

TLE9844-2QX Application Kit User's Manual

Product Family: TLE984xQX

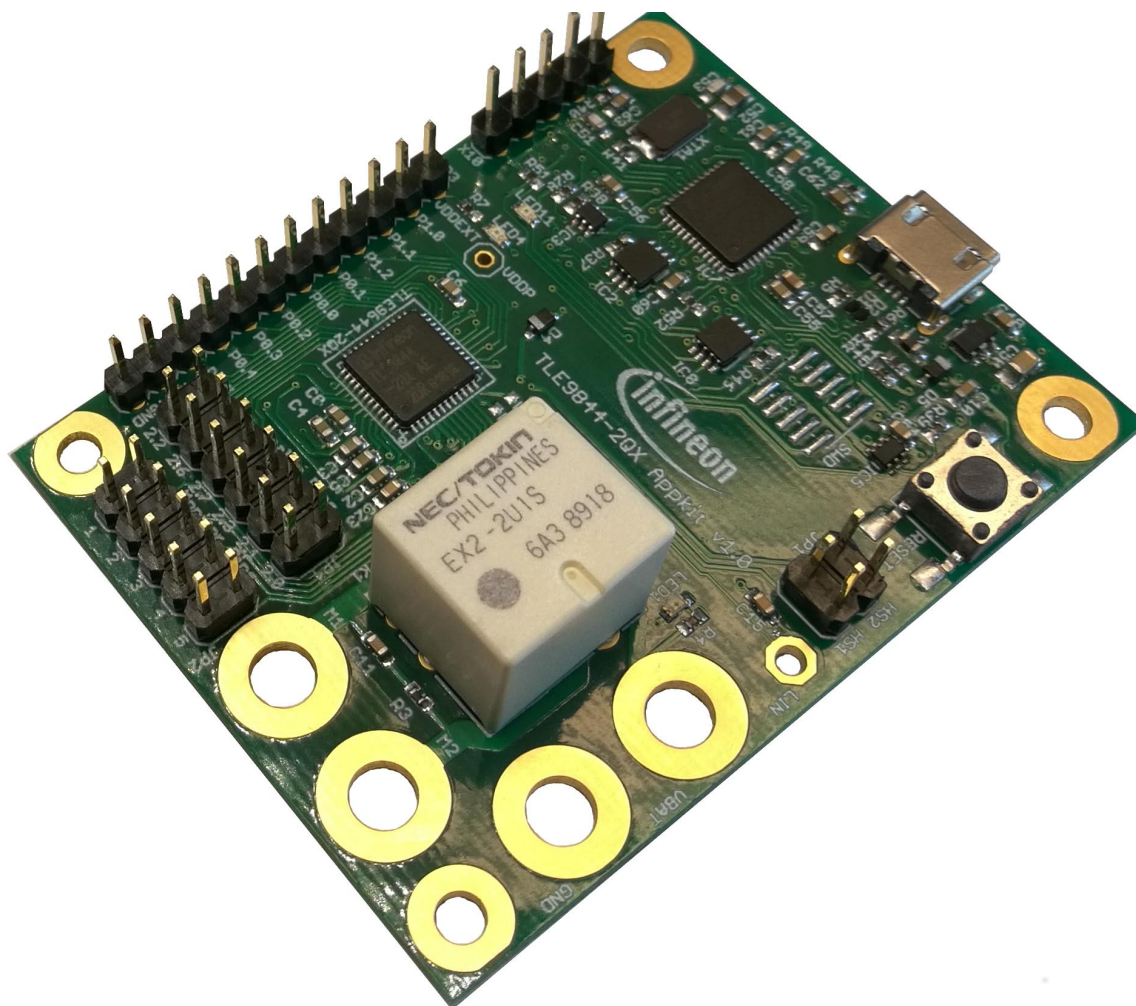


Figure 1 TLE9844-2QX Application Kit 2-Channel Relay

About this document

Scope and purpose

The TLE9844-2QX Appkit is designed to evaluate hardware and software functionalities of the TLE9844-2QX in an application similar designed shape.

The 2-Channel Relay is connected to the integrated low side switches to drive DC motors bidirektionally. This documentation describes the basic use of the TLE9844-2QX Appkit.

Note: This Evaluationboard is not optimized for EMC behavior.

