Easy Kit Board Manual

Easy Kit - XC878

8bit

Microcontrollers

infineon

Never stop thinking

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Chapter	Subjects (major changes since last revision)

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Preface

This manual describes the LQFP-Board (bundle with the Starter Kit) design and functions.

Detailed specification for the XC878CM microcontroller can be found in the respective microcontroller Data Sheets/User's Manuals.

Application hints, software utilities, as well as links to our tool partners are available on the Internet at www.infineon.com/XC878CM.

1 Introduction

The Infineon XC878CM microcontroller is a new member of the XC800 family 8-bit microcontrollers, providing advanced networking capabilities by integrating both a CAN controller (V2.0B active) and LIN support on a single chip.

The XC878CM combines the extended performance of the well-established XC800 core, which is compatible with the standard 8051 core, with powerful on-chip peripherals as well as the on-chip Flash memory (64 Kbytes). This integrated Flash memory offers high flexibility in development and ramp-up. System cost is significantly reduced through integration of components on chip, such as the on-chip oscillator (4 MHz) and the voltage regulator that enables a single voltage supply of 3.3 or 5.0V.

Other key features of the XC878CM are the high-performance Capture/Compare Unit 6 (CCU6) for flexible PWM generation and the enhanced 10-bit Analog-To-Digital Converter (ADC). Furthermore, a CORDIC and a Multiplication Division Unit (MDU) are implemented for fast mathematical computations and a new Timer2 CCU.

For more detailed description of features available for each derivatives of the XC878 microcontroller, please refers to the product brief.

1.1 Contents of XC878CM Starter Easy Kit

The XC878CM Starter Kit includes:

- LQFP-Board (labeled as Easy Kit XC800 - LQFP on the PCB) onto which the 8-bit microcontroller XC878CM is mounted.
- Keil C51 Compiler and debugger evaluation version (in Starter Kit CD).
- XC878CM Starter Kit CD which contains Getting-started application, Product brief, Tools brief, Application hints, DAvE software, utility software for FLASH programming, XC800 Architecture and Instruction Set User's Manual, XC878CM User's Manual and Datasheet.
- 1USB cable.
- This LQFP-Board and LQFP-Board User's Manual (in Starter Kit CD).

2 Hardware

The size of the LQFP-Board (labeled as Easy Kit XC800-LQFP) is100 mm x 80 mm. Debugging of application software can be done via the XC878CM On-chip Debug support.

2.1 Board Features

The LQFP-Board is equipped with following features (see **Figure 10-5**):

- Power supply inlet
  - If LIN transceiver is not used, LQFP-Board can be powered via USB.
  - If LIN transceiver is used, LQFP-Board requires an external 12V DC/300 mA power source via VS at lower left hand corner of LQFP-Board.
  - By default, the input power supply to XC878CM on the board is 5Vdc. However, XC878CM can operate in 3.3Vdc or 5Vdc power supply. So, by changing the value of R1, R2, assembled and removed some components as indicated in **Figure 10-2**, the voltage input to XC878CM will be changed to 3.3Vdc via the input of USB / external 12V DC power supply to the board.
- RS-232 serial interface is available via USB port which converts the USB signal to TTL UART signal.
  - XC878CM has on-chip serial UART port and is able to communicate via the USB connector through the USB-UART bridge IC. The Flash Loader utility can be used to download the hex code into the flash via the USB interface.
- JTAG interface connector, OCDS
  - The JTAG interface provides on-chip debugging support.
- Reset push button, S1
  - The reset push button is connected to the reset input of XC878CM.
- 8 LEDs, P3.0 - P3.7
  - The 8 LEDs are connected to Port 3 of XC878CM via buffer IC6. The buffer IC6 can be enabled or disabled via mounting or removal of resistor R5, respectively. These LEDs are for program control or demonstration purposes.
- Potentiometer, POT1
  - The potentiometer is connected to P2.7 of XC878CM, which also functions as an analog input. The potentiometer can provide an analog voltage range of 0 - 5V to P2.7.
- Bootstrap mode via UART pins P1.0, P1.1
  - Bootstrap mode is enabled by insertion of Jumper J3(BSL) and another jumper inserted at COM header indicated by the USB symbol (left side diagram of **Figure 4-1**). The application Hex code can then be downloaded via UART by the FLASH loader program.
- LIN emulation via UART pins P1.0, P1.1

  - By using the LIN transceiver TLE7259 (IC8), the UART can interface with LIN bus. However, if using LIN interface, a jumper need to be inserted at the COM header indicated by LIN symbol (centre diagram of **Figure 4-2**).
- CAN communication is possible via pins P1.0, P1.1(CAN node 0) to CAN transceiver IC4 and via P1.4, P1.3 (CAN node 1) to CAN transceiver IC5.
  - If user prefer to use MultiCAN node 0, a jumper need to be inserted at COM header indicated by the CAN symbol (right side diagram of **Figure 4-2**).
  - If user prefer to use MultiCAN node 1, then insertion of the jumper at COM header is not necessary.
  - The CANH1 and CANL1 signals of MultiCAN node 1 are connected to CAN connector P1. CANH0 and CANL0 signals of MultiCAN node 0 are connected to header 3D.

