

EVAL_DRIVE_3PH_PFD7

Getting started guide

September 2019



Agenda

1 Motor drive evaluation board

2 Hardware and software

3 Tools

4 Getting started

5 Resources

Agenda

1 Motor drive evaluation board

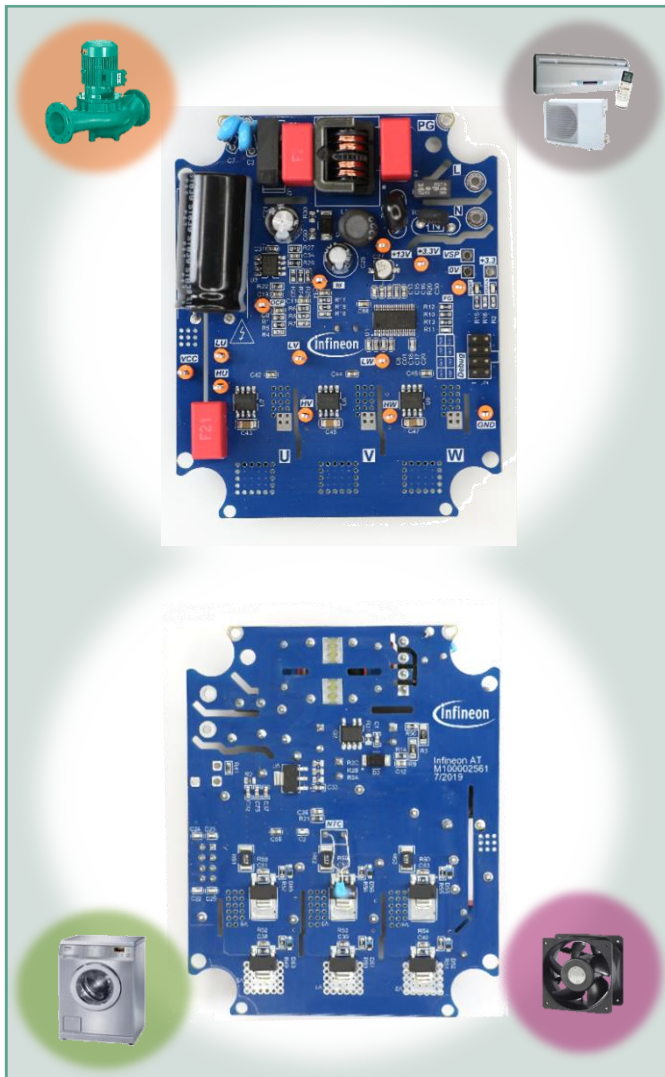
2 Hardware and software

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Introduction



Compact 3-phase motor drive system solution

Designed for **sensorless** motor control

Spin your motor with easy-to-use GUI for tuning of motor

The hardware board and motor control software provides:

- Sensorless control and direct & smooth startup using inductive sensing
- 3 PH/ 2 PH modulation FOC
- Over-current protection
- Speed controlled using GUI

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Components

› **IMC101T-T038 Microcontroller**

- iMOTION™ flexible control solution for variable speed drives. It performs sensor less field oriented control (FOC)
- Includes J-Link debug interface by Segger
- MCEDesigner v2.2-based GUI for parametrization and tuning

Software package (downloadable from www.infineon.com/iMOTION™)

- MCEDesigner
- MCEWizard
- IMC101T-T038 MCE software package installer

› **Half bridge gate driver EiceDRIVER™ 2ED28073J06F**

› **CoolMOS™ IPN60R1K5PFD7S**

System overview

For example the EVAL_DRIVE_3PH_PFD7 Kit consists of:

Hardware

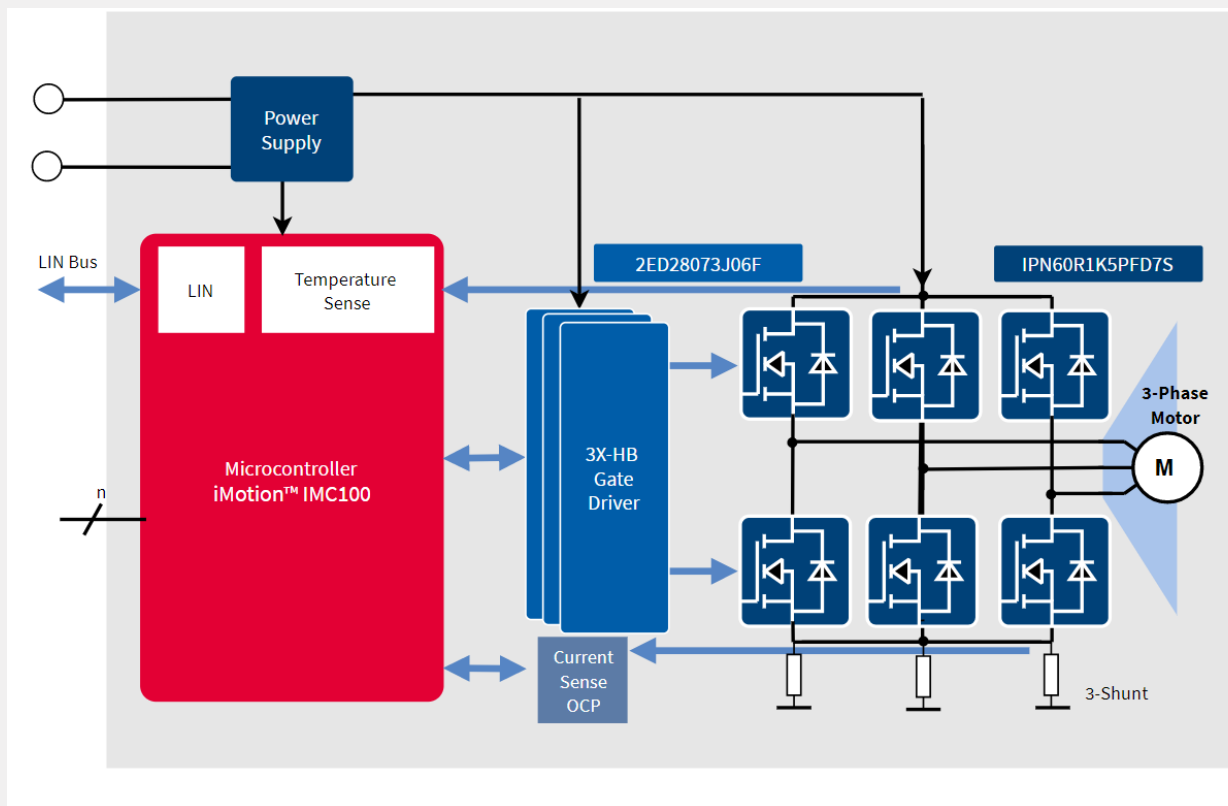
- › EVAL_DRIVE_3PH_PFD7 board
- › KIT_XMC_LINK_SEGGER_V1
- › Micro-B USB cable

Software

- › MCEDesigner
- › MCEWizard
- › IMC101T-T038 MCE software package installer
(downloadable from www.infineon.com/iMOTION™)

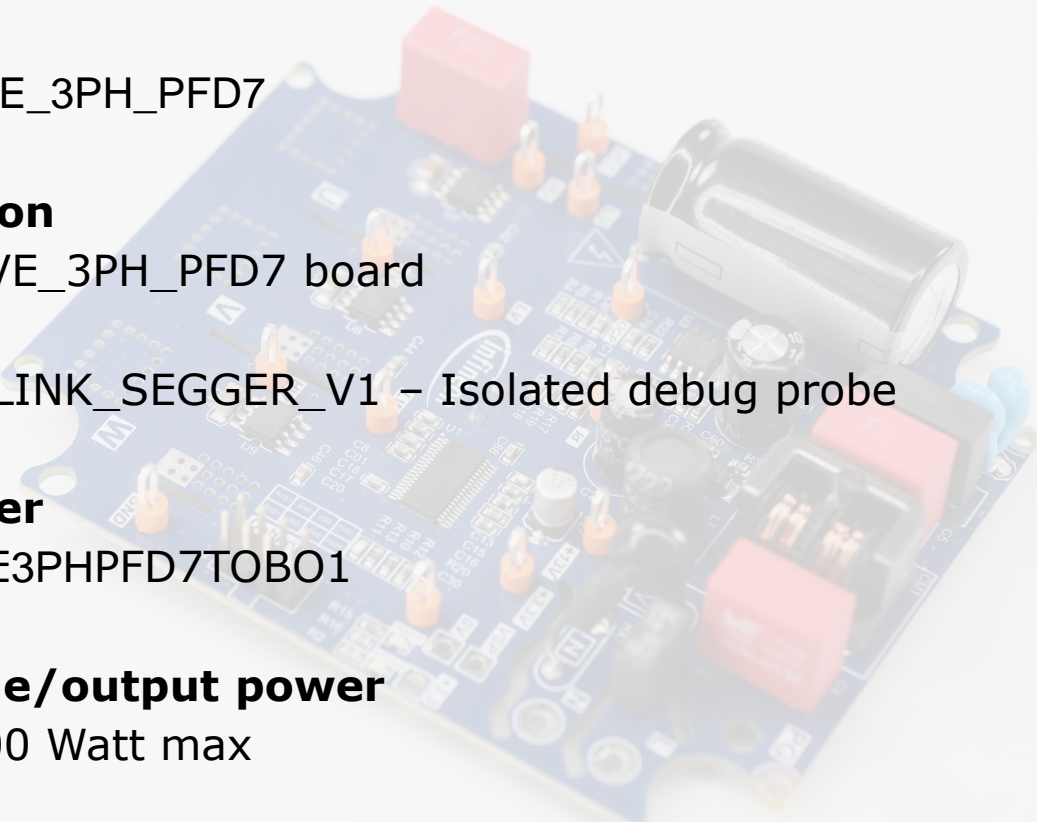
System overview

Block diagram description:



Hardware overview

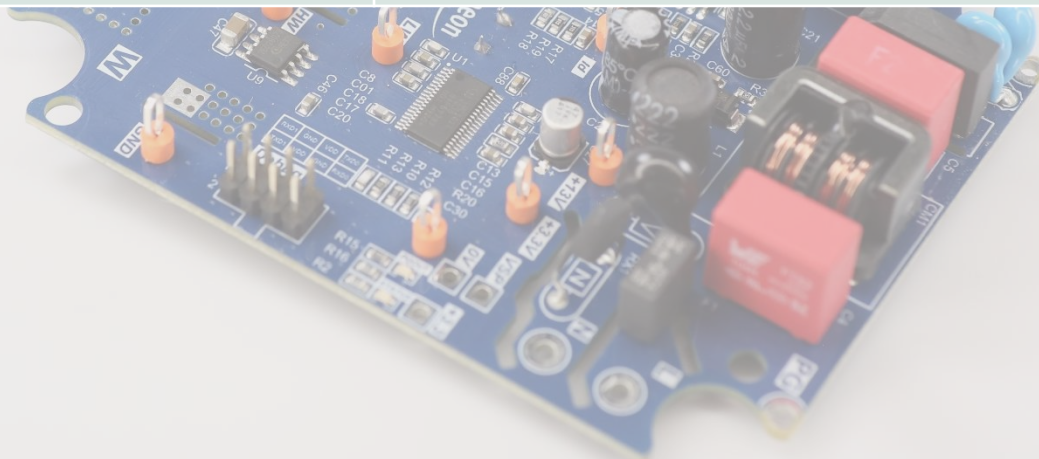
Hardware

- 
- › **Kit name**
 - EVAL_DRIVE_3PH_PFD7
 - › **Kit description**
 - EVAL_DRIVE_3PH_PFD7 board
 - USB cable
 - KIT_XMC_LINK_SEGGER_V1 – Isolated debug probe
 - › **Order number**
 - EVALDRIVE3PH_PFD7TOBO1
 - › **Input voltage/output power**
 - 230 V_{AC}/100 Watt max

Hardware overview

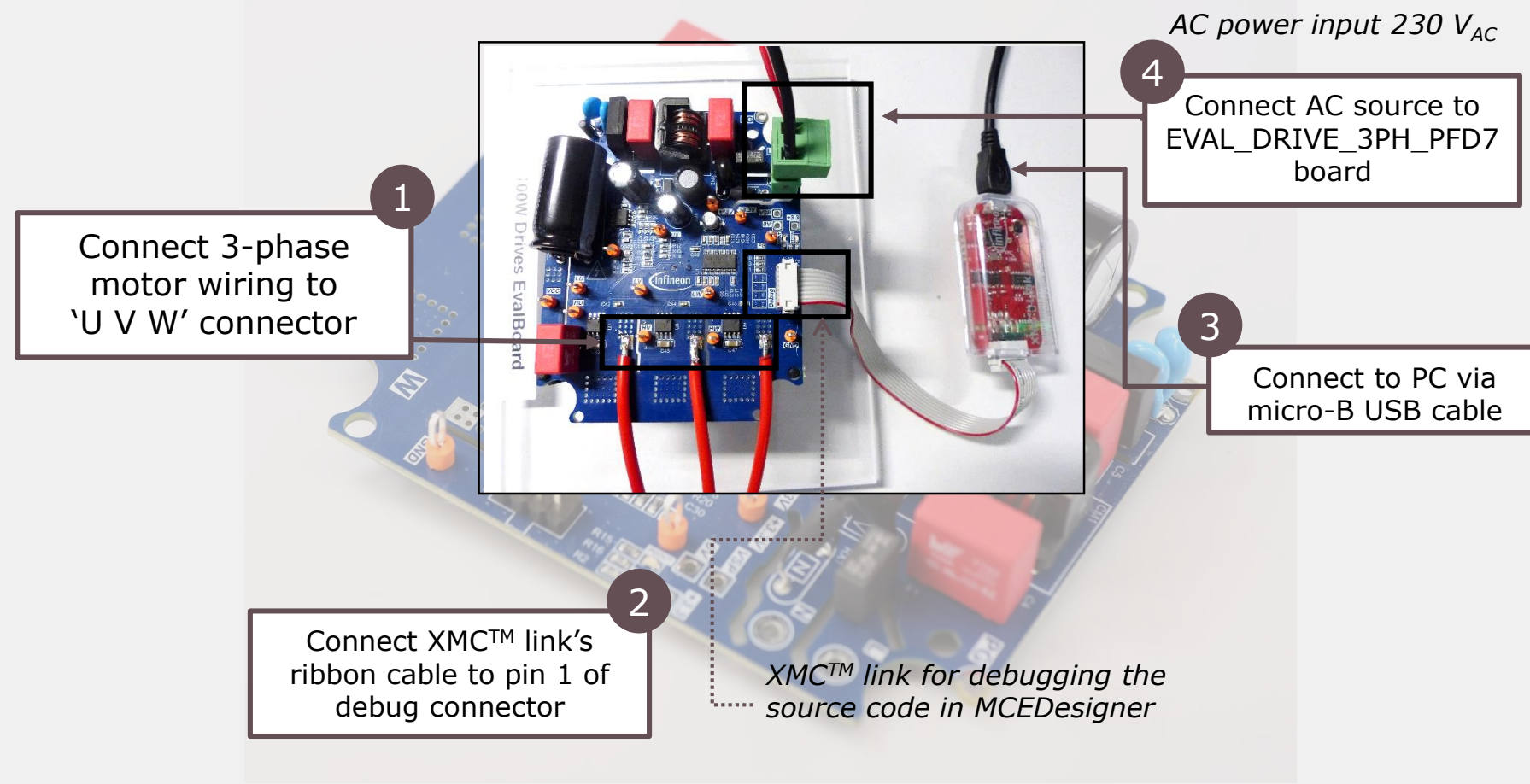
Infineon parts utilized on EVAL_DRIVE_3PH_PFD7 board:

Infineon Parts	Order Number
IMC100 Microcontroller	IMC101T-T038
600 V half bridge gate driver	2ED28073J06F
600 V CoolMOS™	IPN60R1K5PFDS
3.3 V LDO regulator	IFX1117ME V33



Hardware overview

To properly setup the board, follow these steps:



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Software setup



iMOTION™ MCE_Wizard and MCE_Designer

Run the MCE_Wizard and MCE_Designer.exe files and follow the instructions.

