PIC KICK
USER MANUAL

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Features

1. On-board Microchip's PIC18f4520 microcontroller with serial bootloader (External programmer not required*).
2. Power jack for an external power supply from 8 to 16V AC/DC. Alternatively the board can be powered through the on-board mini USB connector.
3. Connector to support MICROCHIP's programming/debugging product line (ICD2, ICD3, PICkit2 and PICkit3) and similar development tools.
4. On board USB to Serial converter to implement UART communication using the standard USB port on the computer.
5. Direct Port Access to all the port pins for interfacing external circuits and ADD-ONs.
6. 16x2 Character LCD interface operating in 4-bit mode and a potentiometer to vary the contrast of Character LCD.
7. Replaecable crystal of 12MHz to clock the microcontroller.
8. Push button to hardware reset the MCU.
9. Four Push Buttons to provide digital input to selected GPIO.
10. Four LEDs to display status of selected GPIO pins with an option to disable using a jumper.
11. Variable Analog Input using a potentiometer to a selected channel.
12. On board USB connector to communicate over USB.
13. Well-documented top and bottom side for easy hardware troubleshooting.

* If the serial bootloader present on the internal flash rom is erased the microcontroller cannot be programmed using the USB-UART bridge. An external ICSP Programmer would be required to reprogram the bootloader into the flash of the microcontroller.

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Revision History

Revision	Revision History	Date
v1.0	First Release	August 2011

Table of Contents

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Package Contents

- PIC KICK development board with PIC18f4520 microcontroller.
- USB Cable.
- Character LCD.

Getting Started

1. The PIC KICK Development Board ships with the following configuration
   - A PIC18f5420 microcontroller.
   - A 12MHz Crystal.
   - All jumpers in default position. The default position is marked by a bracketed white line set against the jumper position as shown in **Figure.1**.

Jumper placed in default position

Figure.1

2. Power the board either using an external adapter or using the USB port on a computer connected to the USB-UART section. The source of power is selected using the jumper JP1.
3. The microcontroller shipped with the development board comes pre-programmed with an LED demo code. When board is powered ON, the user LEDs start blinking.
4. Explore the User Manual, Application notes and Demo source code which can be found on the website.

Introduction

Firstly we would like to thank you for your interest in PIC KICK development board. We here at ENTESLA believe in providing you quality development tools for realizing your innovative ideas in the field of embedded systems.

PIC KICK is an embedded system development board for Microchip's 40 pin 8-bit microcontroller. It is a low cost kick start board designed to help professionals, students and amateurs to explore the capability of PIC16, PIC18 architecture and practice application development for various interfaces with minimal hardware reconfiguration. The PIC KICK Development board comes with a user manual with schematics, demos and source codes for getting started with PIC18f4520 microcontroller. The user is free to use the libraries provided with the board and make changes suiting their needs.