3 Pin Layout

Please ensure that none of the module connections exceed their indicated maximum voltage or current. The maximum input values are specified in the corresponding controller manuals. As improper connections can lead to possible damage depending on the actual use and application, it is the user's responsibility to take appropriate safety measures to ensure that the module connections are protected from overloading through connected peripherals.

As shown in **Figure 3-1**, all relevant controller signals extend to pin headers H1 and H2(with pin labels provided) in the middle of the board. The following section provides an overview of the pin assignment of the pin header.

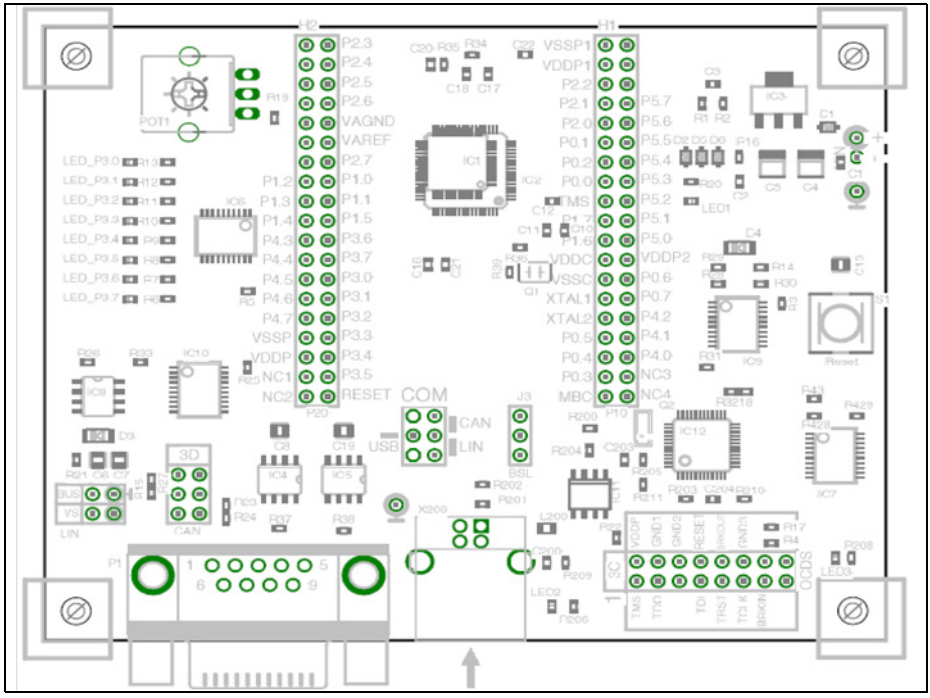

Figure 3-1 Position of the Connector

3.1 Connector OCDS

Table 3-1 Connector OCDS

Pin Number	Signal	Pin Number	Signal
1	TMS	2	VDDP
3	TDO_0	4	GND
5	N.C.	6	GND
7	TDI_0	8	RESET
9	TRST	10	BRKOUT
11	TCLK	12	GND
13	BRKIN	14	N.C.
15	N.C.	16	N.C.

3.2 Connector 3D

Table 3-2 Connector 3D

Pin Number	Signal	Pin Number	Signal
1	CANL1	2	GND
3	CANL0	4	CANH0
5	GND	6	CANH1

3.3 Clock Generator source

An external 8 MHz crystal provides the clock signal to XC878CM.

4 Jumper

The LQFP-Board (labeled as Easy Kit XC800-LQFP) uses following jumpers to set the various modes of operation:

4.1 Jumper setting for BSL/User mode selection

Table 4-1 Jumper J3 Setting

Jumper	Default Setting	Alternate Setting
J3	Lower Position: RESET is controlled by the debug/flash programming tools connected to the Board. (Refer to leftmost diagram of **Figure 4-1**).	Upper Position: Used for LIN Loading. (Refer to rightmost diagram of **Figure 4-1**). RESET needs to be manually controlled by pressing the RESET button. Caution: Any PC application software that uses the serial port and uses RTS and DTR as control lines will affect the behaviour of the board. Always make sure that RTS and DTR are set to HIGH so not to interfere with the normal board operation