Download Micrium μ C/Probe™ for XMC™ installer package from:

www.infineon.com/ucprobeXMC



Installation requirements:

- › PC with Windows 7, Windows 8, Windows 10 – 32 bit & 64 bit
- › RAM – 3 GB or more

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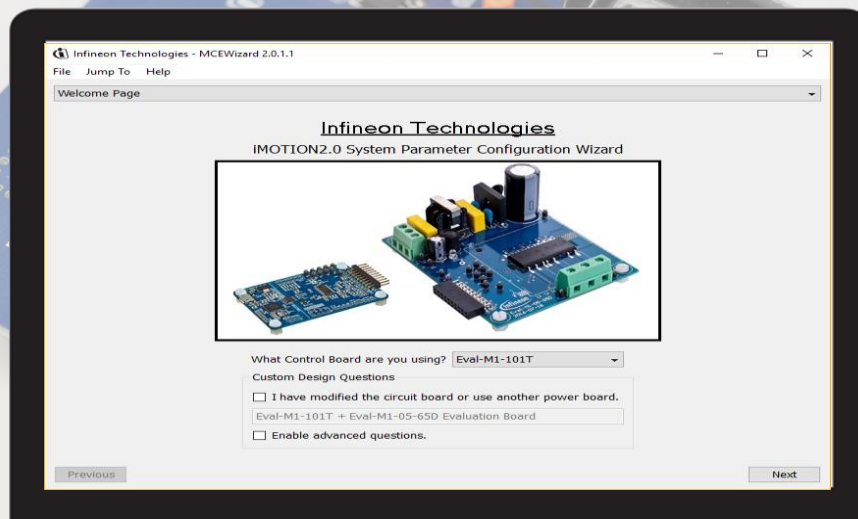
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MCE Wizard step by step

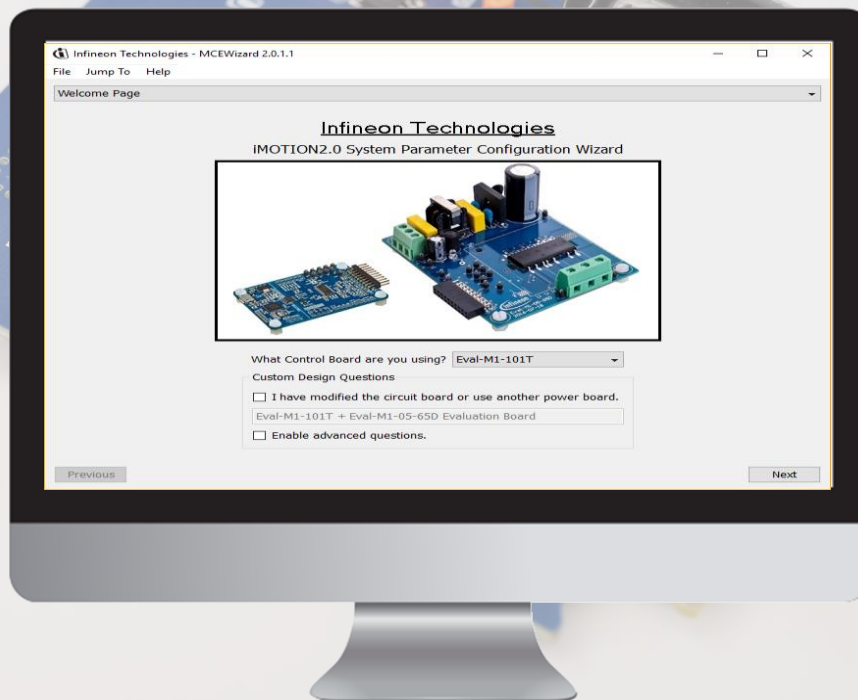
- 1 After installing the MCEWizard, the shortcut for MCEWizard appears on the Windows desktop.
- 2 Double click the shortcut to open the MCEWizard and configure the parameters for evaluation boards or motor.



If both "I have modified the circuit board" and "Enable advanced question" checkmarks are selected. Please refer to the User Manual of the corresponding power board for additional information.

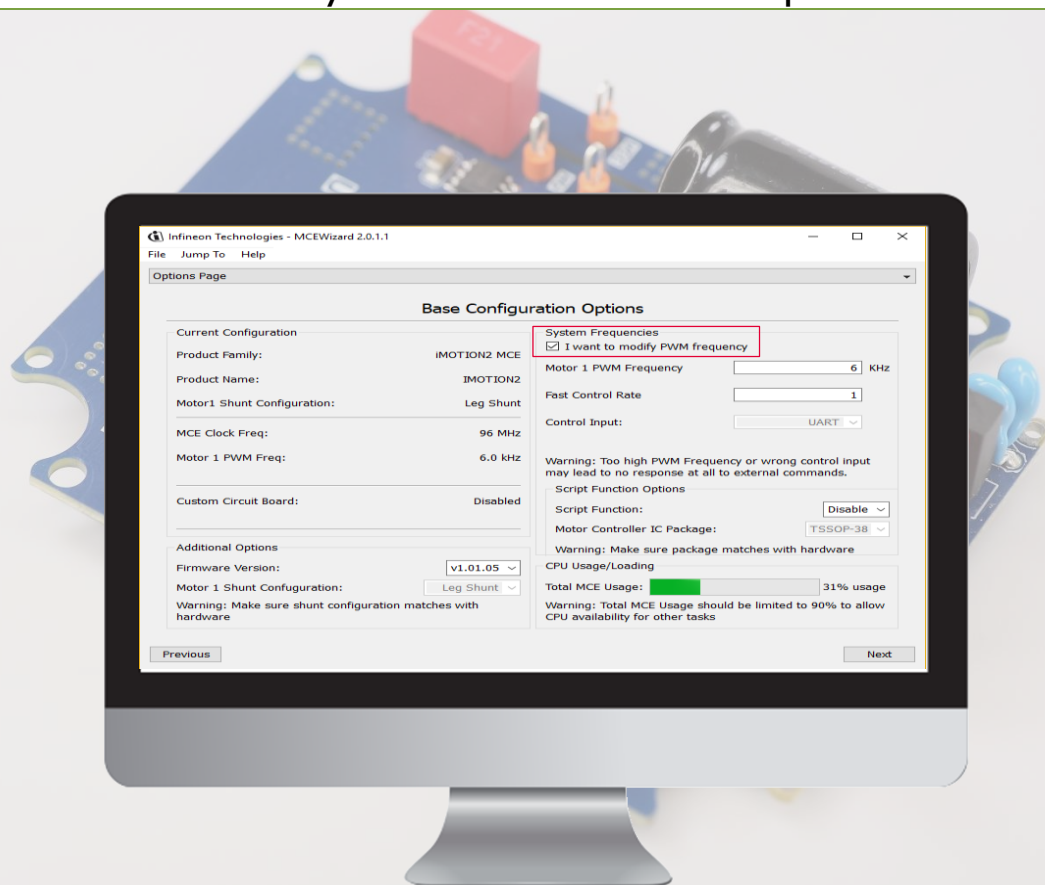
MCE Wizard step by step

- 1 Select the control board, Eval-M1-101T start the MCEWizard system setup procedure by clicking the "Next" button in the right bottom corner.



MCE Wizard step by step

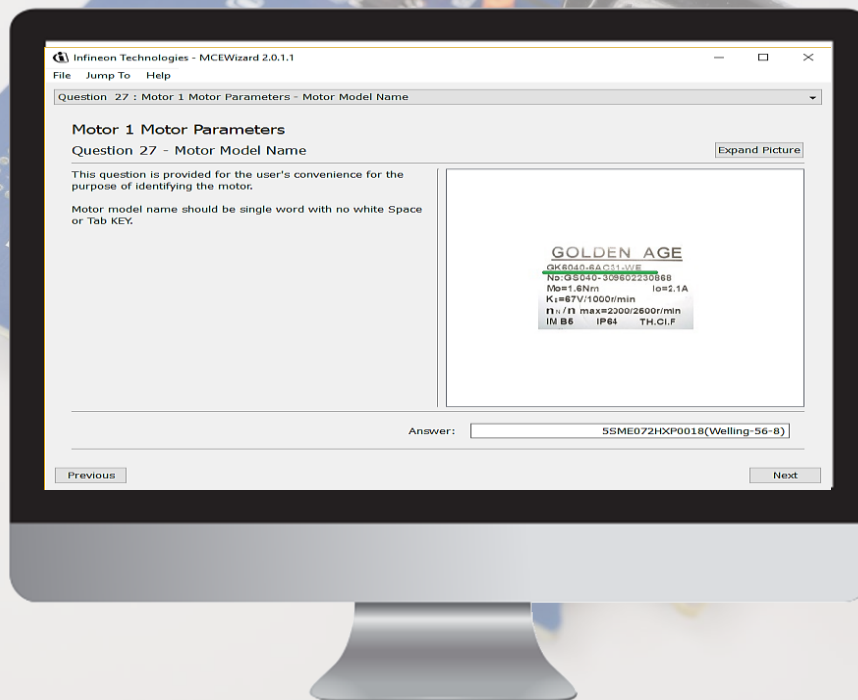
1 Make sure that "I want to modify the PWM frequency" checkmark is selected to be able to modify the motor PWM freq.



