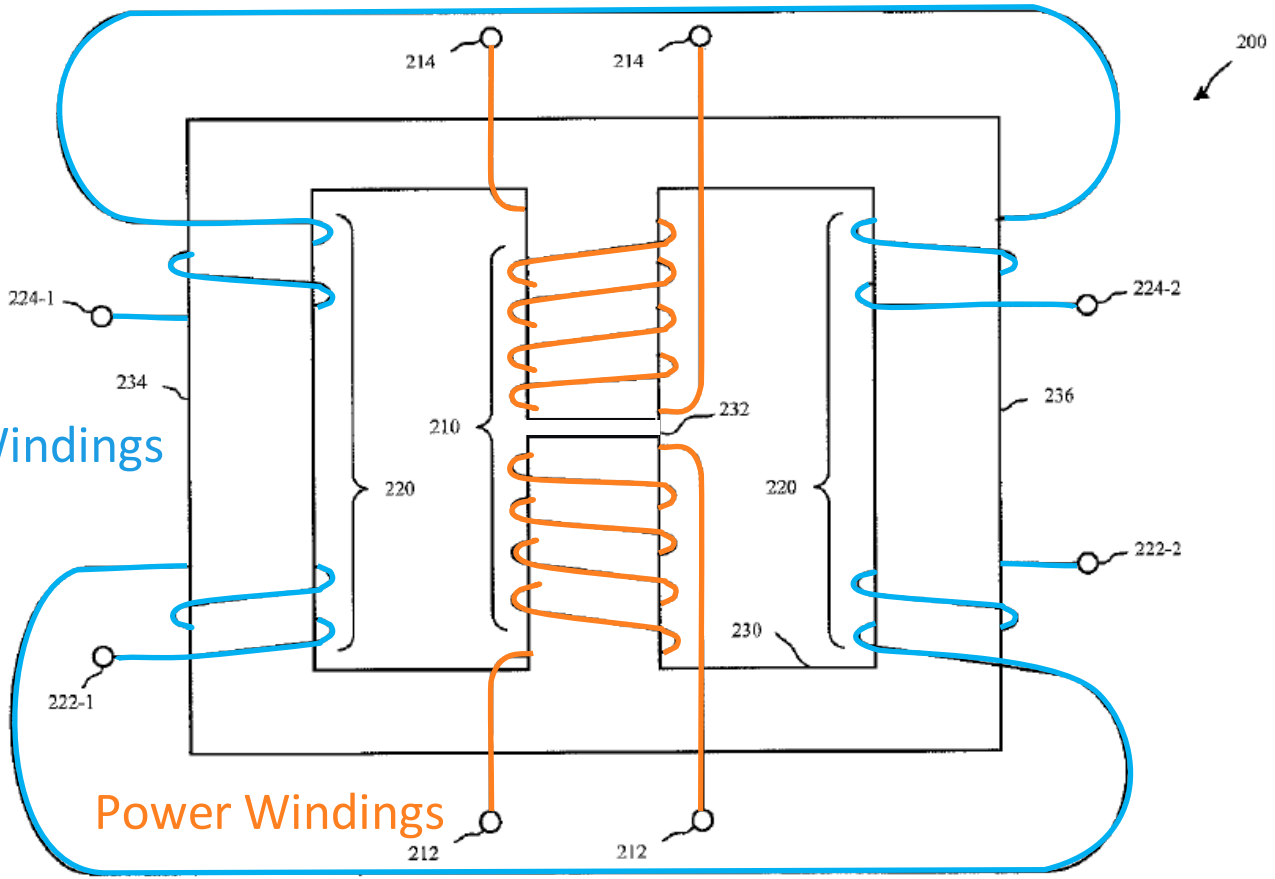
The purpose of the DT100118 is to allow the User to easily evaluate all the features of the MCP1012

The Integrated Magnetic Concept



PWM output of the Secondary-Side Controller is sent across the isolation barrier to command the Auxiliary Controller