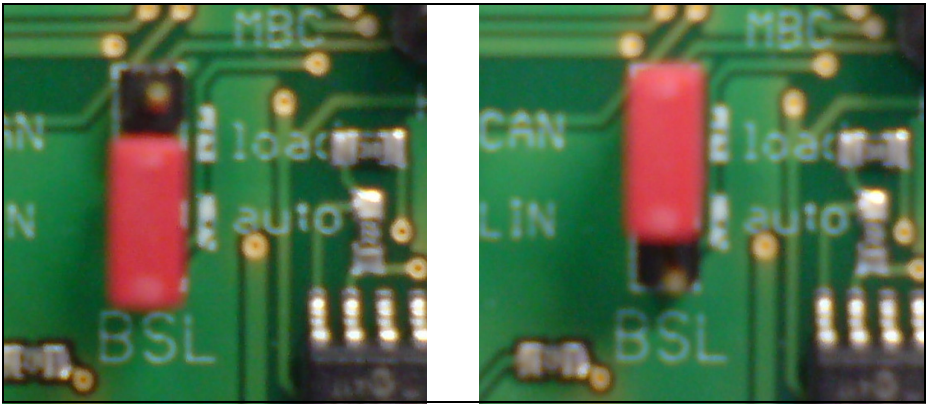

Figure 4-1 J3 closed or opened by insertion or removal of the Jumper

4.2 Jumper setting for USB / LIN / CAN0 selection

P1.0 and P1.1 of XC878CM are connected to the RX and TX pins of CAN tranceiver IC4, LIN transceiver IC8 and USB-UART bridge IC IC2. As only one transceiver should be enable at a time, the desired transceiver to be enable is controlled by the position of the COM jumper as shown **Figure 4-2**.

Table 4-2 Jumper COM Setting

Mode	Jumper positon	Description
USB	Left-most diagram of **Figure 4-2**	To connect the TX, RX pin of USB-UART bridge IC to XC878CM.
LIN	Centre digram of **Figure 4-2**	To enable the LIN transceiver IC8 and connect its TX, RX pin to XC878CM.
CAN0	Right-most digram of **Figure 4-2**	To enbale CAN transceiver IC4 and connect its TX, RX pin to XC878CM.

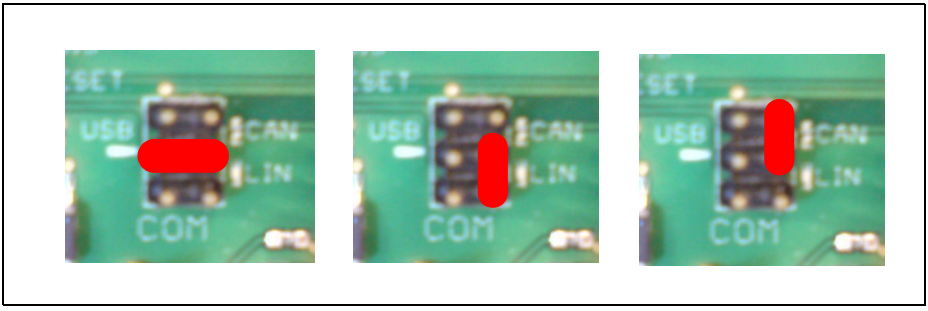

Figure 4-2 Jumper setting for USB, LIN and CAN0 mode selection

5 On-Board LEDs

The LQFP-Board (labeled as Easy Kit XC800-LQFP) provides 8 red LEDs, P3.0, P3.1, P3.2, P3.3, P3.4, P3.5, P3.6, P3.7 to indicate the status of the controller port P3. Port P3 can also be used to generate PWM signals. There is another green ON LED to indicate power ON.

Table 5-1 On-Board LEDs

LED	Connected to Port Pin
P3.0	P3.0
P3.1	P3.1
P3.2	P3.2
P3.3	P3.3
P3.4	P3.4
P3.5	P3.5
P3.6	P3.6
P3.7	P3.7
ON	Indicates the LQFP-Board is powered ON

6 Potentiometer

The LQFP-Board (labeled as Easy Kit XC800-LQFP) provides a potentiometer POT1 for ease of use and testing of the on-chip analog to digital converter. The potentiometer is connected to the analog input AN7 (P2.7). The analog output of the potentiometer ranges from 0V to 5V(or 3.3V).

7 Power Supply

The LQFP-Board can be powered by USB, however, there is a current limit that can be drawn from the PC host through USB. So, if the LQFP-Board is used to drive other board (eg. Motor driver board) and the total current required exceed 100mA, then the LQFP-Board needs to be powered up via external power supply.

A 12Vdc, 300mA power supply can be supplied to the VS and GND pin (indicated by the RED arrow) OR supplied to the VIN pins as shown in **Figure 7-1** to power up the LQFP-Board.