MCE Wizard step by step

1

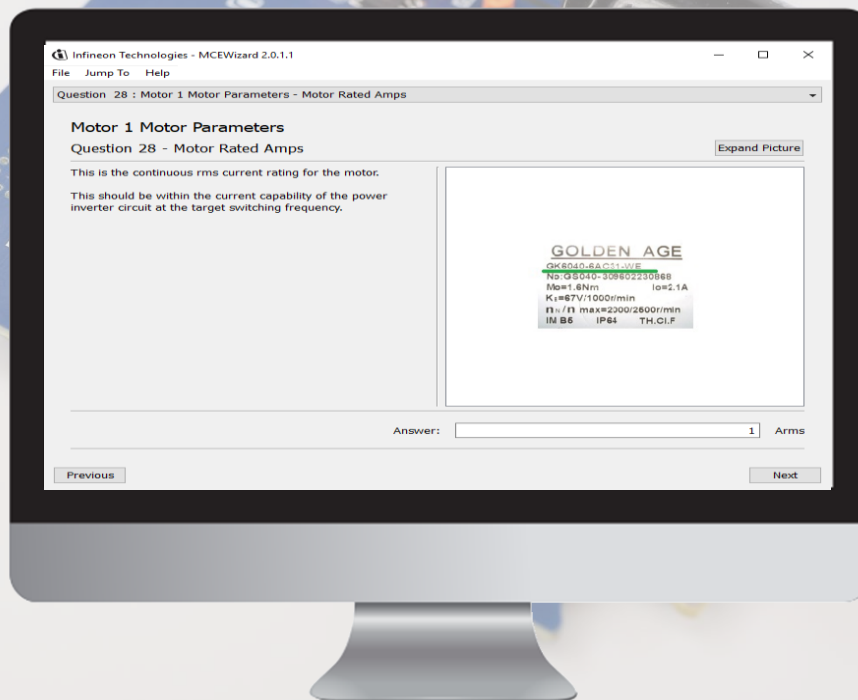
Please insert the motor model name.



MCE Wizard step by step

1

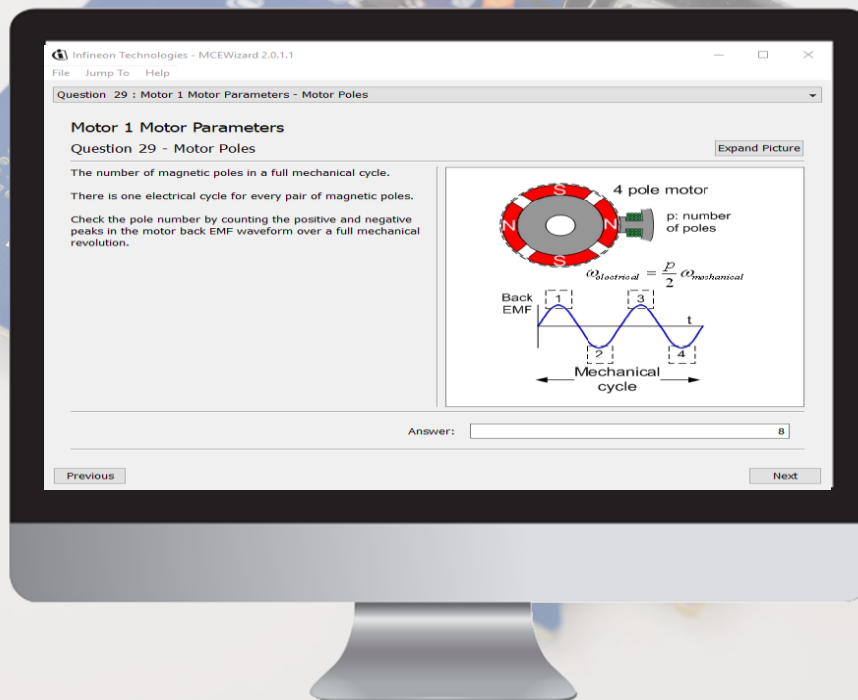
Please insert the motor rated continuous current.



MCE Wizard step by step

1

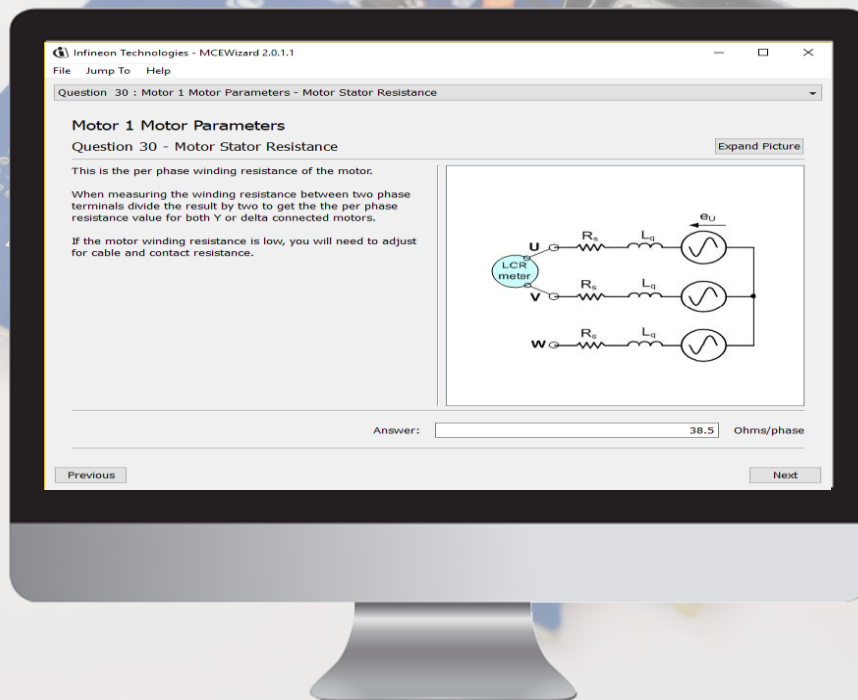
Please insert the motor number of magnetic poles.



MCE Wizard step by step

1

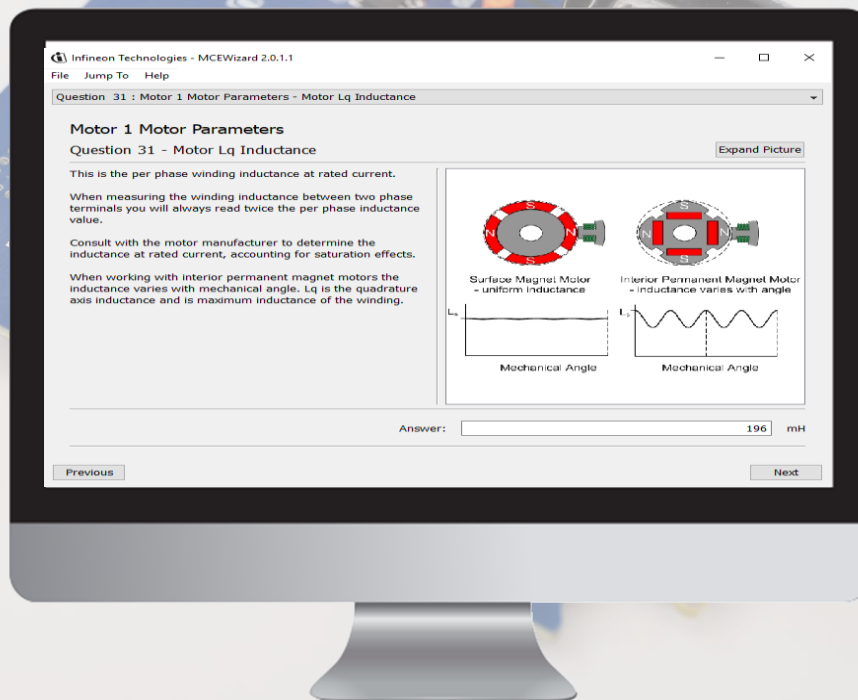
Please insert the motor phase winding resistance.



MCE Wizard step by step

1

Please insert the motor phase winding inductance.



MCE Wizard step by step

1

Please insert the motor back EMF constant (Ke).