Safety Instructions

- Read the user manual carefully for exact jumper position.
- Keep the development board away from humid environment.
- Ensure that you supply the board with 9 to 16 Volts AC/DC.
- Disconnect the power supply before connecting LCD or other external circuit.
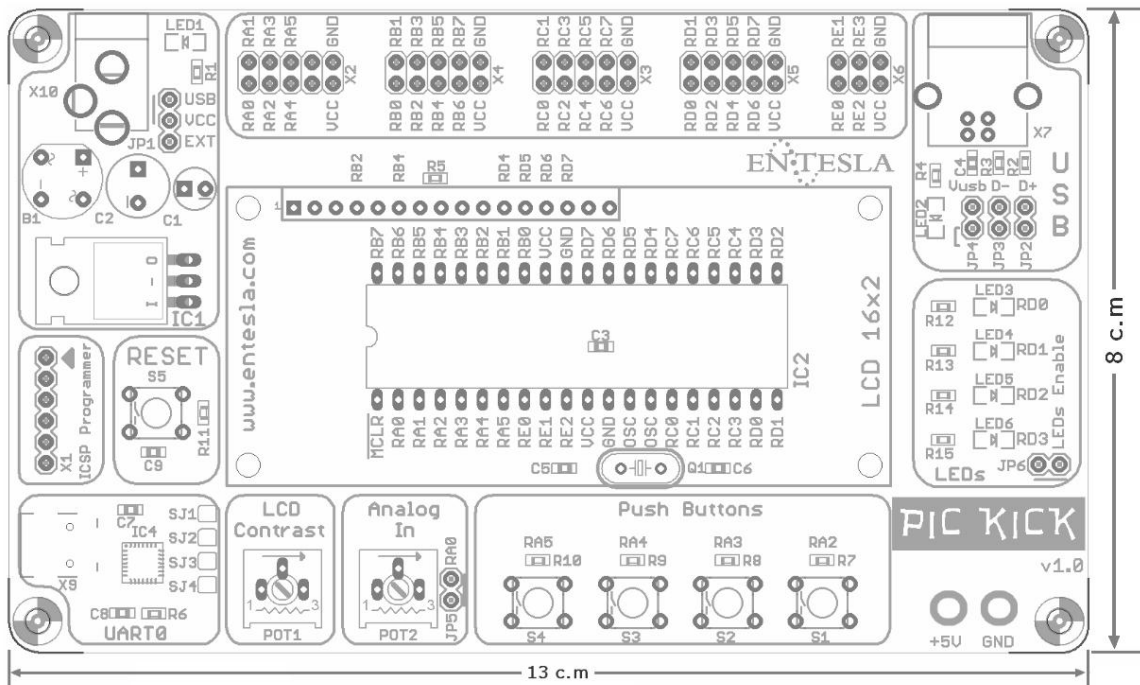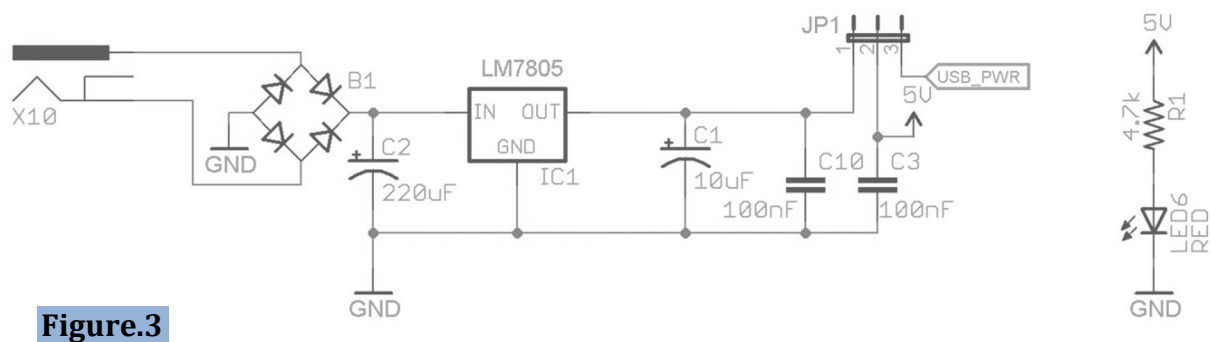- All cautions and warnings should be noted.

Figure.2

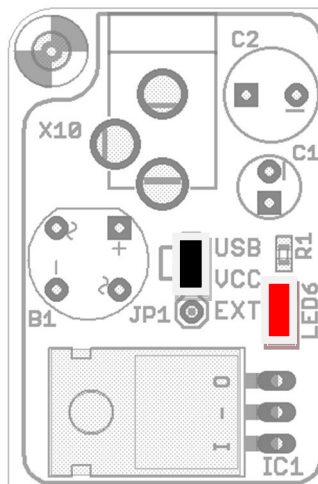ENTESLA Embedded Designs and Solutions

Power Supply

The PIC KICK development board can be powered either using an external power supply or USB. For external power supply, ensure that the output is in range of 8 to 16 Volts AC/DC with a minimum current rating of 200 mA. An onboard LM7805 voltage regulator is used to regulate the AC/DC input to +5V D.C output. Electrolytic capacitors are used to reduce the ripples in the voltage. The ceramic capacitors are used to suppress the high frequency noise present at the output of the voltage regulator.

In absence of external power supply, the board can also be powered by a computer's USB port using the USB-UART bridge. A jumper (JP1) is provided to select the power source and an LED is used as an indicator.