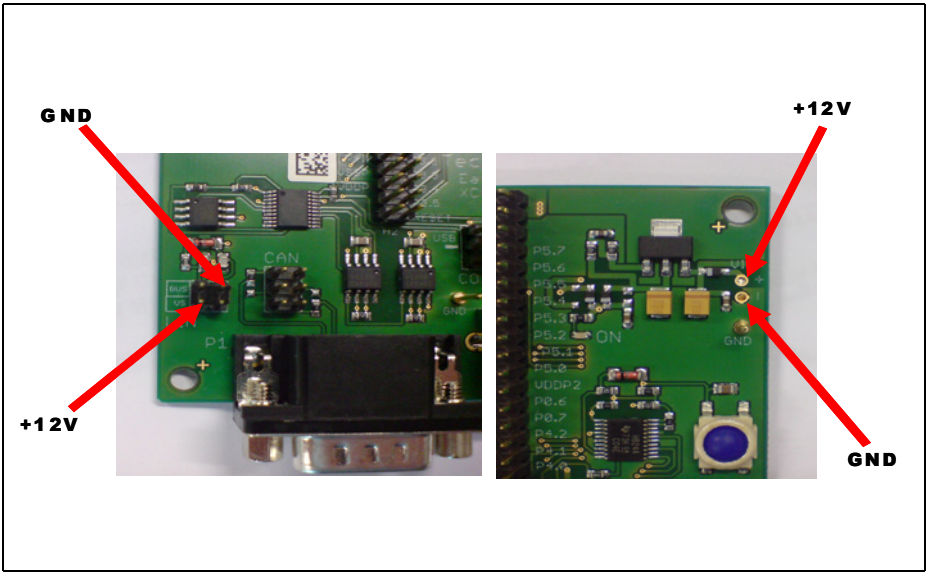

Figure 7-1 Connection of external power supply

8 LIN connection

The LIN transceiver TLE7259G on the LQFP-Board needs a voltage input of 12Vdc. Hence, user has to power up the LQFP-Board via external power supply of 12Vdc instead of using the USB which output a maximum of 5Vdc.

Furthermore, the jumper setting at the COM connector needs to be set as shown in **Figure 8-1**.

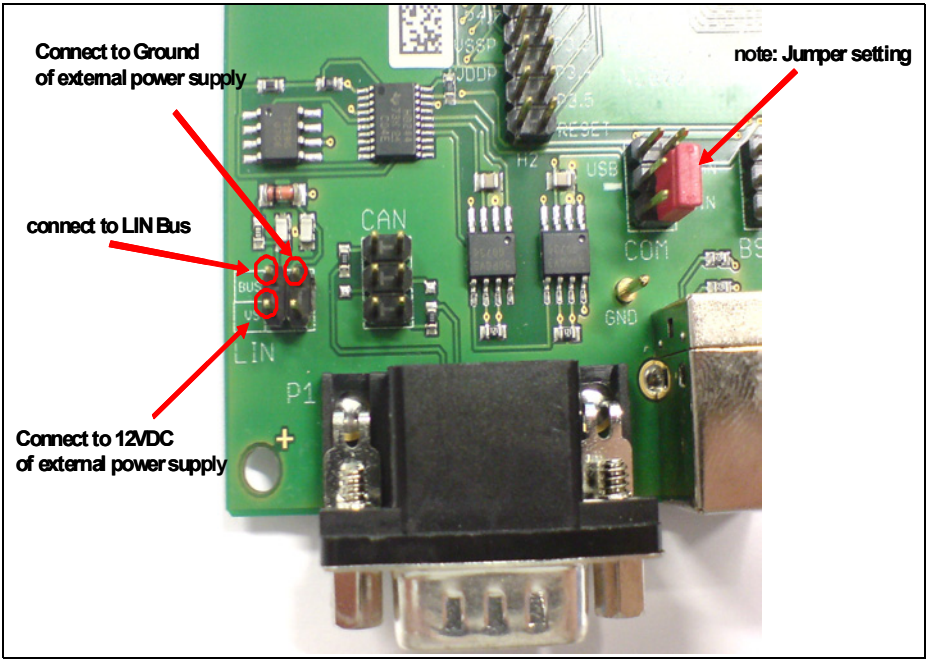

Figure 8-1 Jumper setting of LQFP-Board to connect to LIN network

9 CAN connection

The CAN node 1 of XC878CM (P1.3 and P1.4) on the LQFP-Board are connected to the 9 pins CAN connector P1 by default. Hence, if user uses P1.3 and P1.4 for CAN network communication, then user just needs to connect the CAN bus to CAN port P1.

However, user also has the option to use CAN node 0 (P1.0 and P1.1) for CAN communication.

Then the jumper setting needs to set to position as shown in **Figure 9-1**.The CANH0 and CANL0 are located at connector 3D. The user can also form a CAN loop back from node 1 to node 0 via the connector 3D.