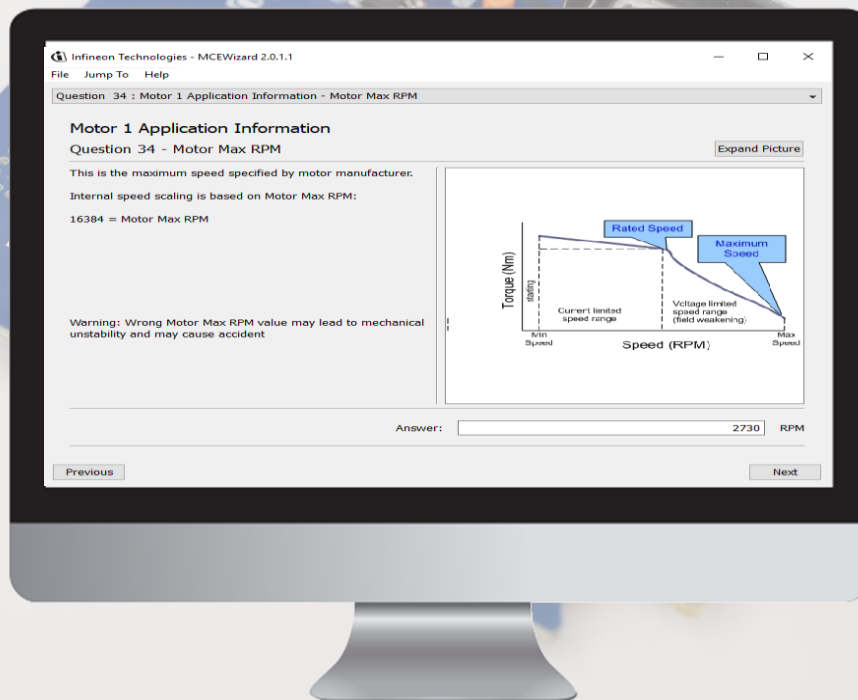
The screenshot shows the 'Motor 1 Motor Parameters' section of the MCE Wizard. The question is: 'Question 33 - Motor Back EMF Constant (Ke)'. The text explains that the line-neutral back EMF constant is expressed in volts rms per 1000RPM and is often printed on the nameplate. It provides instructions on how to check Ke by driving the motor and measuring the line-line back EMF waveform, noting that the measurement can be taken at a lower RPM and scaled to 1000RPM. A diagram shows a three-phase motor circuit with phase voltages E_{UV} , E_{VW} , and E_{WU} and a line-line back EMF waveform E_{ik} with a period $t_{elec} = 1 / f_{elec}$. The answer field contains '36' and the unit 'V(ln-rms)/krpm'.

for additional information on how to measure the back emf please follow the "How to measure motor parameters" document .

MCE Wizard step by step

1

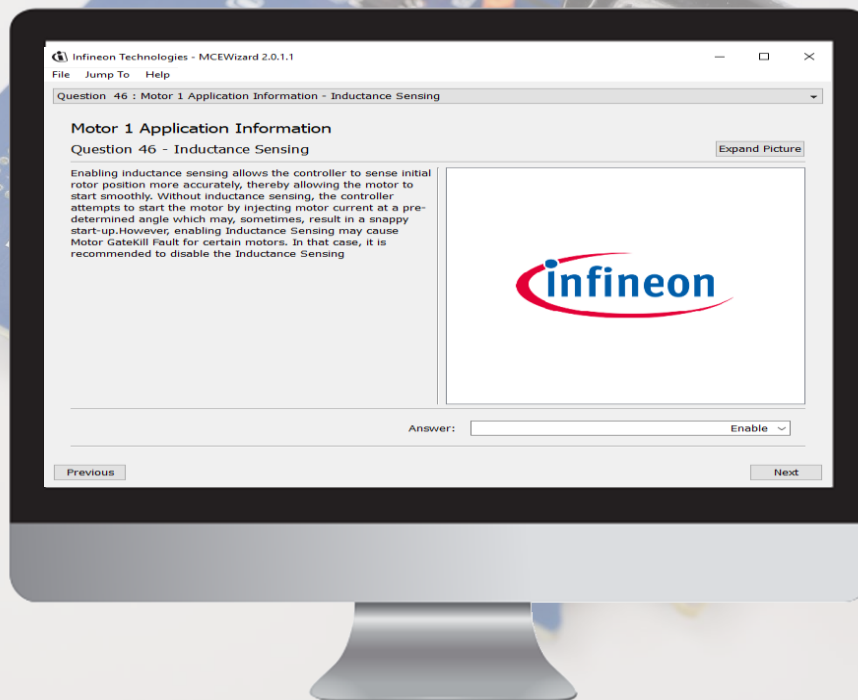
Please insert the motor maximum speed RPM.



MCE Wizard step by step

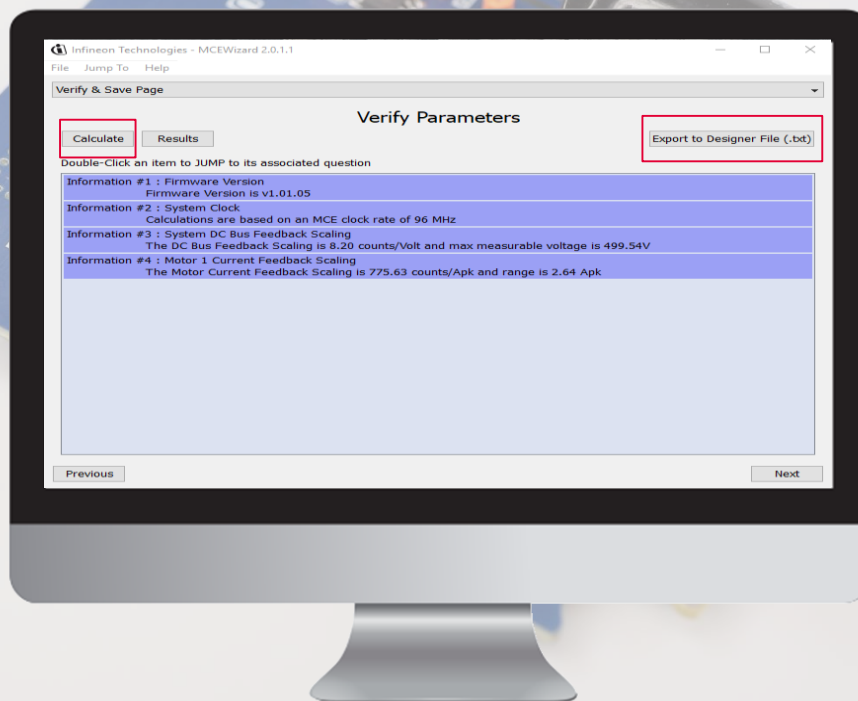
1

Please enable the inductive sensing for smooth motor startup.



Generate the motor parameters file

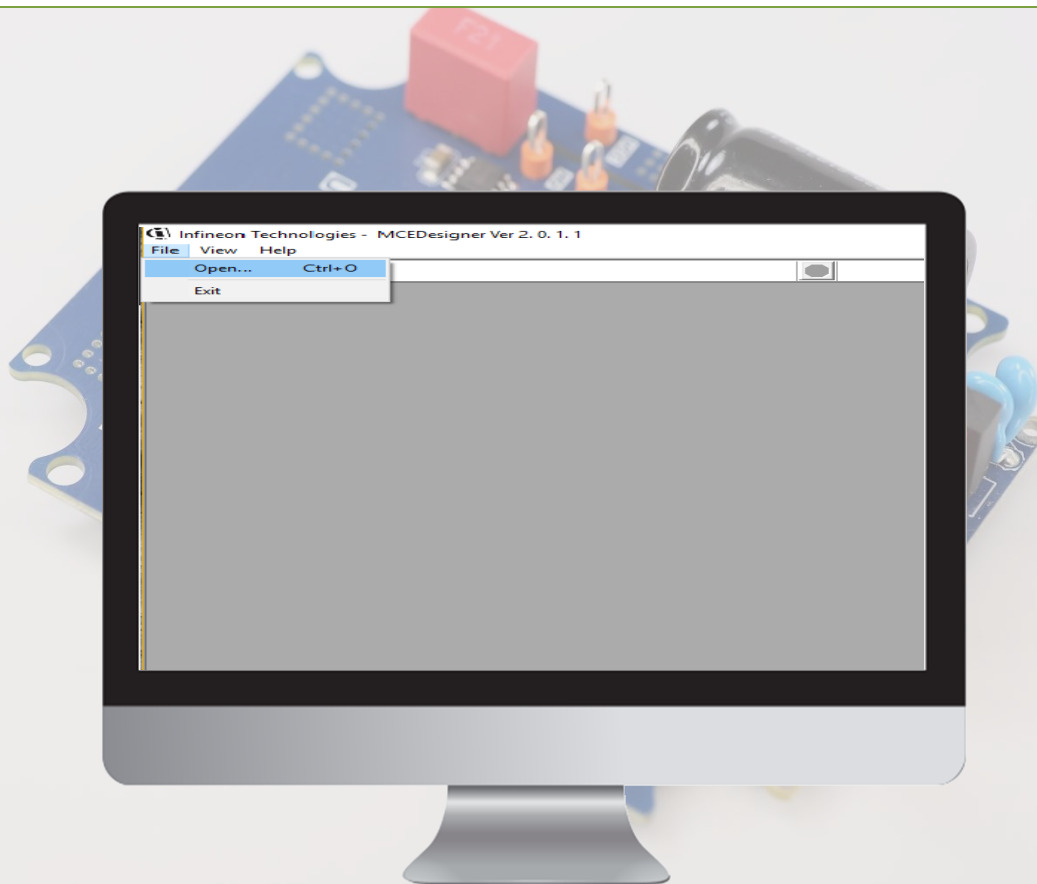
- 1 In the verify parameters window press "Calculate" and then press on "Export to Designer" to generate the motor parameter file.