Intended audience

This Document is for everyone who works with the TLE9844-2QX Appkit

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Concept

1 Concept

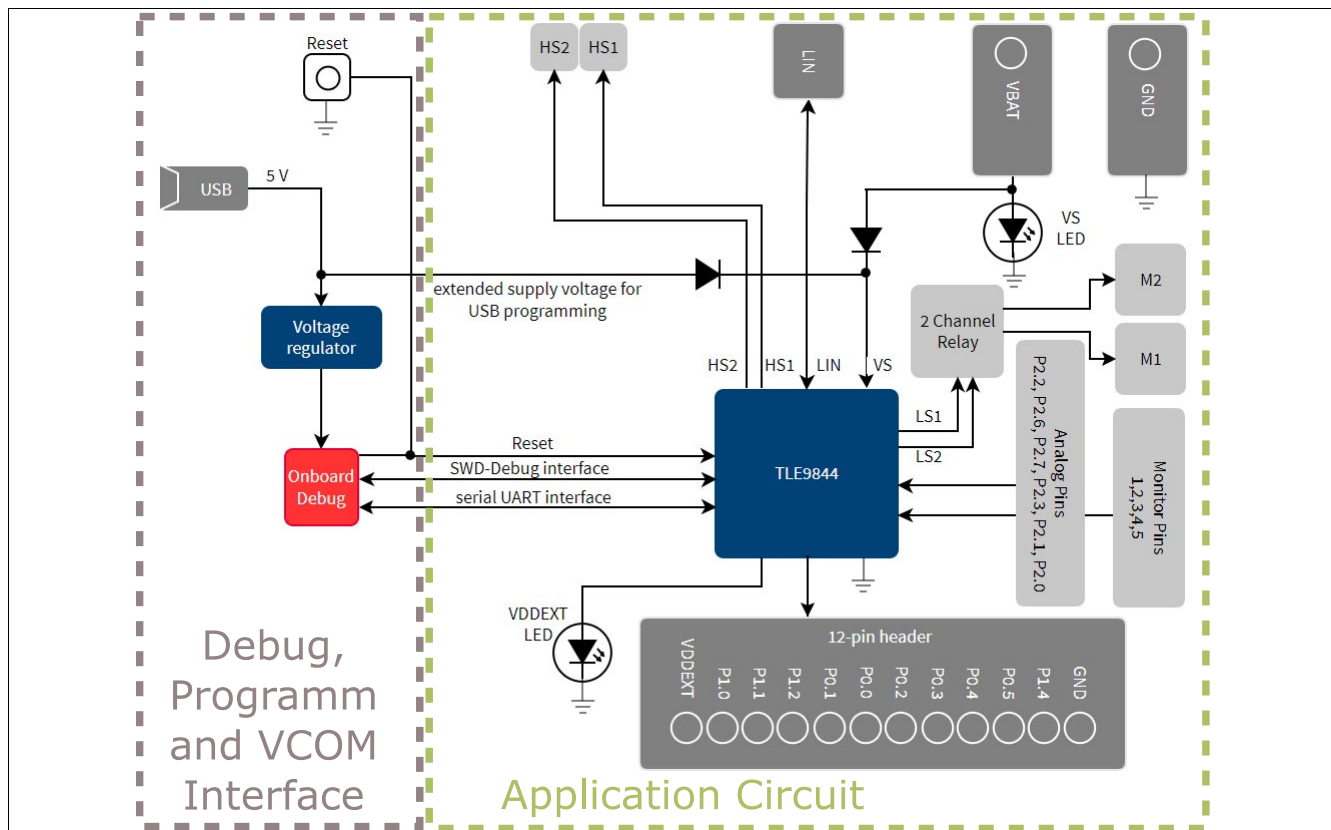


Figure 2 Application Kit Concept

The TLE9844-2QX Appkit provides an application near circuit to evaluate relay based bidirectional dc motor applications.

The TLE9844-2QX device is placed near a 2-Channel Relay. The board is protected against reverse polarity of input voltage supply. GPIOs, high voltage monitor PINs and high side switches are accessible via pin head connectors.

The Application Kit provides an On-Board debugger. It provides a SWD-Debug connection and a virtual COM port for serial UART communication.

Power supply and motor connectors are accessible via plated through hole contacts, which can be used to place M2.5 pressnuts (optionally).