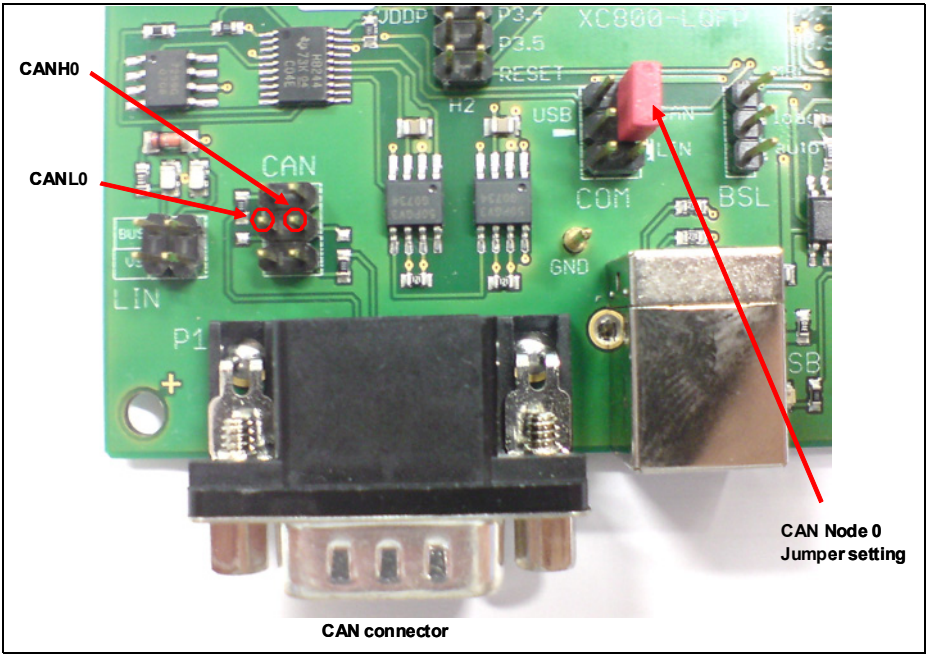

Figure 9-1 Jumper setting of LQFP-Board to connect CAN0 to CAN bus

10 Appendix

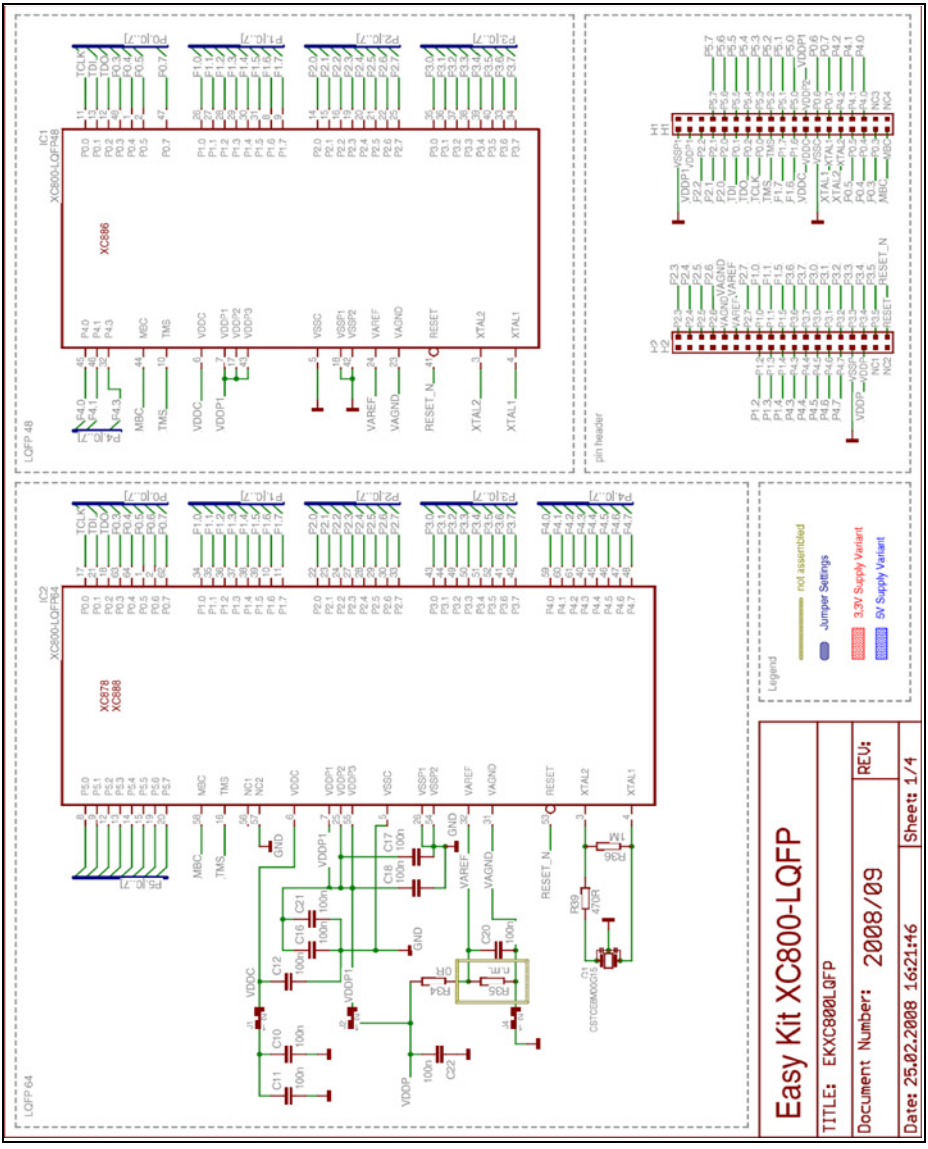