The Integrated Magnetic Concept

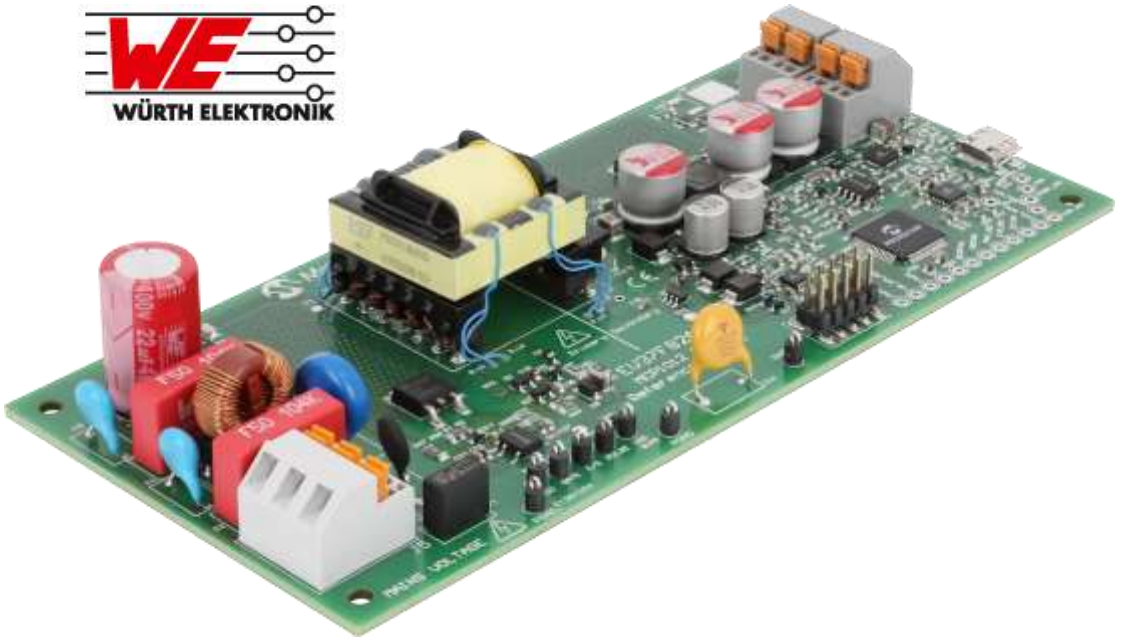


Signal Windings

Power Windings

EV37F82A – MCP1012 15W Reference Design

- **The EV37F82A is a more challenging application**
  - Single-stage of conversion
  - Output isolated during start-up by a power delivery switch
  - The Flyback provides regulated output voltage and current limit
  - Can operate autonomously or by external commands from a GUI
  - Uses the Integrated Magnetic Concept



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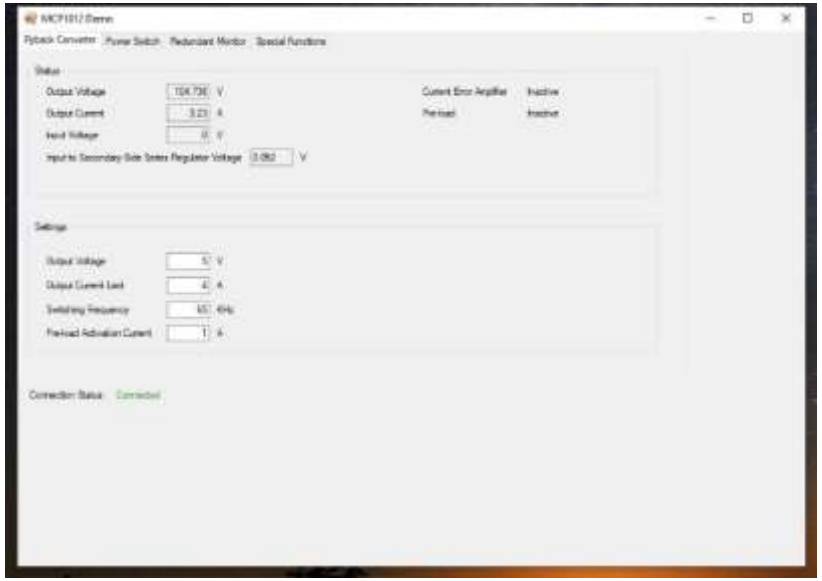
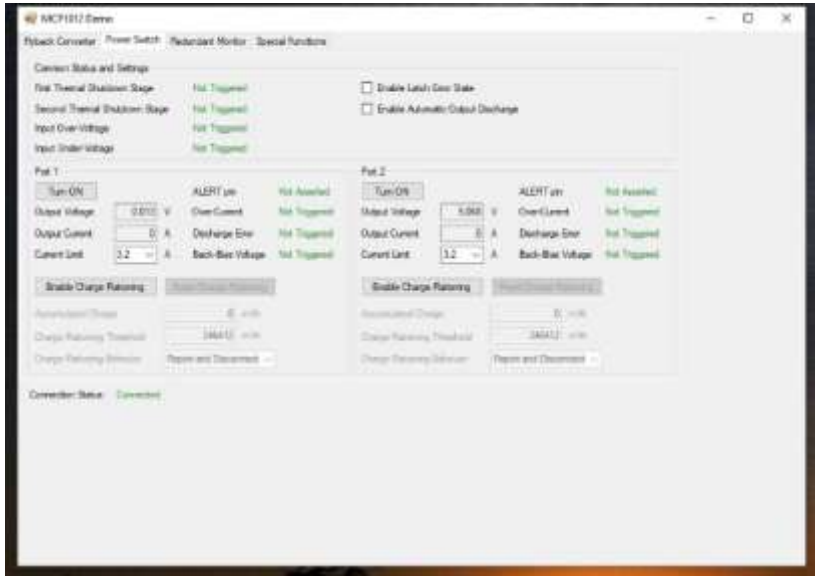
GUI Screens Developed For EV37F82A