Load the m/c files

1

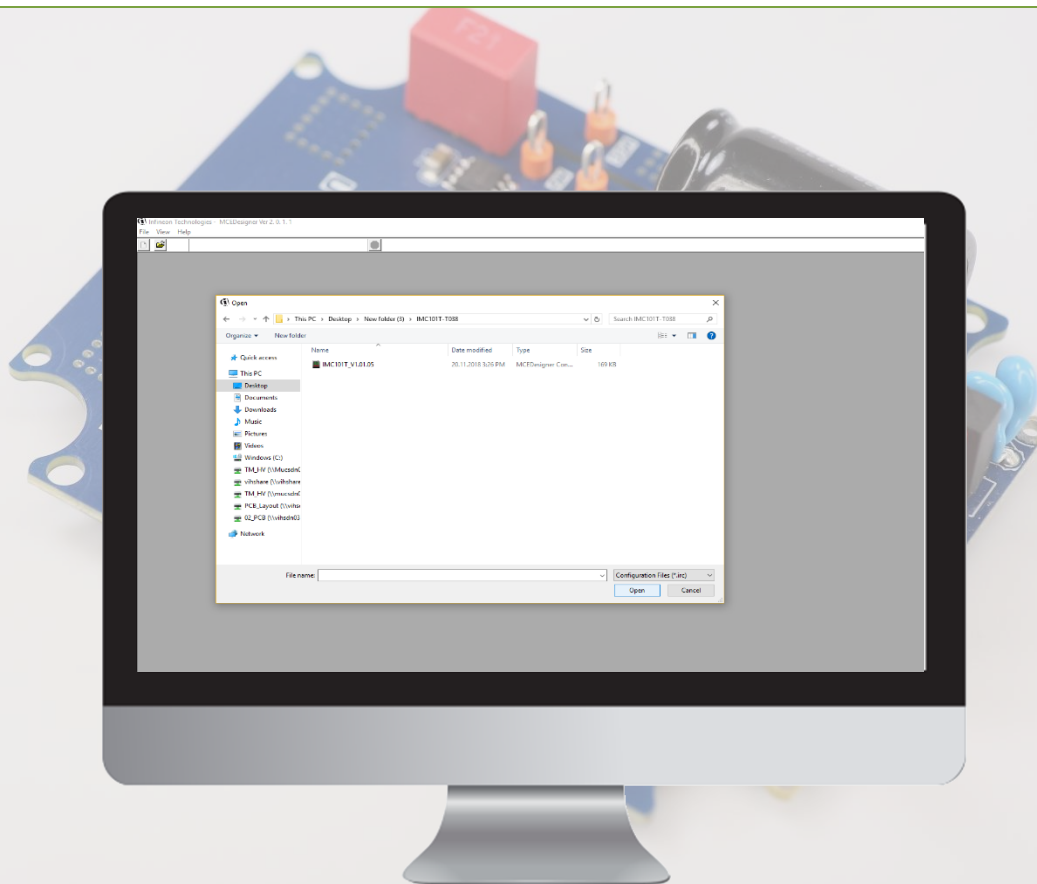
Open the "MCE Designer" go to File -> Open



Load the m/c files

1

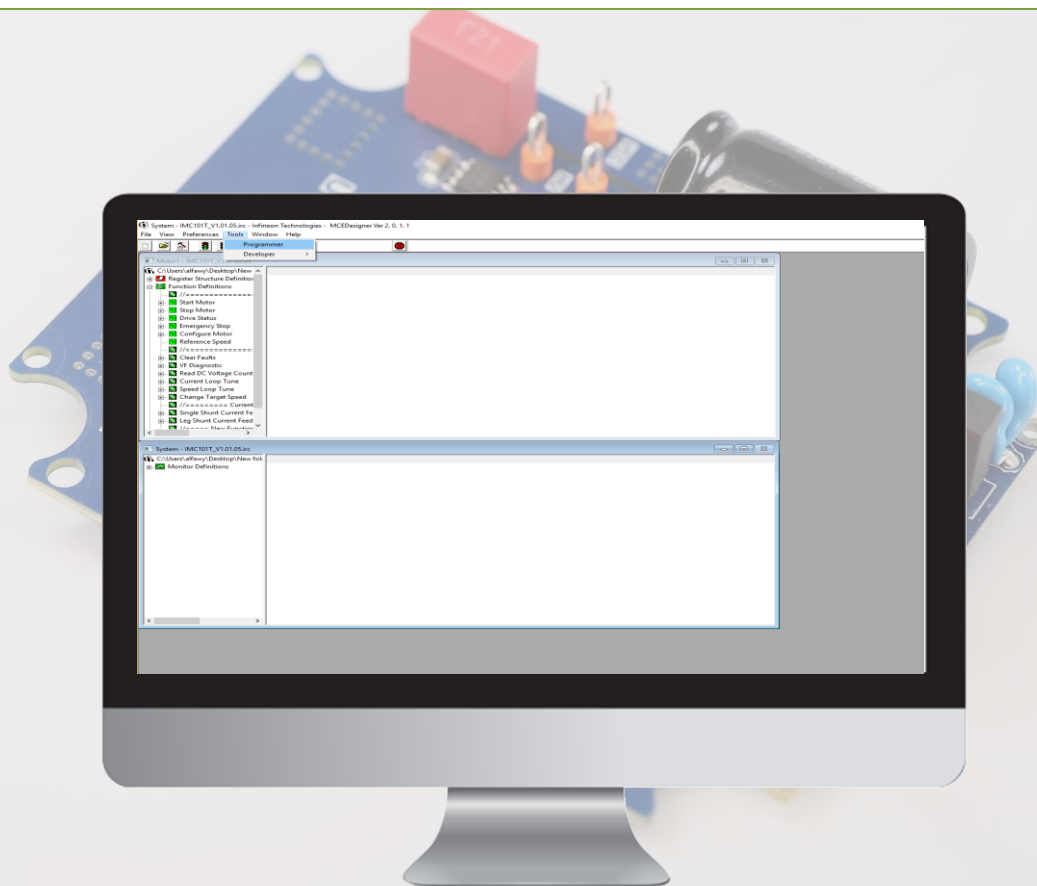
Go to Desktop-> IMC101T-T038 -> IMC101T_V1.01.05 and open



Load the m/c files

1

Go to Tools -> Programmer

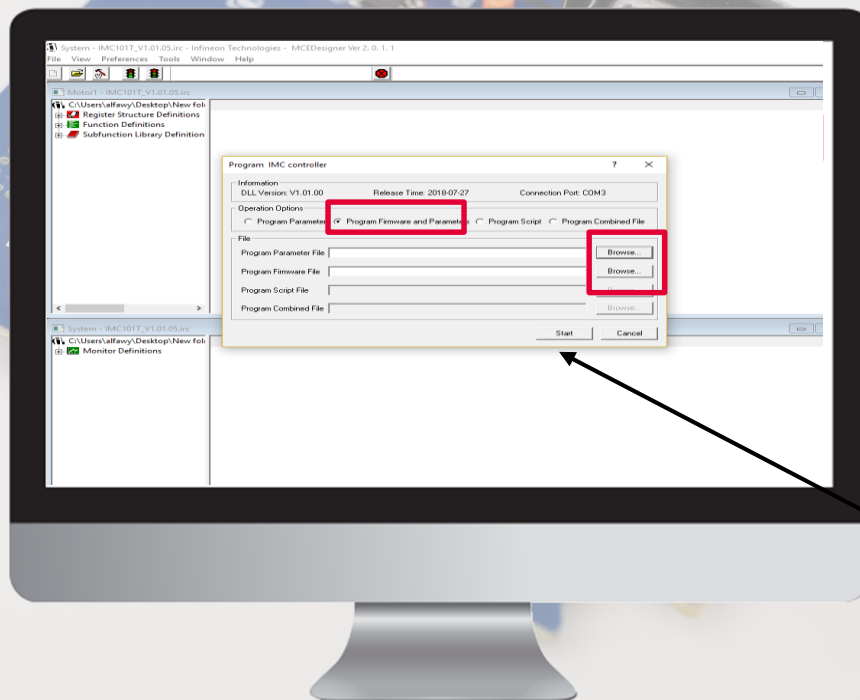


Load the parameters

1

Chose "Program firmware and parameters" PFD7 test.txt and PFD7test

Chose for Parameter "PFD7 test.txt" and for firmware "PFD7 test.idf"