Board features:

- Application near circuit (e.g. Window lift)
- LIN-PWM Interface
- 2-Channel Relay for bidirectional dc motor control
- Analog Pins with additional GND connector (double row pin header)
- GPIOs accessible (pin header)
- High side switches accessible (pin header)
- USB-Communication and Debug-Interface (USB-Connector)
- Example Code (Keil µVision 5)

Interconnections

2 Interconnections

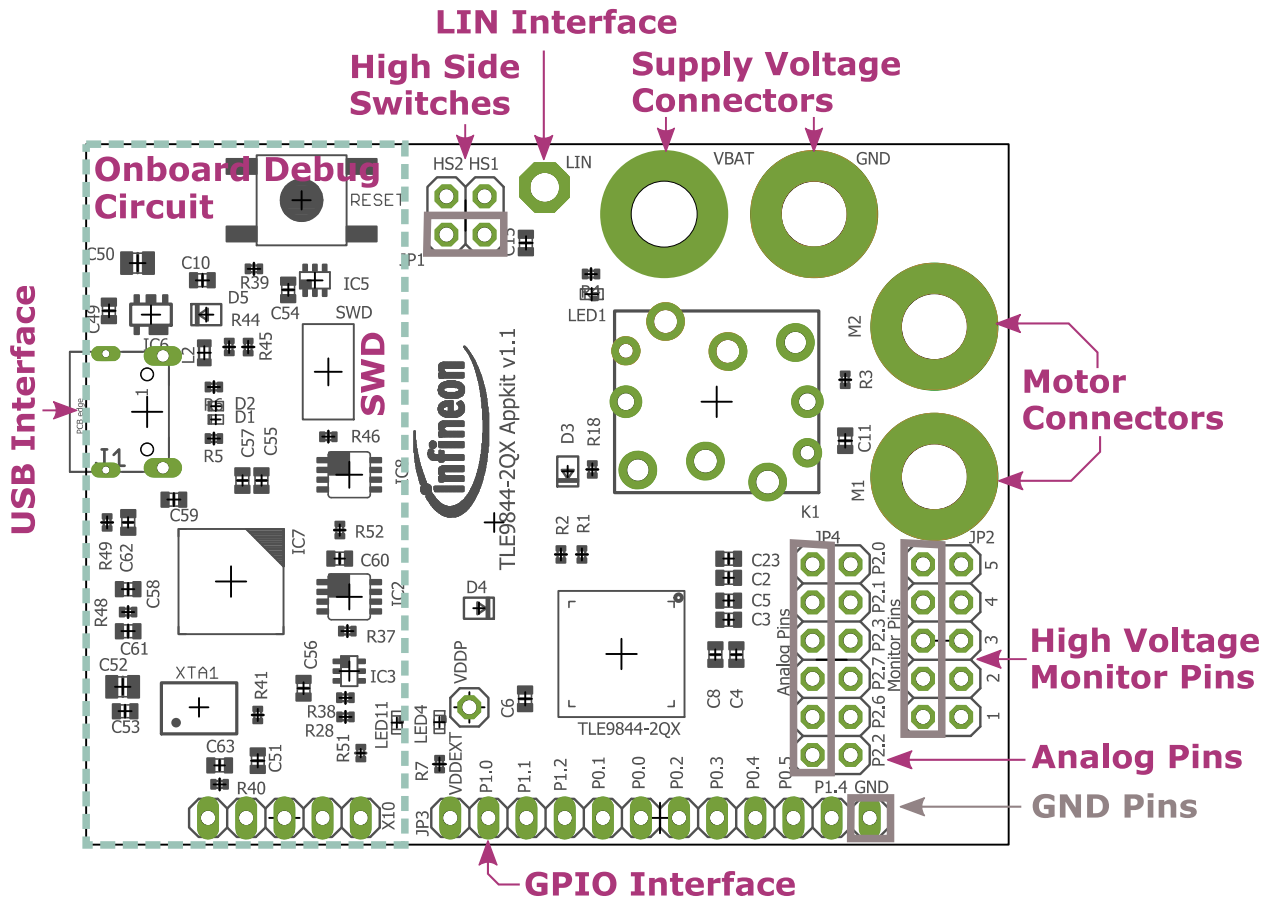


Figure 3 Interconnections Overview

Supply Voltage Connectors

This is the main Appkit supply voltage connection. It is recommended to supply the board with typ. 12V. The operational voltage range of the TLE9844-2QX can be found in the Datasheet.