Figure.3 illustrates the schematic of the power supply section on the PIC KICK development board.
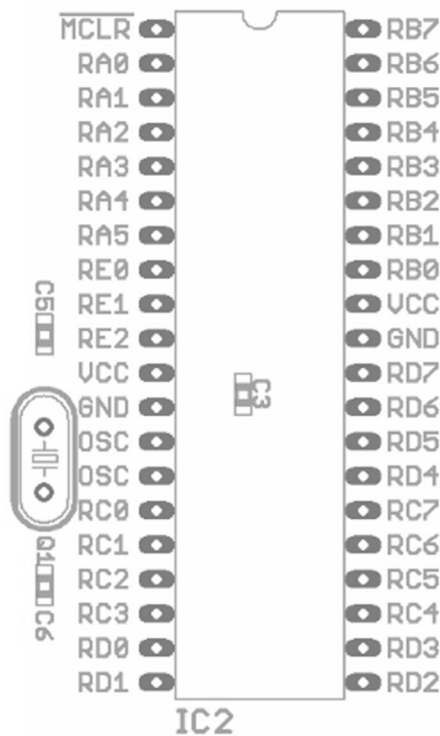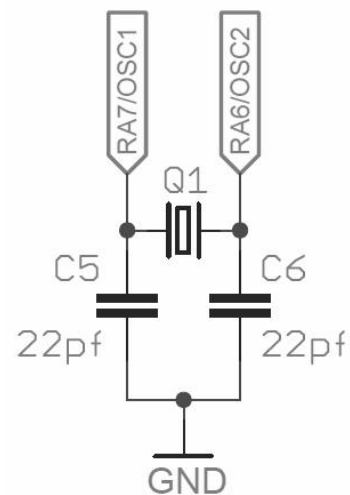

Figure.3

Figure.4

Microcontroller and Oscillator Circuit

The PIC KICK development board features Microchip's PIC18f4520 microcontroller. The microcontroller features 1.5kB of RAM, 32kB of on-chip flash ROM and 256 Bytes of EEPROM. The **Figure.5** below illustrates the microcontroller and the oscillator circuit.

The development board comes with a replaceable 12MHz crystal oscillator. Using the internal PLL block of PIC18f4520, the processor can be clocked at upto 40MHz.
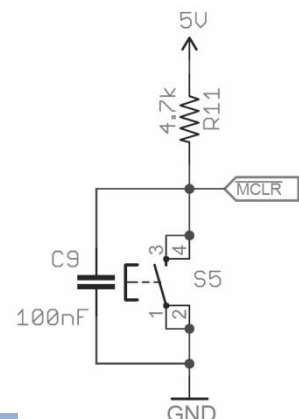

Figure.5

Reset

A reset is generated by holding the MCLR pin low. As shown in **Figure.6.** Reset button can be used to reset the microcontroller. The state of MCLR can also be controlled using a PC based utility or the MPLAB IDE if an ICSP programmer is used.

Figure.6

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Programmer/Debugger Interface

The PIC KICK Development board provides an option to program the microcontroller on-board using the on-chip serial bootloader or using an ICSP programmer.

Programming using On-Chip bootloader

The PIC18f4520 on PIC KICK development board ships with an on-chip serial bootloader. The USB-UART bridge can be used to download the program code into the internal flash rom.
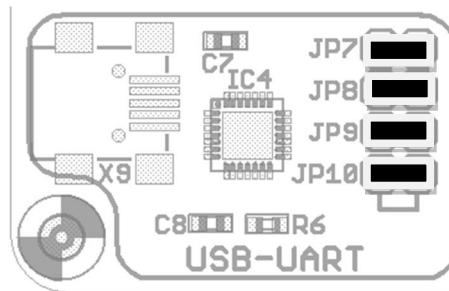