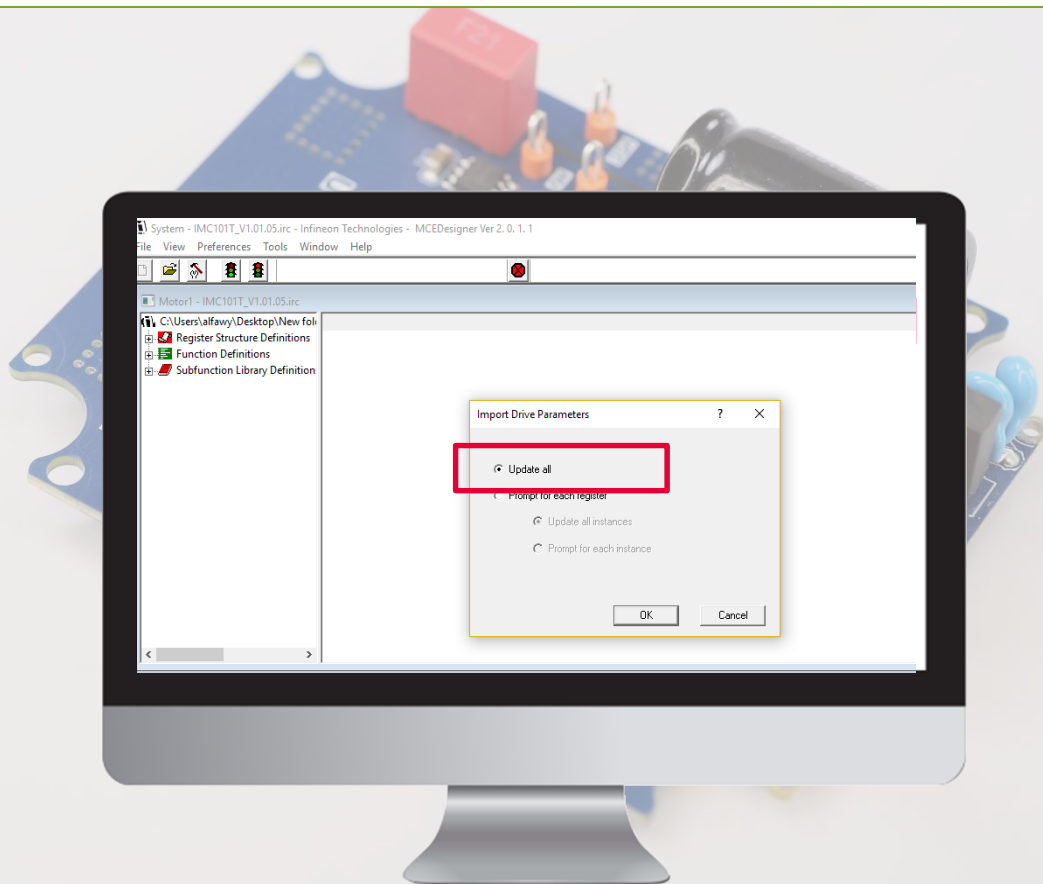


Press Start

Load the parameters

1

Import drive parameters -> Select "Update all"



