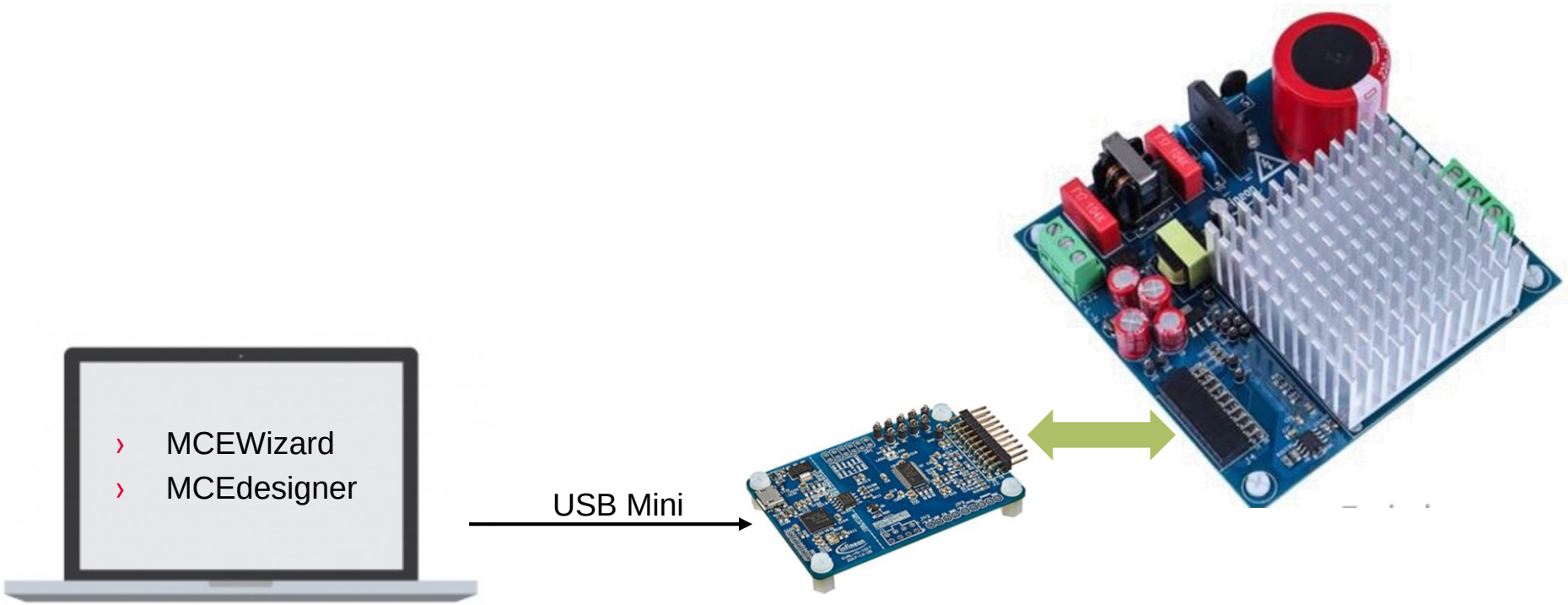
MADK start up guide

Yannick Maurice – December 2019

- restricted -

Hardware requirement (Ex: EVAL-M1-IM231 + EVAL-M1-101T)



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Step 1 – download the software and install MCEdesigner and MCE wizzard

- Download IMC101T Software package (38Pins) : https://www.infineon.com/dgdl/Infineon-MCE_IMC101T-T038_v01_02-Software-v01_02-EN.zip?fileId=5546d4626b2d8e69016b88a47ffb1e2d

- Download MCE designer: https://www.infineon.com/dgdl/Infineon-MCE_Designer-Software-v02_02-EN.exe?fileId=5546d4626b2d8e69016b7be010c17847

- Download MCEWizzard: https://www.infineon.com/dgdl/Infineon-MCEWizard-Software-v02_02-EN.exe?fileId=5546d4626b2d8e69016b7be93ca07858

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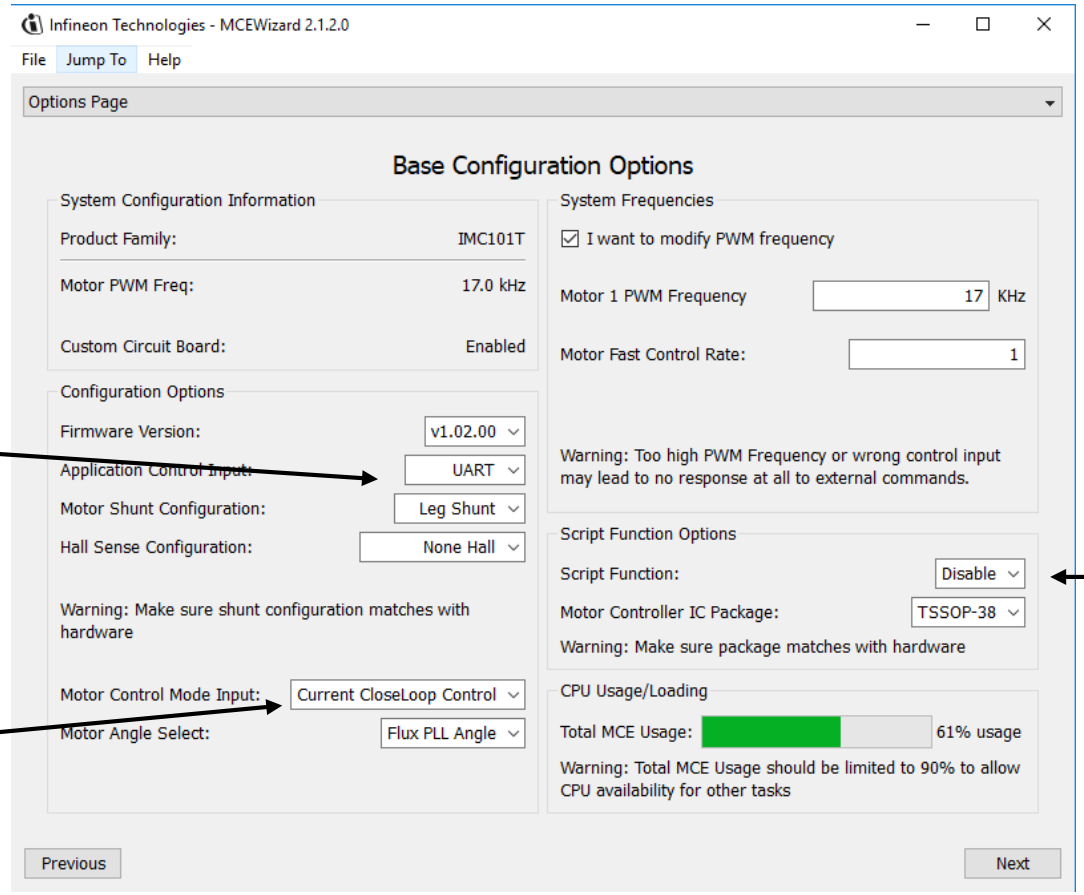
Step 2 – lunch MCEWizard