Figure.7

Programming using ICSP Programmer/Debugger

The PIC18f4520 programmer can also be programmed/debugged by In-Circuit System Programming Interface (ICSP) using a compatible programmer/debugger such as PICkit or ICD.
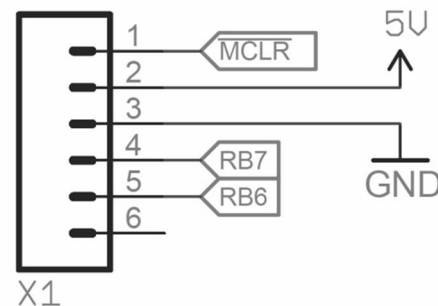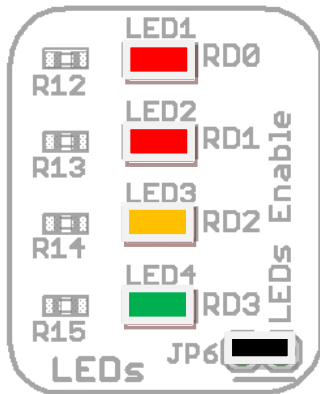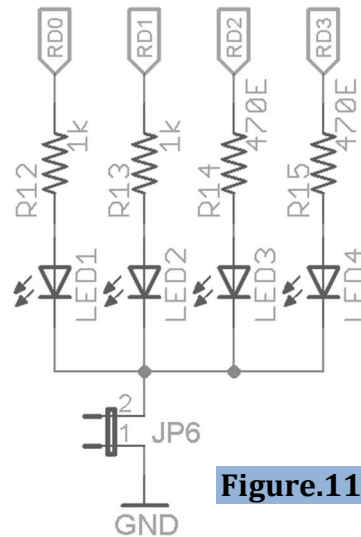

Figure.8

Figure.9

Note: If the serial bootloader present on the internal flash rom is erased the microcontroller cannot be programmed using the USB-UART bridge.

LEDs

There are a total of 4 LEDs connected to the port pins of the microcontroller on PIC KICK Development Board. The LEDs are connected to PORT pins RD0, RD1, RD2, RD3. The jumper JP6 can be used to enable or disable the LEDs on the development board. The schematic of the LED interface is shown in **Figure.11**. The **Figure.10** below shows the jumper position to enable the LEDs.
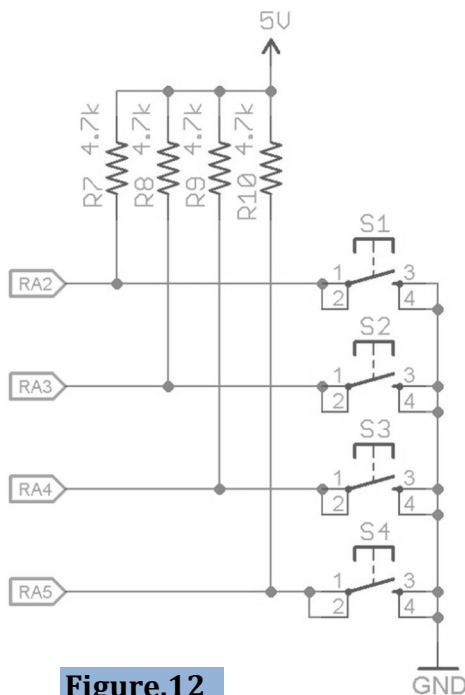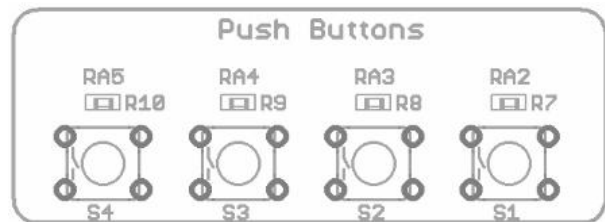

Figure.10

Figure.11

Push Buttons

The PIC KICK Development board has a total of 4 Push Buttons connected to port pins RA2, RA3, RA4, RA5 of the microcontroller. The port pins to which the push buttons are connected are pulled up to define a Logic '1' when button is not pressed. On button press a Logic '0' is applied to the microcontroller. The **Figure.12** below shows the schematic for push buttons interfaced to the microcontroller.
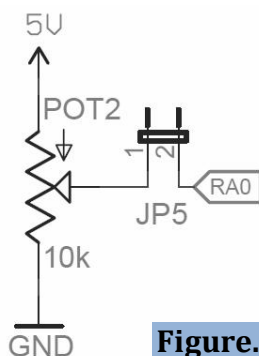