Figure 10-1 Schematic of LQFP-Board and LQFP-Board (Page 1/4)

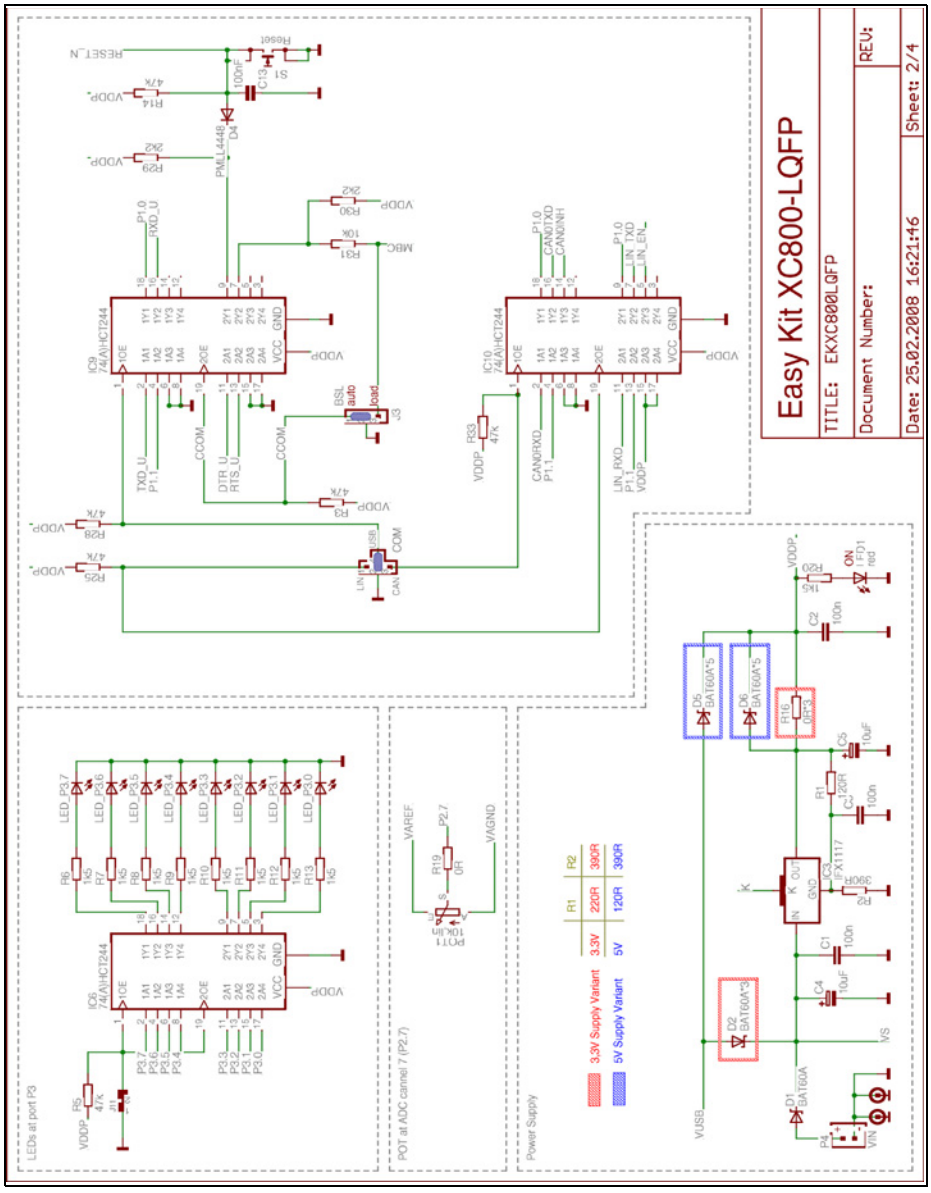

Figure 10-2 Schematic of LQFP-Board and LQFP-Board (Page 2/4)