The two supply connectors fit for 2,5mm press nuts.

Motor Connectors

The 2-channel relay is directly connected to this contacts. They are terminated to GND in relay 'off'-state. The relay is capable to carry up to 20A for short time periods. The power supply should be chosen accordingly.

High Voltage Monitor Pins

These Pins are capable to measure voltages on battery voltage level, directly. The second Pin head row is connected to GND.

Analog Pins

The 5V Analog Channels of the TLE9844-2QX can be accessed at this pin row. Their name suffix is P2.x.

Interconnections

GPIO Interface

All Chip GPIO Pins are accessible with pin head rows. They can be used for many different interfaces (e.g. UART, SPI, I2C).

USB Interface

An onboard-debug interface is implemented on the TLE9844-2QX Appkit. The USB-connection provides a debug- and serial-interface to the PC.

A serial Diode supply the TLE9844-2QX in the extended operation voltage area. This enables the possibility to flash download code, by usb connection only. For operating the relay, a 12V supply is mandatory.

LIN Interface

This connector is a direct access to the LIN Interface of the TLE9844-2QX. The LIN Interface can be used to establish halfduplex connections to other boards or modules for evaluation. The example code library provides example projects for LIN master and slave low level drivers.

SWD Interface

The SWD PIN-Header can be used optionally, instead of using the On-Board Debug Interface.

Communication Interfaces

3 Communication Interfaces

3.1 LIN and uIO for LIN BSL

The device integrated LIN transceiver is connected to a dedicated Connector (see [Figure 3](#)). To integrate the device in a LIN network it is sufficient to use the single wire banana interface. The BSL interface is intended to program the device via LIN. For further information about the uIO interface see www.hitex.com/uio.

3.2 UART (Virtual COM PORT via USB)

A virtual COM port provided by Segger driver enables a PC – board – communication via UART. The UART2 module of TLE9844-2QX uses the pins P1.0 (transmit) and P1.1 (receive). Those are connected to the XMC4200, which emulates Rx and Tx on PC side with Segger firmware. Though they can be disconnected physically, bidirectional level shifters ensure that the XMC pins are hi-Z in case the virtual COM port is not used. By connecting the evaluation board to the PC a virtual COM port gets emulated by the Segger driver automatically. The virtual COM port will show up in the Microsoft® Windows® device manager.

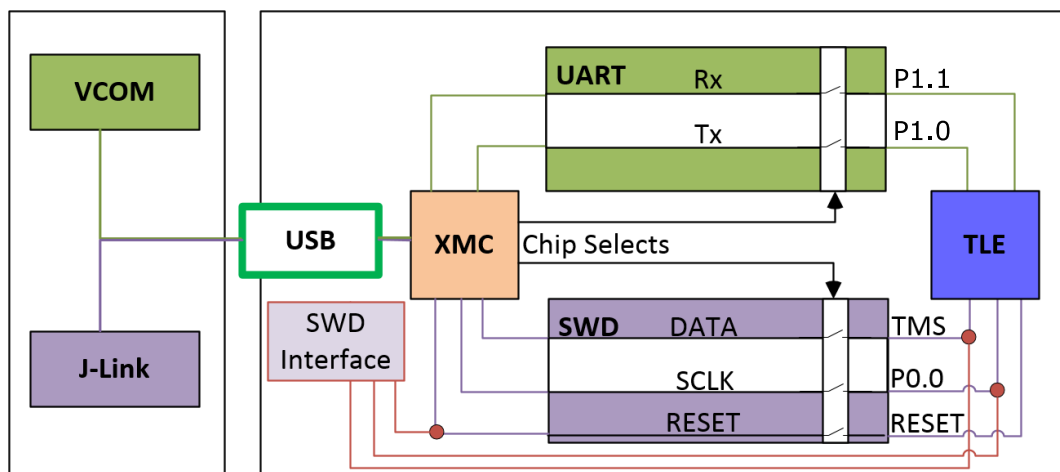


Figure 4 UART and Debugging

Note: Only one of the interfaces USB or SWD can be used at one time. While using the SWD interface the XMC is hold in reset. As long as a debugger is connected with the SWD interface it eliminates therefore debugging or UART via USB.