Figure.12

Figure.13

Analog In

The PIC18f4520 has 13 analog channels connected to a 10-bit Analog to Digital Converter. A Potentiometer POT2 provides the analog input to the RA0 pin of the microcontroller. User has an option to enable or disable Analog In to RA0 using jumper JP5. The **Figure**.15 below shows the jumper position to connect analog input to RA0/AN0 channel. The schematic of analog input is shown in **Figure.14**.
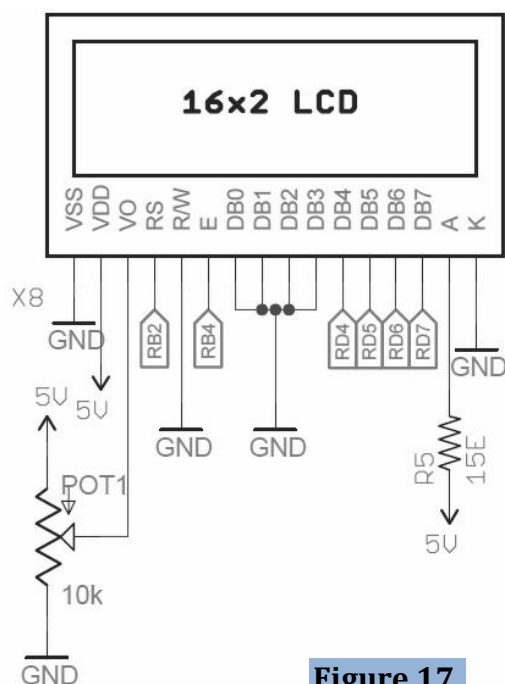

Figure.14

Figure.15

Character LCD (4-bit Mode)

PIC KICK Development board provides a connector to interface a Character LCD of 16 columns and 2 rows. Each character is made up of 5x7 pixels. The data lines of the CLCD are connected to higher nibble of PORTD and control lines to port pins RB2 and RB4. The **Figure.16** illustrates the schematic for operating the LCD in 4-bit mode.
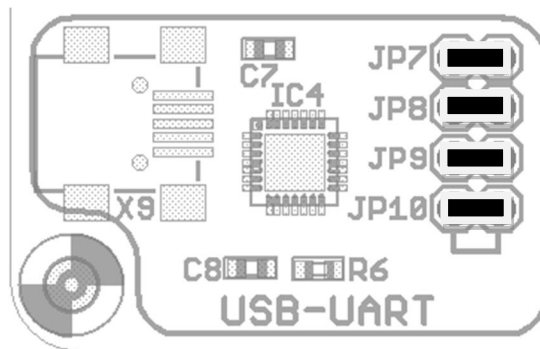

Figure.16

Figure.17

Figure.18

A potentiometer POT1 is provided to manually control the contrast of the LCD.

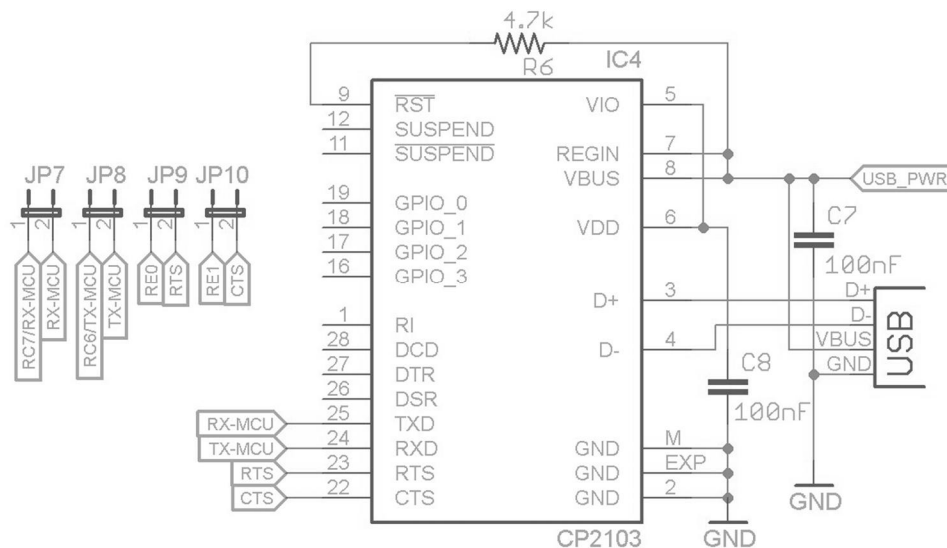**Note: Do not plug the CLCD into its connector while the power is switched ON. It may damage the CLCD permanently.**