choose different control input

choose different control mode

Script is for specific and personalized control functionalities

› Ex: EVAL-M1-IM231 + EVAL-M1-101T

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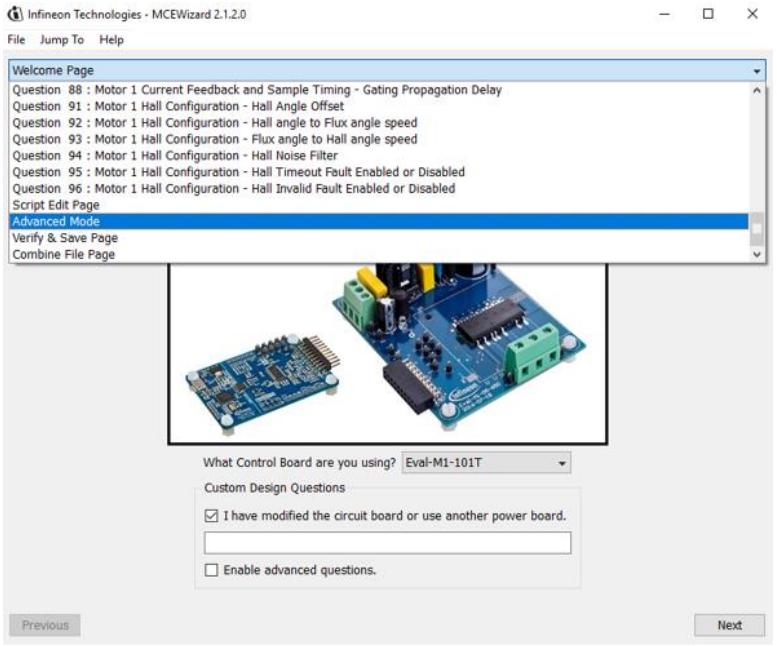
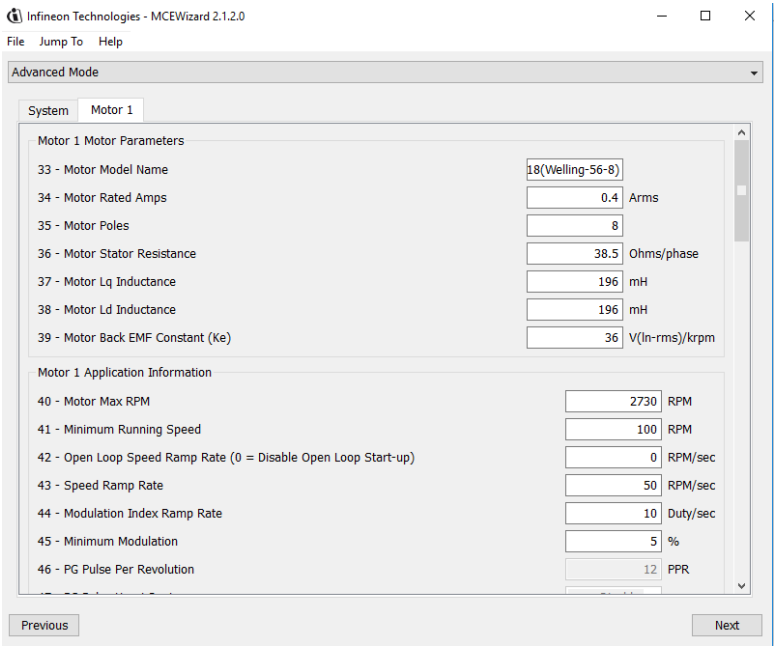
Step 3 – fill up parameters







- Jump to advanced mode for easy and fast programing

- Enter your motor and system parameters

- For EVAL-M1-IM231 + EVAL-M1-101T:
  - System section should be left as it is
  - Overcurrent comparator reference voltage : 0.9666 V
  - Motor 1 current input scaling : 83.3mV/A
  - Internal current feedback amplifier gain: 3

- https://www.infineon.com/dgdl/Infineon-AN2018-36_EVAL-M1-IM231-A-UM-v01_00-EN.pdf?fileId=5546d462689a790c01694827bbf475c8

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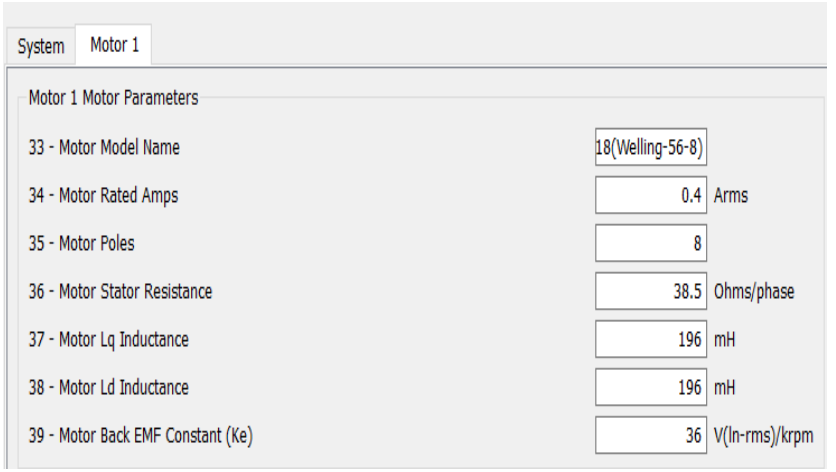
Your motor Parameters