3.3 SWD-Debuginterface (J-Link via USB)

For serial wire debug the TLE984x uses the pins TMS (data) and P0.0 (clock). Level shifters between XMC4200 and TLE9845QX allow using P0.0, while it is not used for debugging.

The Segger J-Link module on board allows serial wire debugging via USB. Alternative debugging via SWD interface is possible to debug with another ISP than the onboard Segger e.g. U-Link2. Therefore the signals are routed through the 10 pin header SWD interface between the XMC4200 and the TLE984x. The pin configuration makes sure that the XMC is hold in reset while another debugger is physically connected to X11. The virtual COM port will be disabled, while the external ISP is connected.

Software Toolchain

4 Software Toolchain

4.1 Keil μ Vision 5

The recommended Integrated Software Development Environment is Keil® μ Vision5®. Infineons embedded Power family is supported. For more information about the Toolchain go to: www.keil.com

4.2 Infineon Config Wizard

In addition to the IDE, Infineon® provides the ConfigWizard. The tool is designed for code configuration, in combination with the IDE. Infineons Config Wizard can be downloaded via:

www.infineon.com/embeddedpower

4.3 TLE9844-2QX Installation

All embedded Power products can be installed to Keil® μ Vision5® via “Pack Installer”. Browsing to the Infineon chapter in “All Devices” will lead to the “TLE98xx Series”. The “.pack” file comes with several code examples, to provide an easy start up and speed up software development.

4.4 Debug Connection Setup

For a proper Flash and Debug Connection, Install V5.10 (or newer) from: www.segger.com/jlink-software.html

Keil® μ Vision5® has to be configured in the IDE Menu “Options for Target”. After connecting the USB-cable and power up the Evalboard, go to the “Debug” register-card and choose “J-LINK / J-TRACE Cortex” and press “Settings”.

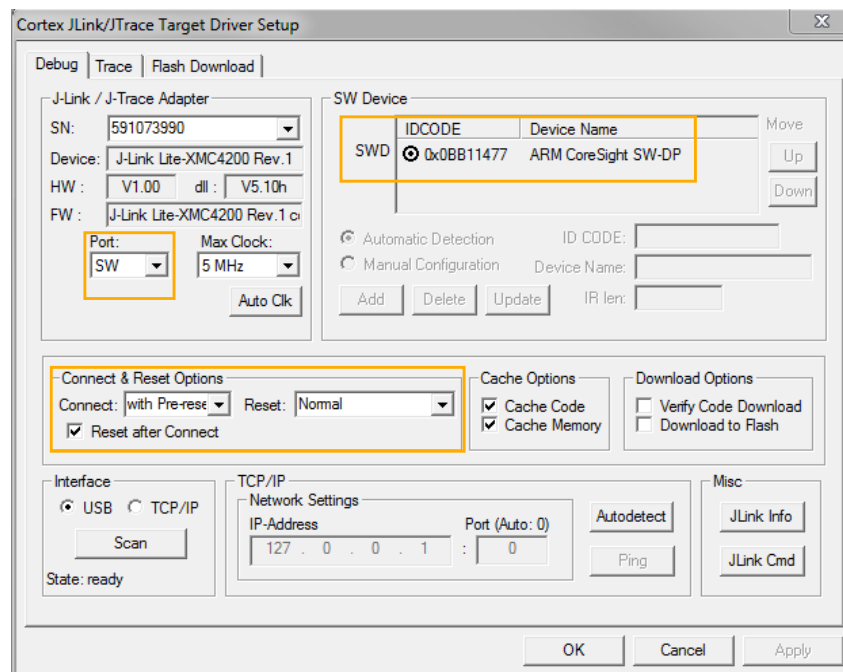


Figure 5 Debug and Flash Configuration

If the board has been connected successfully, the ARM IDCODE will be visible in the SW Device Window. If connection fails, “Connect & Reset Options” and “Port” window has to be checked.