Flyback Control

- MCU commands to the MCP1630
- Voltage Reference
- PWM Clock
  Also defines maximum duty cycle
- Sets current limit
- Controls Pre-Load



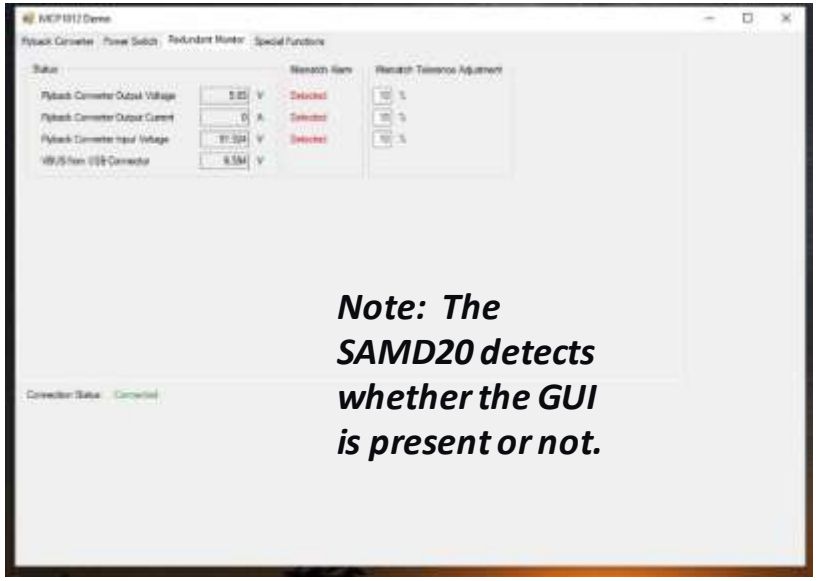


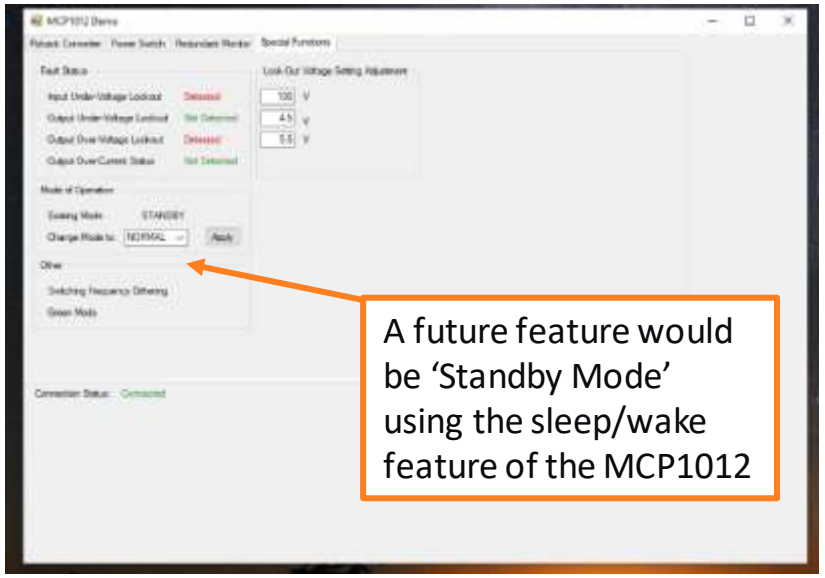
UCS2113 Control

- This device has two output channels
- Each channel has:
  - Enable
  - Thermal Shutdown
  - OV and UV
  - Current trip level
  - Reports V_{OUT} and I_{OUT}

MCP2221A Control

- MCP2221 has 4 GPIO controlled by the GUI
- The GPIO are used to make redundant measures of key parameters
- GUI SW can make comparisons of redundant measurements





Other GUI Features

- Input voltage is inferred by secondary winding voltage measurements, making possible INPUT UVLO
- The MCU monitors for secondary-side OV and UV, as well as Over-Current

Thank you very much !

Q&A

Please contact us for further details

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