- Motor Rated Amps → this will be used especially for current control mode. IqRef_Ext register can be set up at 4095 and it will represent this value
- Motor Pole → Turn the motor through 1 revolution and measure the back EMF waveforms. Number of negative and positive peaks + Number of Poles.
- Motor Stator Resistance → Attach an ohmmeter to two phase of the motor and record the resistance
- Motor Lq and Ld Inductance → Attach LCR meter to two phase of the motor. Change the position of the rotor seeking out the maximum and minimum value of the inductance. Repeat for other phase combinations. Lq = Average the maximum values, Ld = Average the minimum values .
- Motor Back EMF Constant (Ke) → record back EMF waveforms between 2 phases :

$$Ke = 1000 * ([rms\ Voltage] / \sqrt{3}) / ([frequency] * 120/poles)$$



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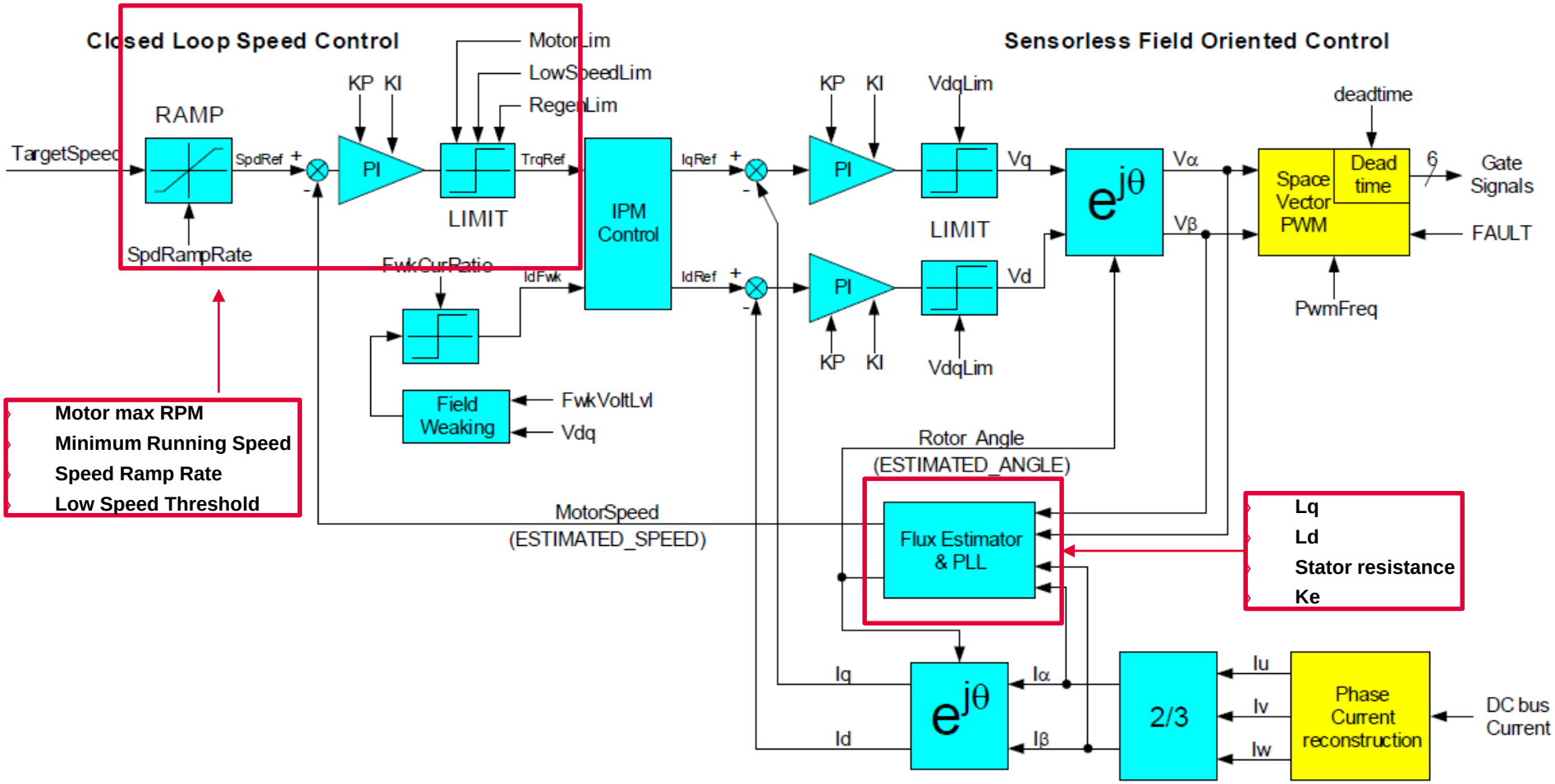
Sensor less Field Oriented Control



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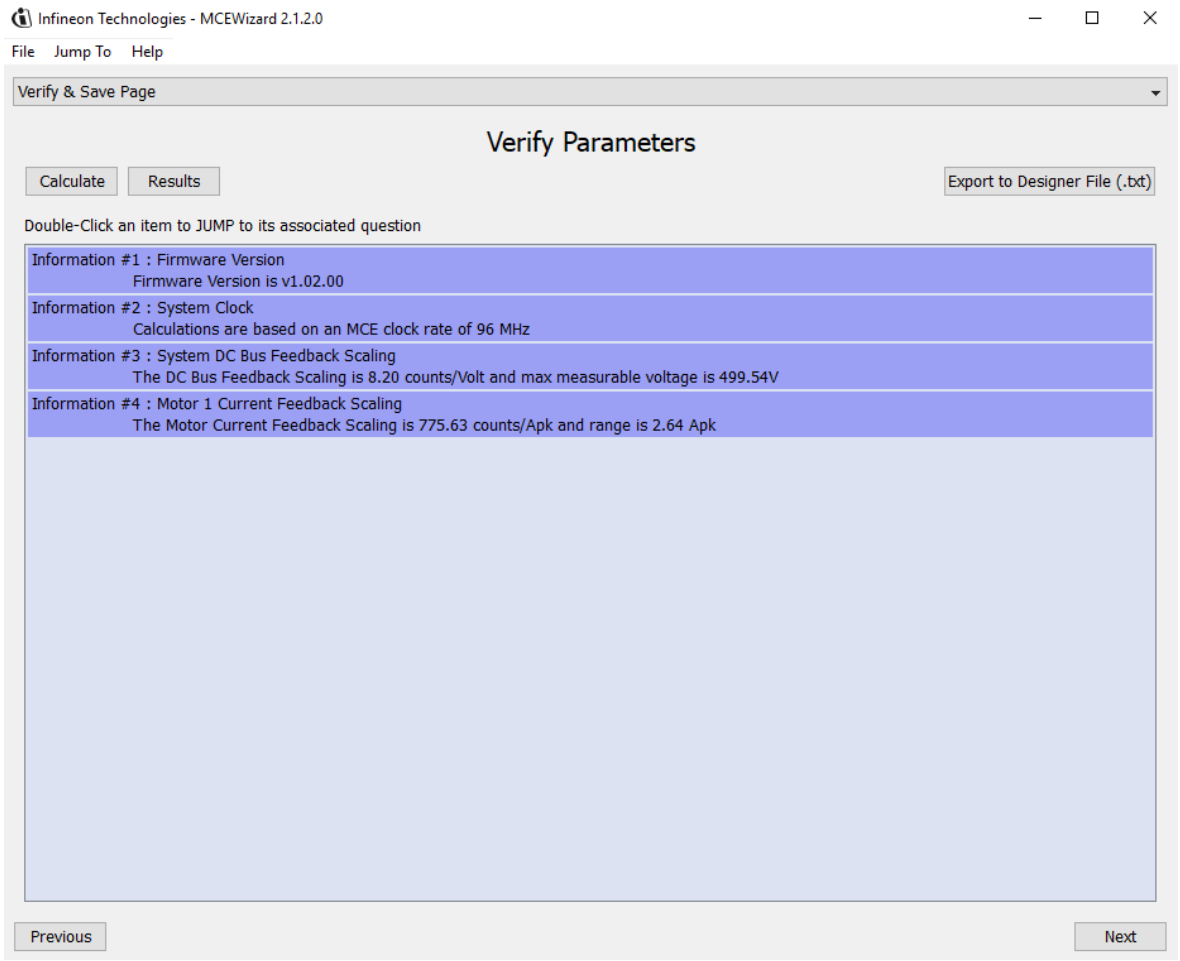
Step 4 – Generate parameter file .txt