5 Schematic and Layout

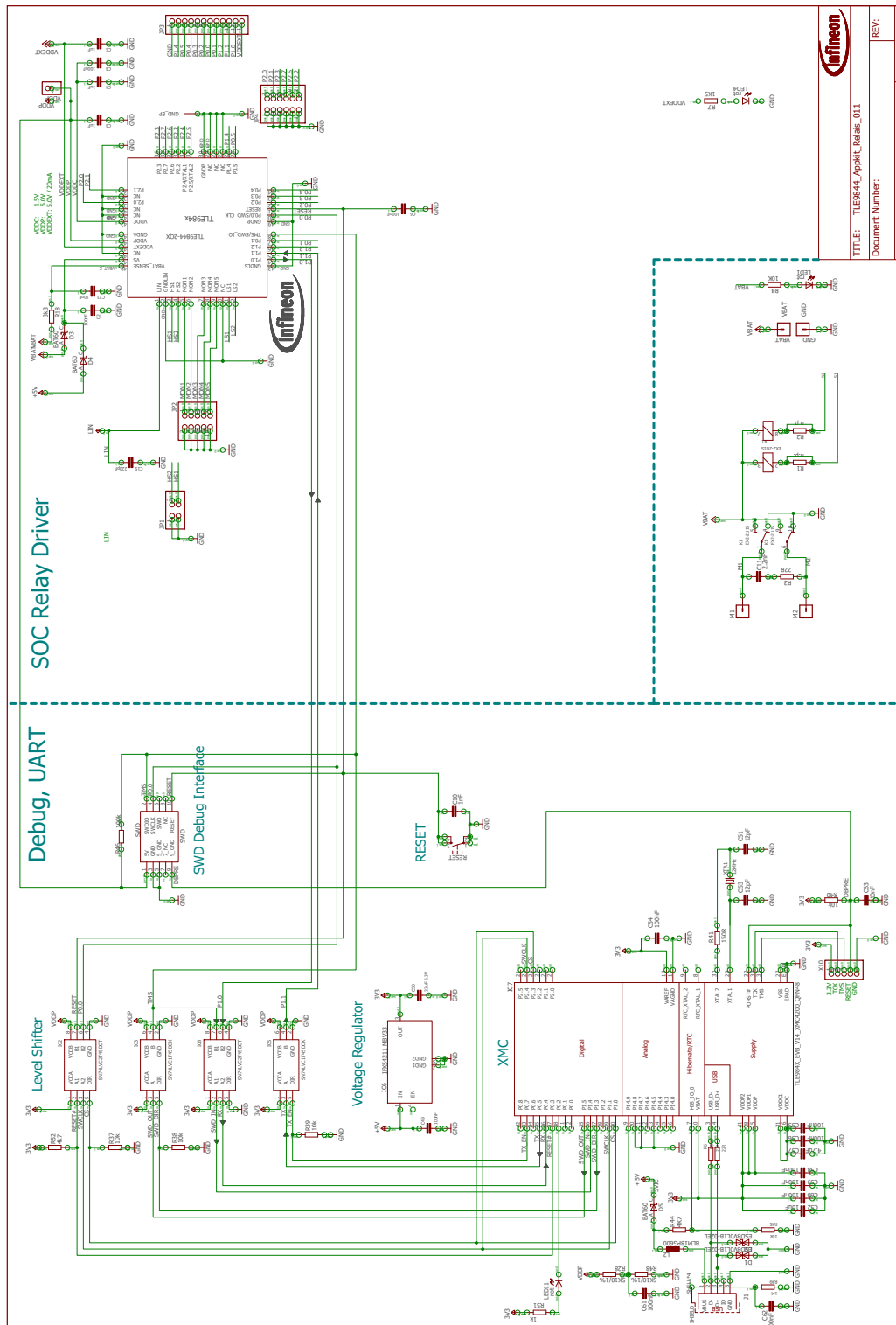


Figure 6 schematic sheet: TLE9845QX with PN-MOSFET halfbridge and On Board Debug Interface

Note: This is a very simplified example of an application circuit and bill of material. The function must be verified in the application.