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UART

The PIC18f4520 microcontroller features an on chip Enhanced USART peripheral. PIC KICK development board features an on-board USB-UART bridge for establishing a UART communication between the microcontroller and a computer. To isolate the USB-UART bridge for access of the RX, TX, RTS and CTS pins at the direct port access section the jumper JP7, JP8, JP9 and JP10 should be removed.
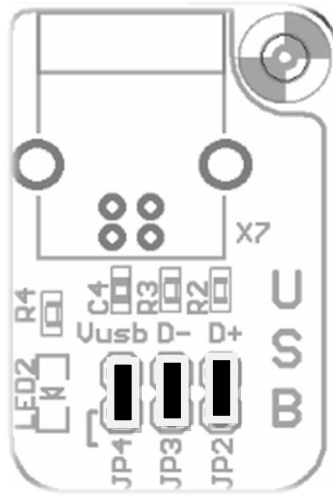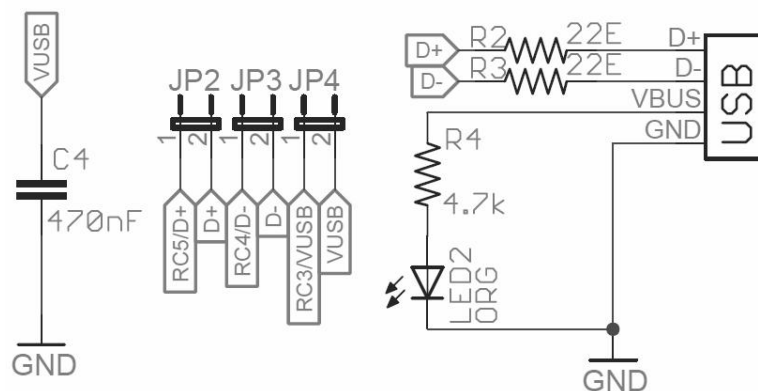

Figure.19

Figure.20

FYI: The PIC KICK development board can be powered using the USB provided in the USB-UART bridge section.

USB

The PIC KICK development board features an on-board USB connector for devices such as PIC18f4550 featuring an on-chip USB peripheral. The USB birectional lines D+ and D-can be connected with such microcontrollers using jumpers JP2 and JP3. An external 470nF capacitor is necessary to stabilize the voltage of the internal 3.3V regulator of the microcontroller. The capacitor can be connected by placing the jumper JP4 as shown in **Figure.19**. An LED is provided as a USB link indicator.

Figure.19

Figure.20

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Direct Port Access

The PIC KICK development board provides access to PORTA, PORTB, PORTC, PORTD and PORTE in the Direct Port Access section. The user can connect ADD Ons and other external circuits to this section using jumper wires or a flat ribbon cable.
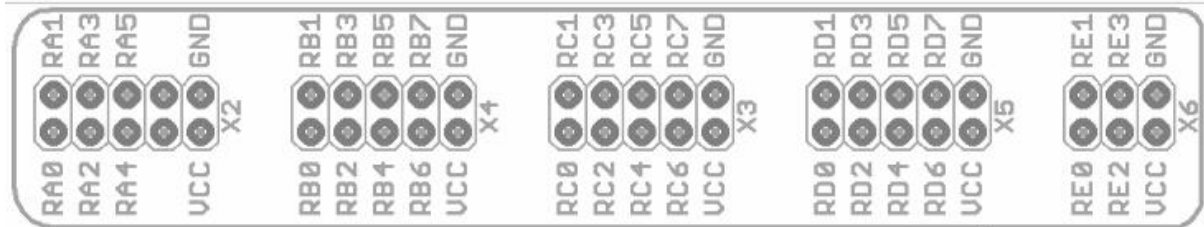

Figure.21

Note: **The port pins RA6 and RA7 are not available on the direct port access section since an external crystal is connected to these pins.**

Notes

For solutions, query or feedback regarding the development tool, source code or the user manual feel free to contact us at **support@entesla.com** or post the same at **www.entesla.com/forums.**

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