Click on Export to designer file (.txt) and save the text file generated

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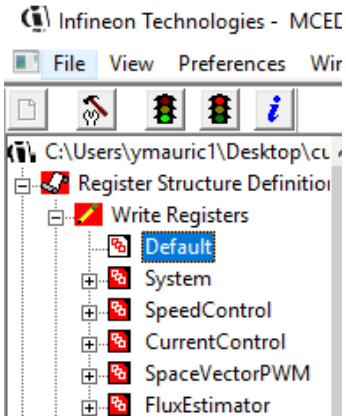
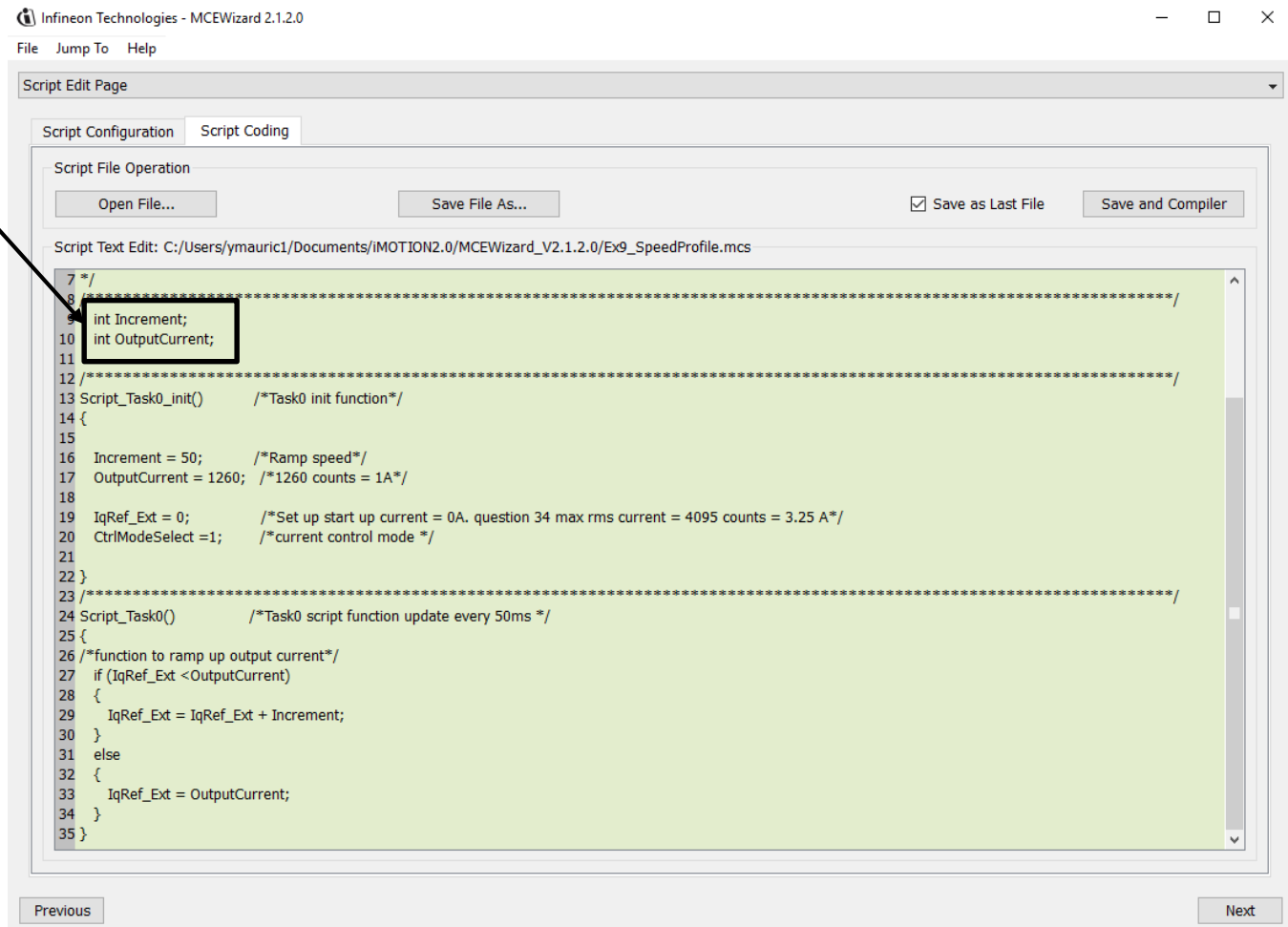
Step 4-1 Script functionality.
Ex: Current control 1A with 12s ramp up

Parameters accessible in Default folder in MCEDesigner





- Write desired script function.
- Save desired script file as .mcs for upload in MCEDesigner

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Script Introduction

- iMOTION™ script language is a type of interpreted language.
- The script engine is designed to take advantage of the spare CPU resource for the execution of the script program.
- The script engine supports 2 independent tasks, namely, Task 0 and Task 1, running concurrently.
  - The user script program runs repeatedly on a configurable interval within Task 0 or Task 1 loop.
  - The execution period for each task can be configured to the multiples of 1 ms for Task 0 or 10 ms for Task 1 in the script code.
    - Default execution period: 50 ms (Task 0) / 100 ms (Task 1)
    - Default execution step: 1 (Task 0) / 10 (Task 1)
  - Task 0 has higher priority than Task 1.