Schematic and Layout

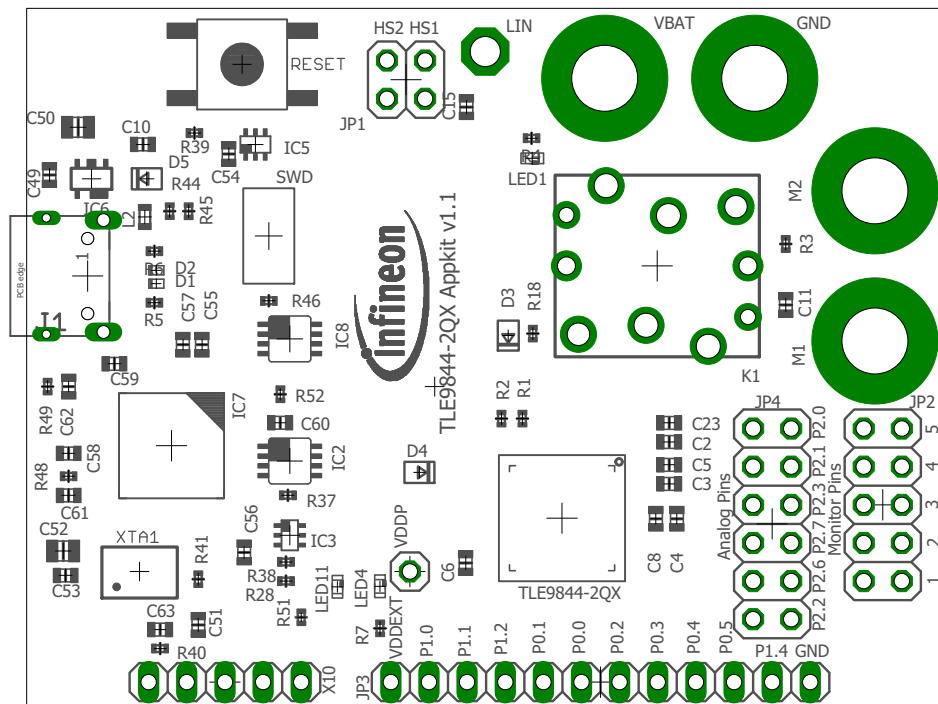


Figure 7 Parts placement

Note: This is a very simplified example of an application circuit and bill of material. The function must be verified in the application.

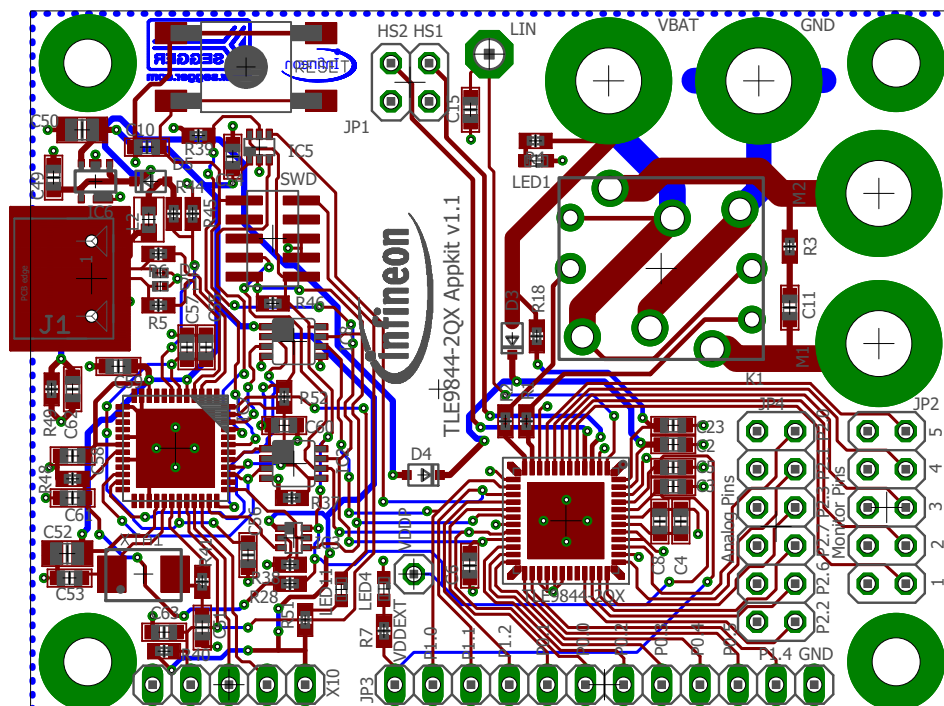


Figure 8 Layout

Note: This is a very simplified example of an application circuit and bill of material. The function must be verified in the application.

Revision History

6 Revision History

Revision	Date	Changes
1.0	2018-04-04	Release State

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