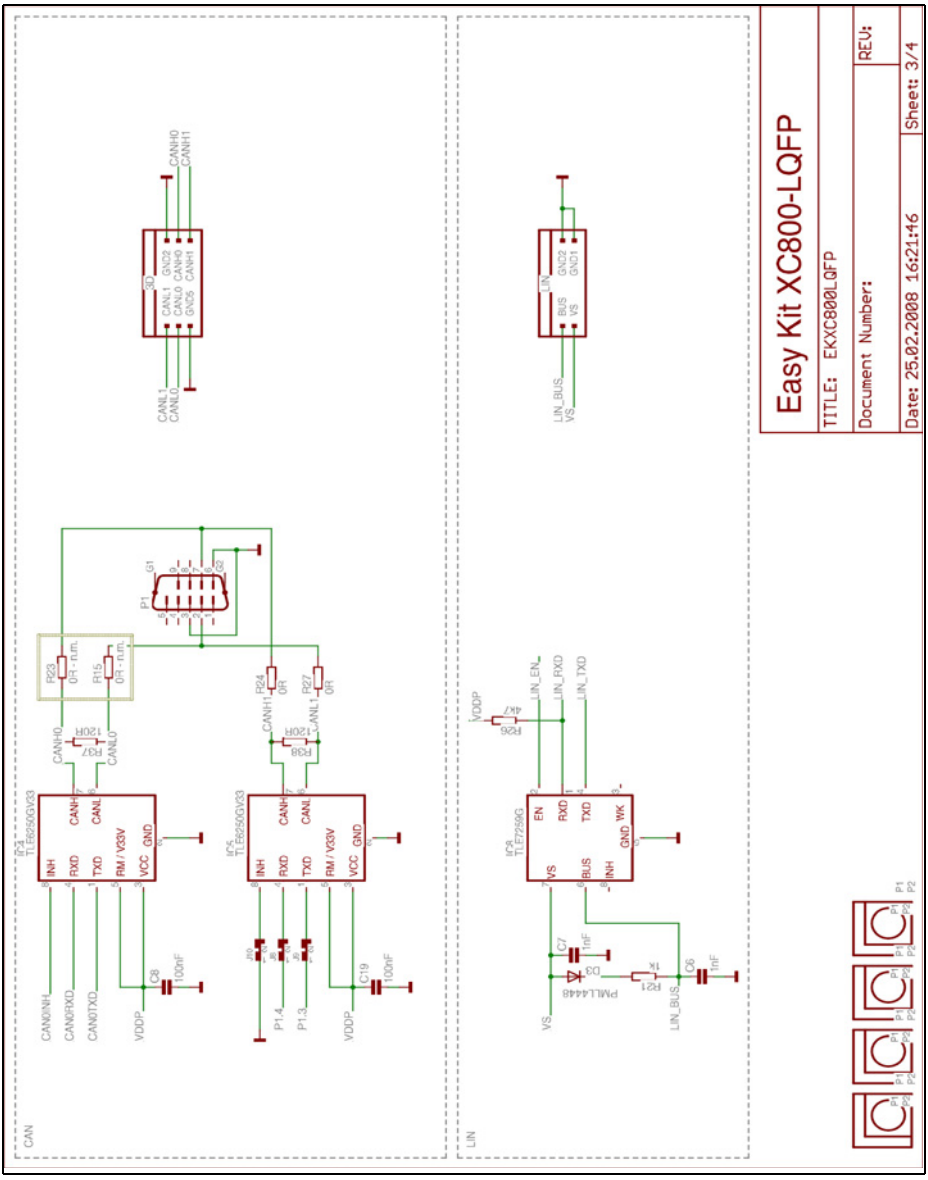

Figure 10-3 Schematic of LQFP-Board and LQFP-Board (Page 3/4)