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Script Guidelines & Limitations

- The maximum number of global variables is 30. The maximum number of local variables for each task is 24.
- The maximum allowed script code size is 16kB (approximately 1500 lines of script code).
- The script engine only supports 32 bit signed integer type of variables.
- The script engine supports 2 independent tasks, namely, Task 0 and Task 1, running concurrently. The user script program runs repeatedly on a configurable interval within Task 0 or Task 1 loop.
- The analog input pins are sampled by MCE every 10 ms.
- The GPIO pins are sampled and updated by MCE every 10 ms.

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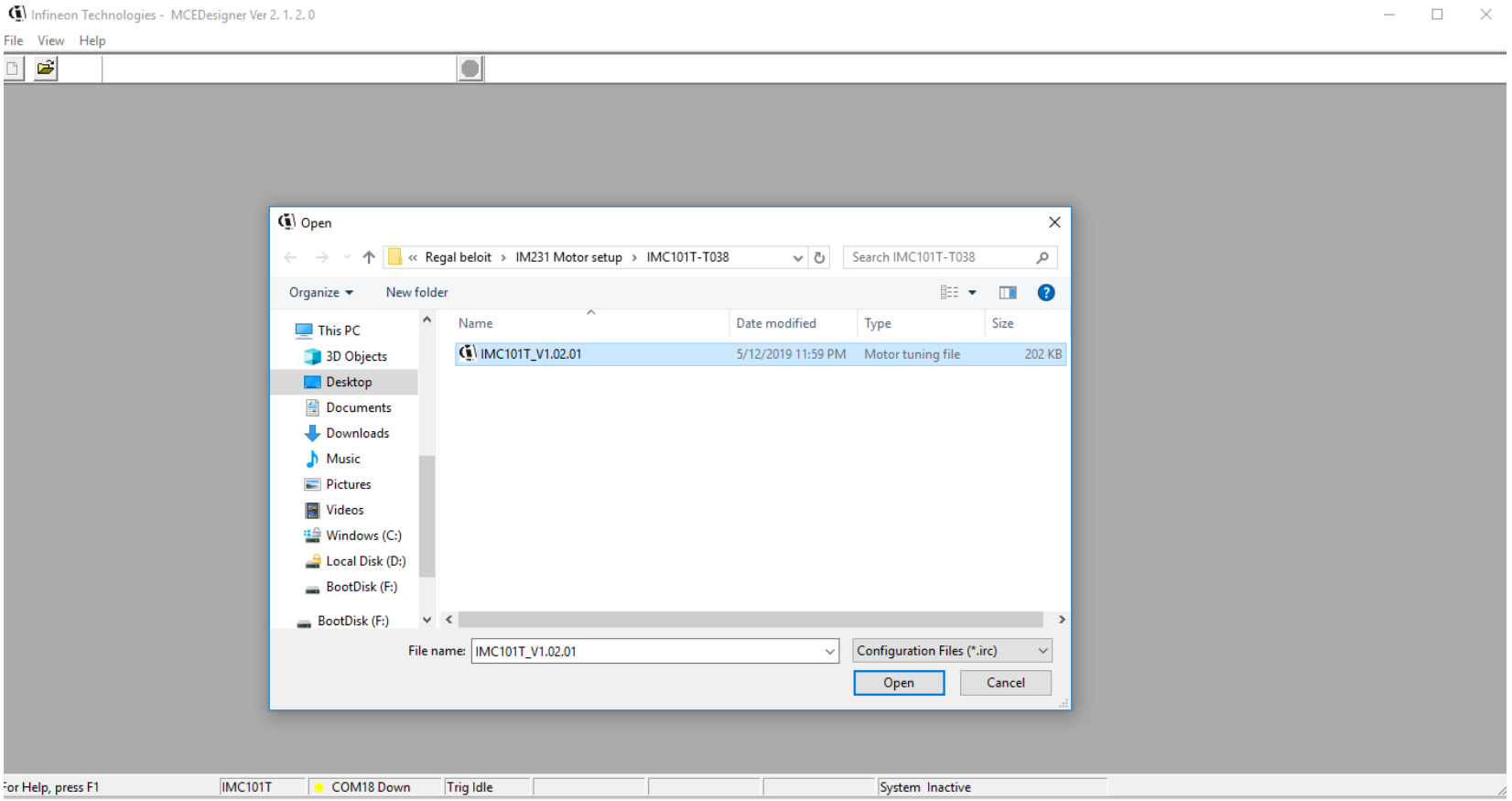
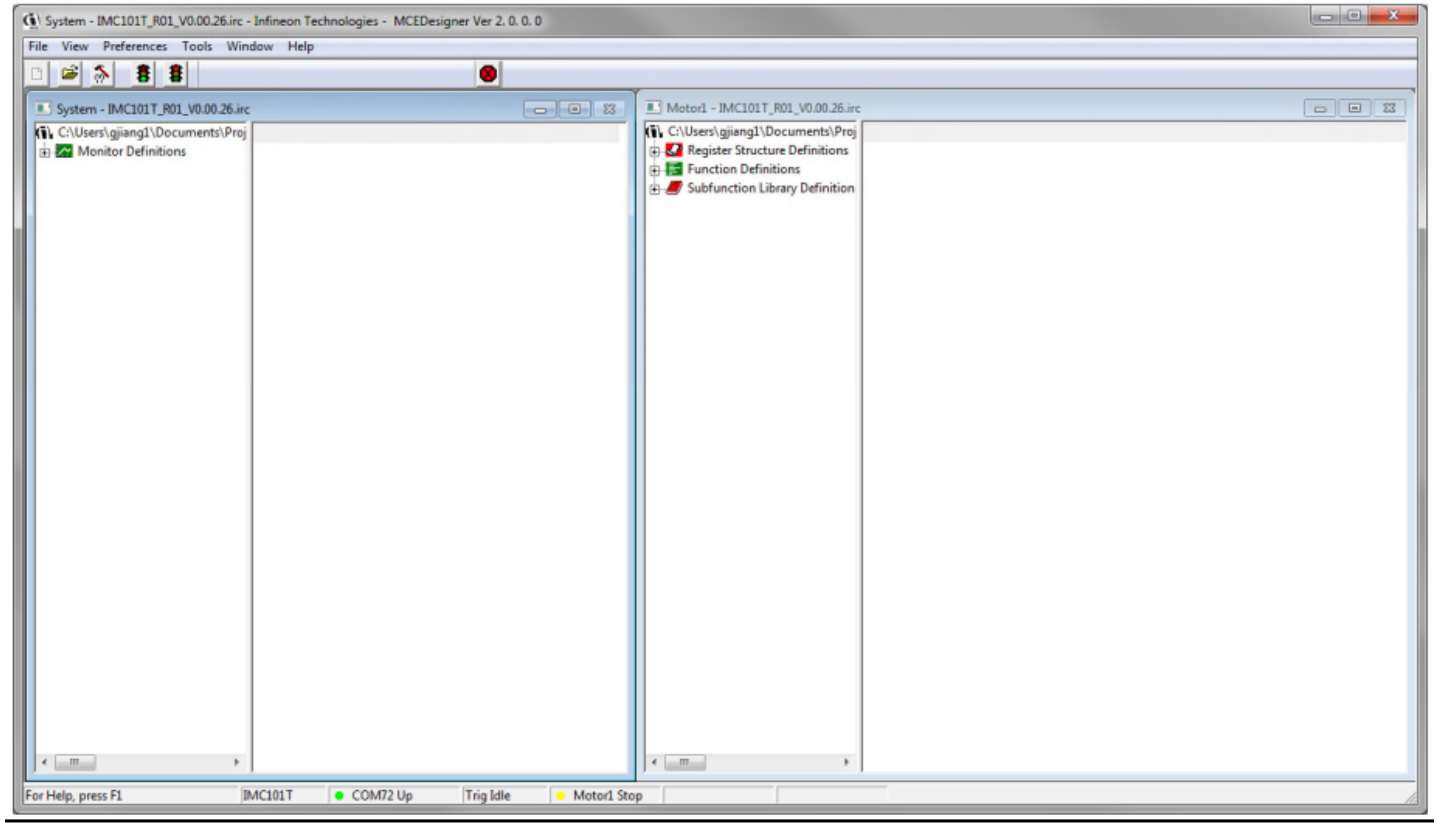
Step 5 – MCE Designer start up