Start the motor

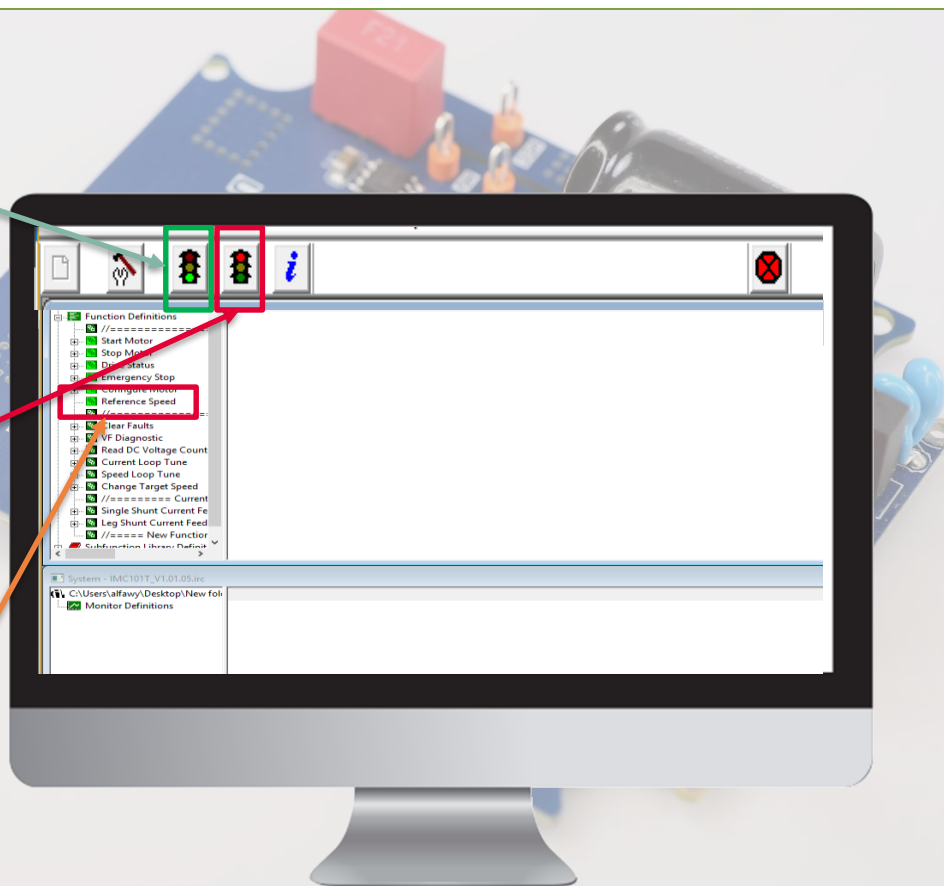
1

Motor now is ready to run

To start motor

To stop motor

Double click on Ref speed to change speed



Agenda

1 100 W motor drive evaluation board

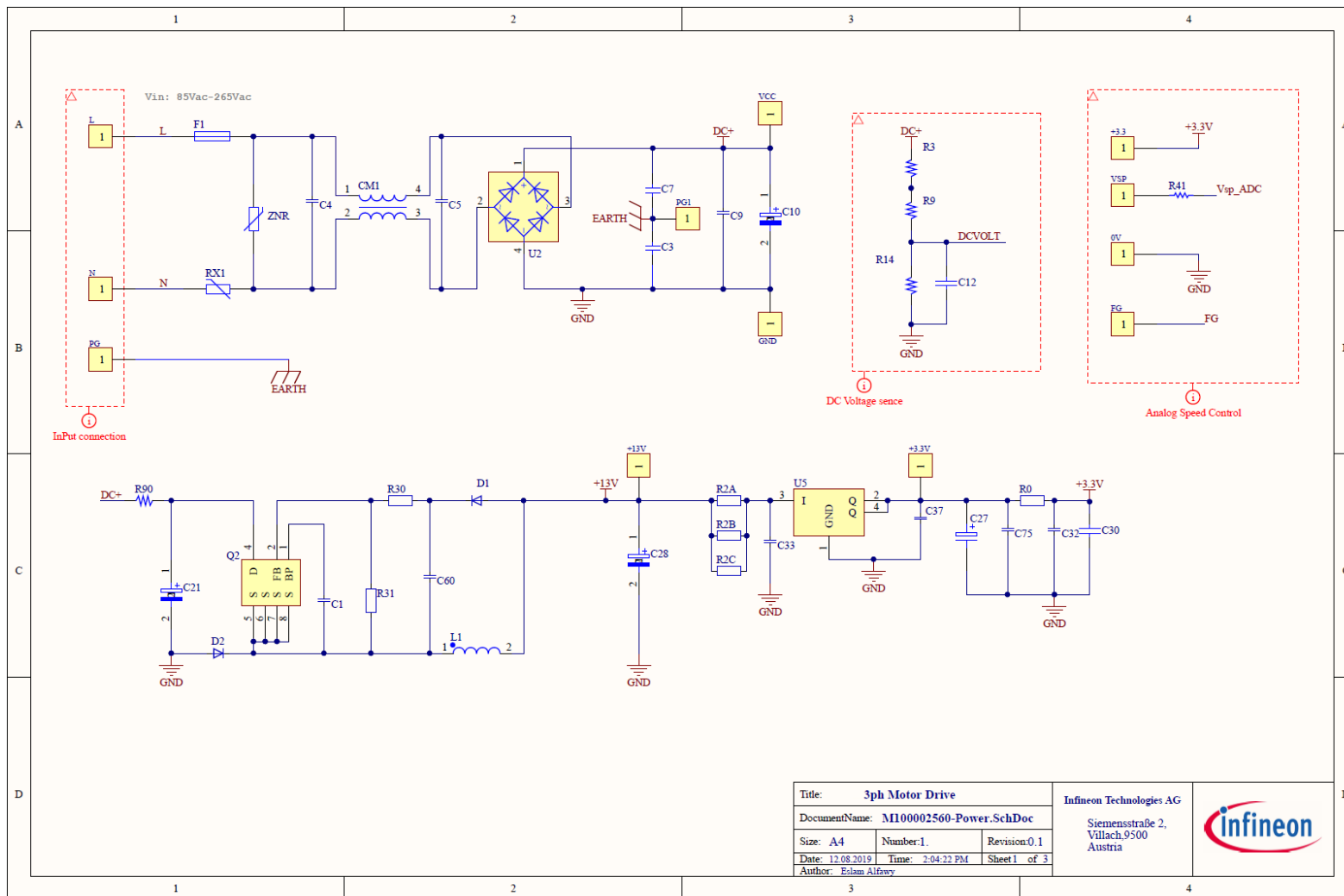
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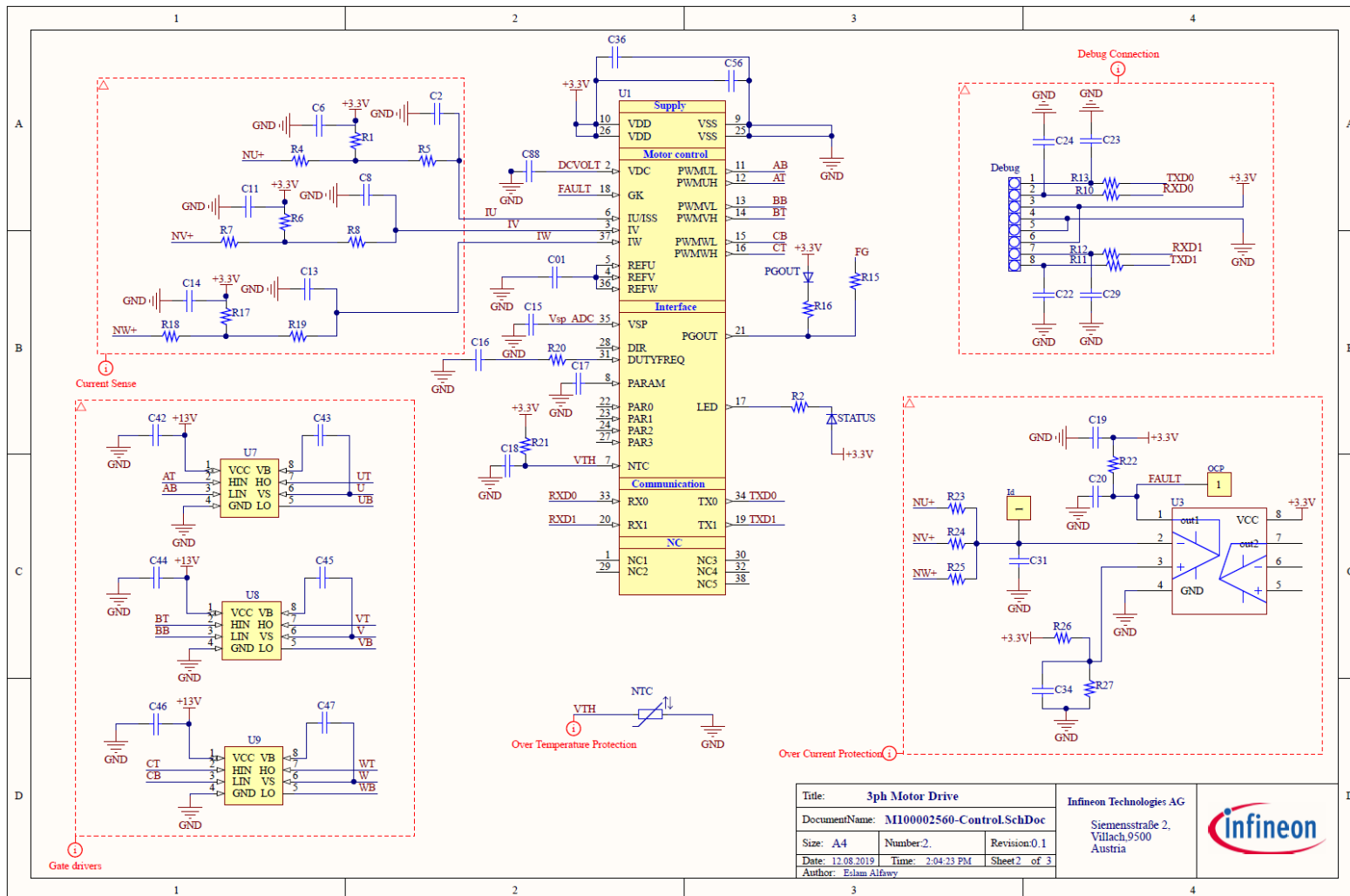
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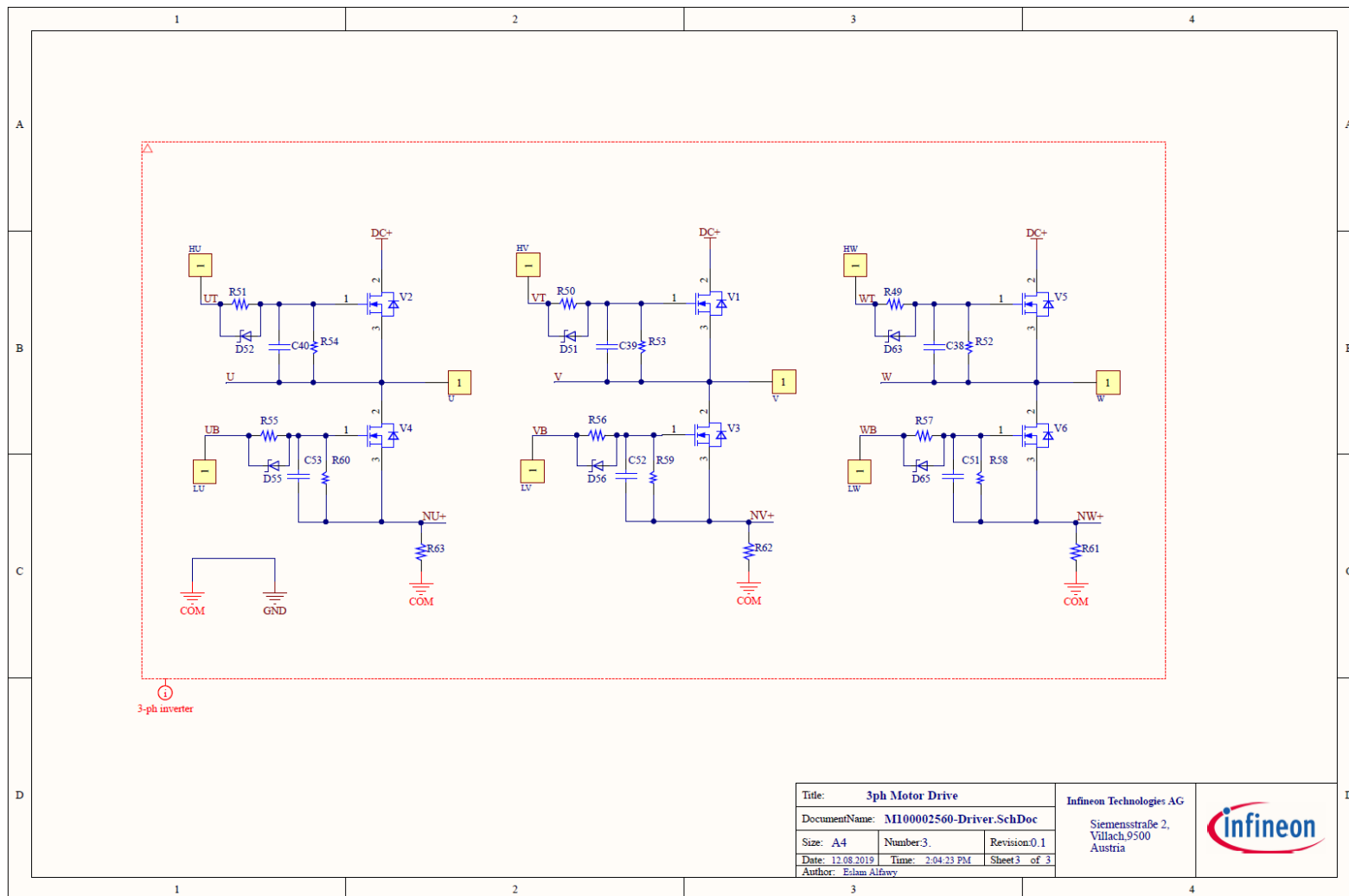
Schematic of EVAL_DRIVE_3PH_PFD7 board



Schematic of EVAL_DRIVE_3PH_PFD7 board



Schematic of EVAL_DRIVE_3PH_PFD7 board





Part of your life. Part of tomorrow.