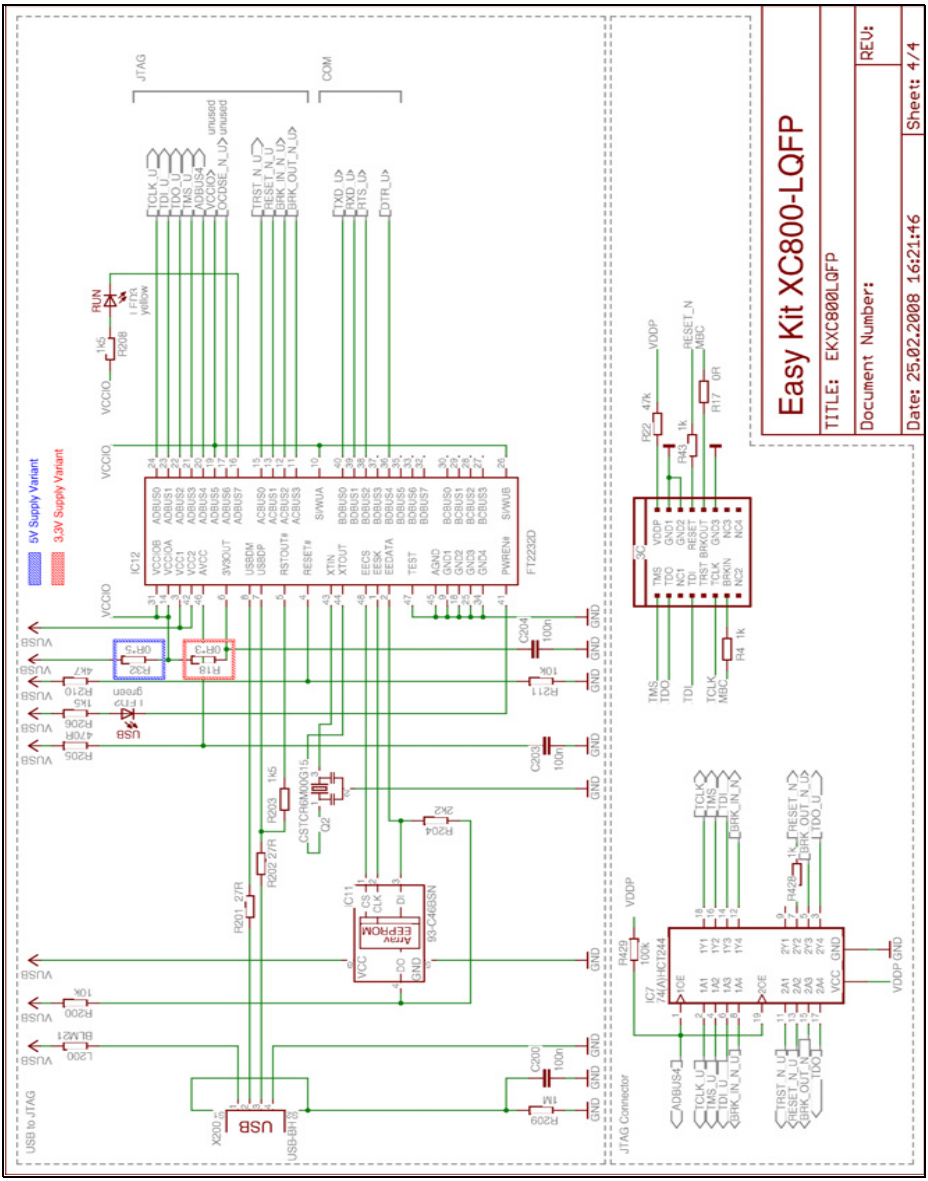

Figure 10-4 Schematic of LQFP-Board and LQFP-Board (Page 4/4)

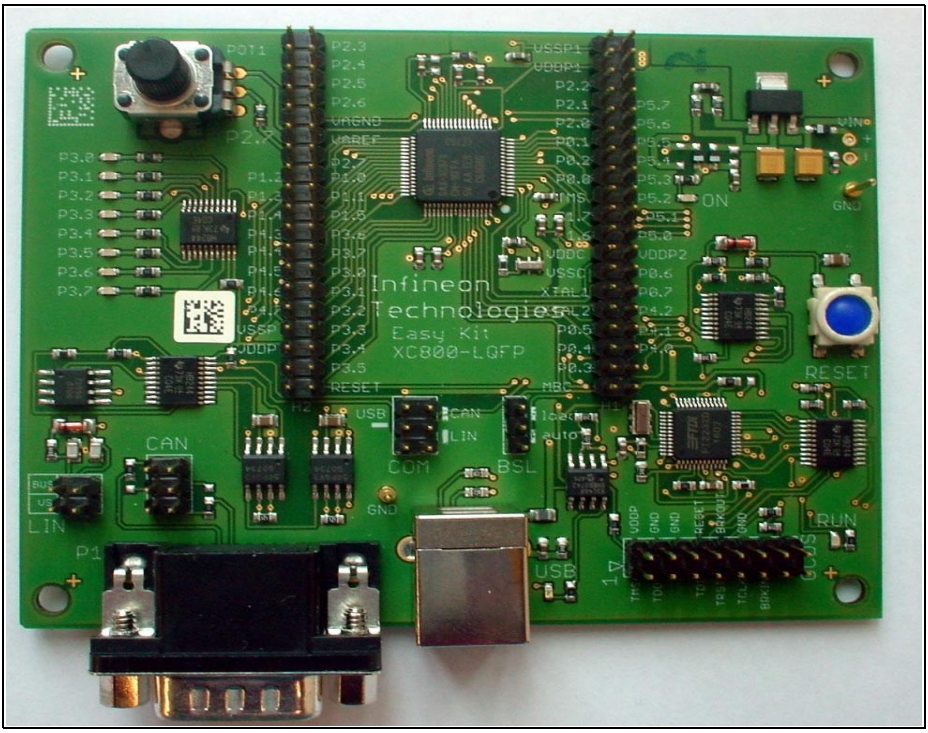

Figure 10-5 Top View of LQFP-Board

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