› Load correct .irc file. It should be found in the software packaged downloaded

Step 5 - 1 – MCEDesigner COM port



› When board is powered up COM light should be green to show proper UART communication. If not, go to Preferences → connection and choose the right come port

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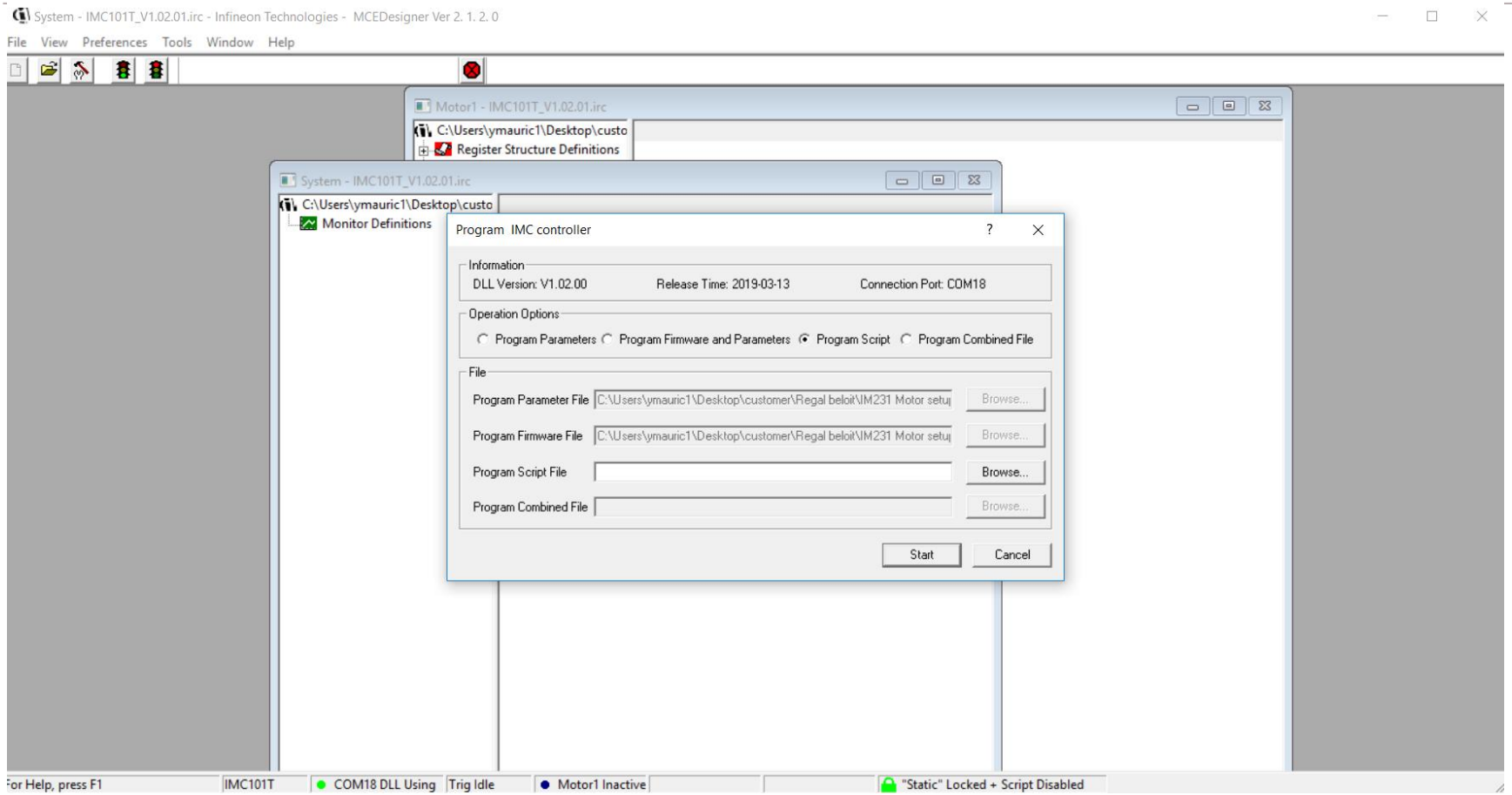
Step 6 – import motor and firmware parameters (Script Optional)



- Go to Tools → Programmer in the system window
- Import parameters file generated from wizard (.txt)
- Import firmware file download from Infineon website (.ldf)
- Program script file .mcs (If using script functionality see next slide Step 6-1)
- Click Start

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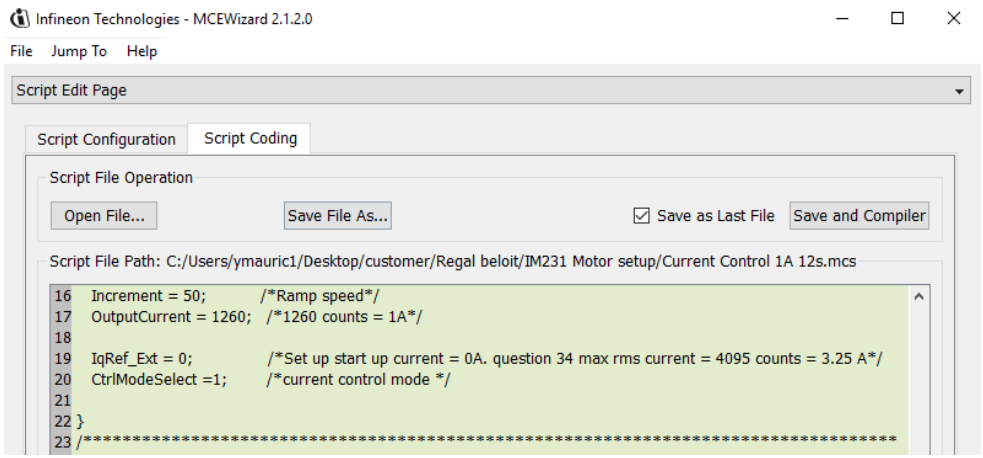
Step 6-1. If using scripting import generated .map file

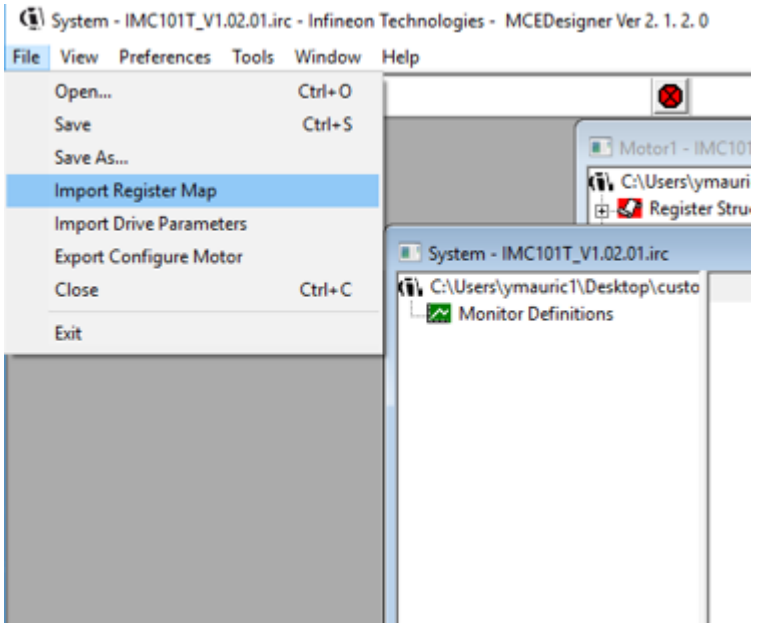
MCEWizard



Click on "*Save and Compiler*" to create .map register file

Click on "*Save File As…"* to create .mcs Script file

MCEDesigner



Import .map register file generated in the wizard for Script function register acces

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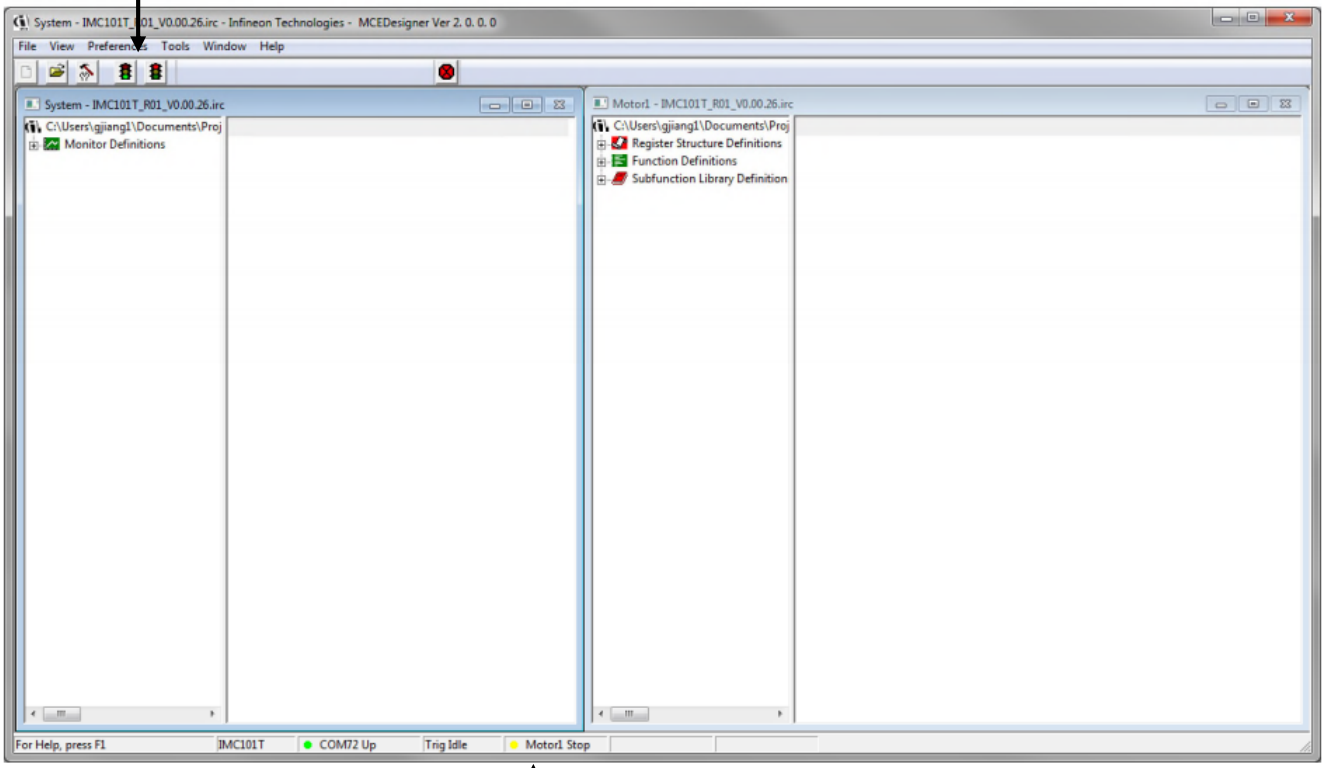
Step 7 – Run/Stop your motor

- Click on the green light in order to run
- Red light is to stop



Make sure to check status light

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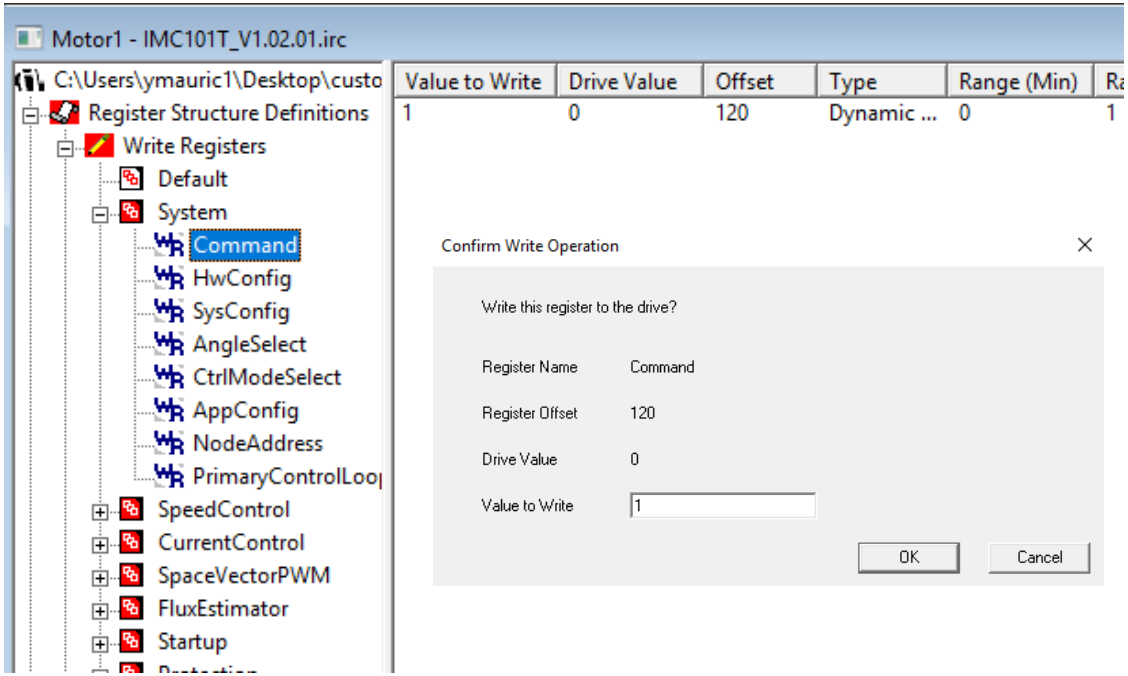
Step 7-1 Run/Stop your motor when using Script



- Often when using Script, functionality will start automatically
- Write command register = 0 in order to Stop Motor (1 = run per default)

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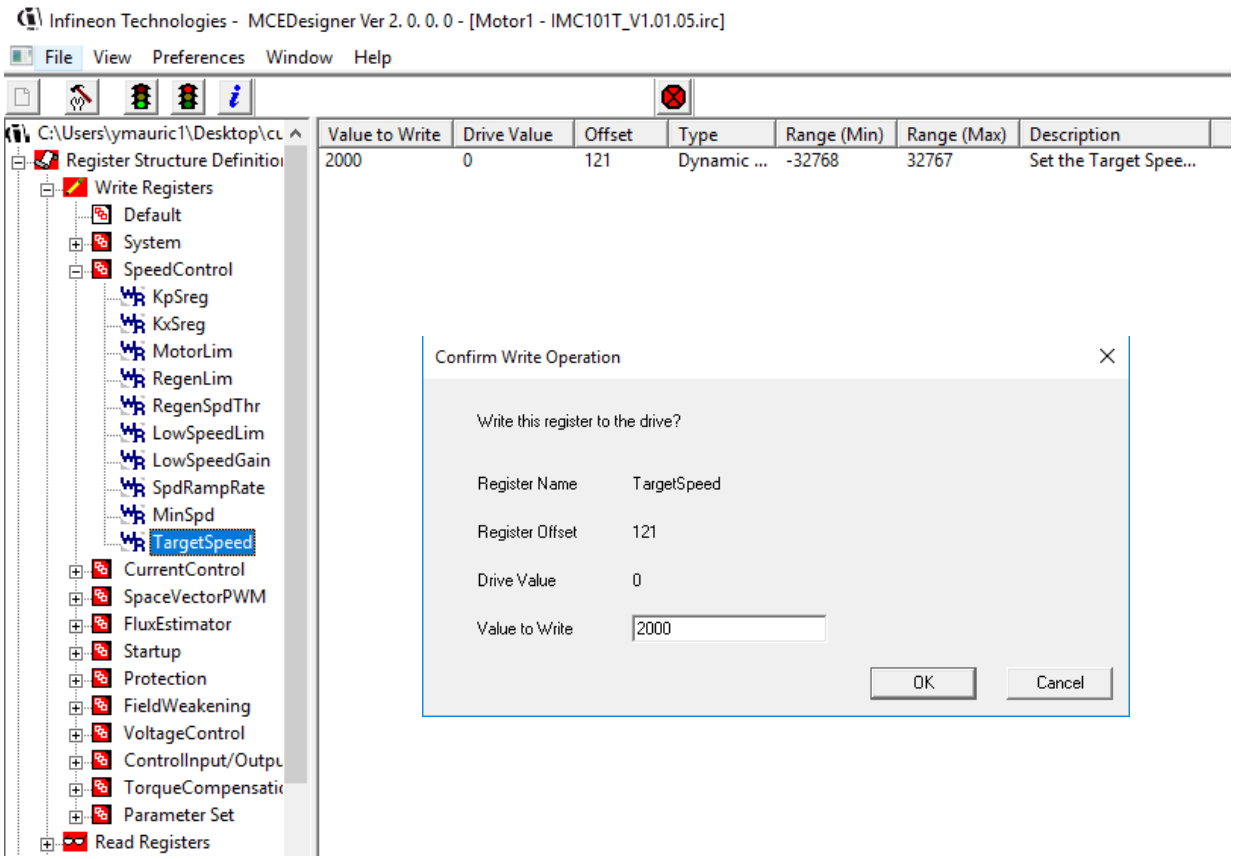
Step 8 : Speed control, increasing speed



- Double click on TargetSpeed in the Write Register section and enter desired speed (in counts)
- Motor max RPM set up in the wizard = 16383 Counts.

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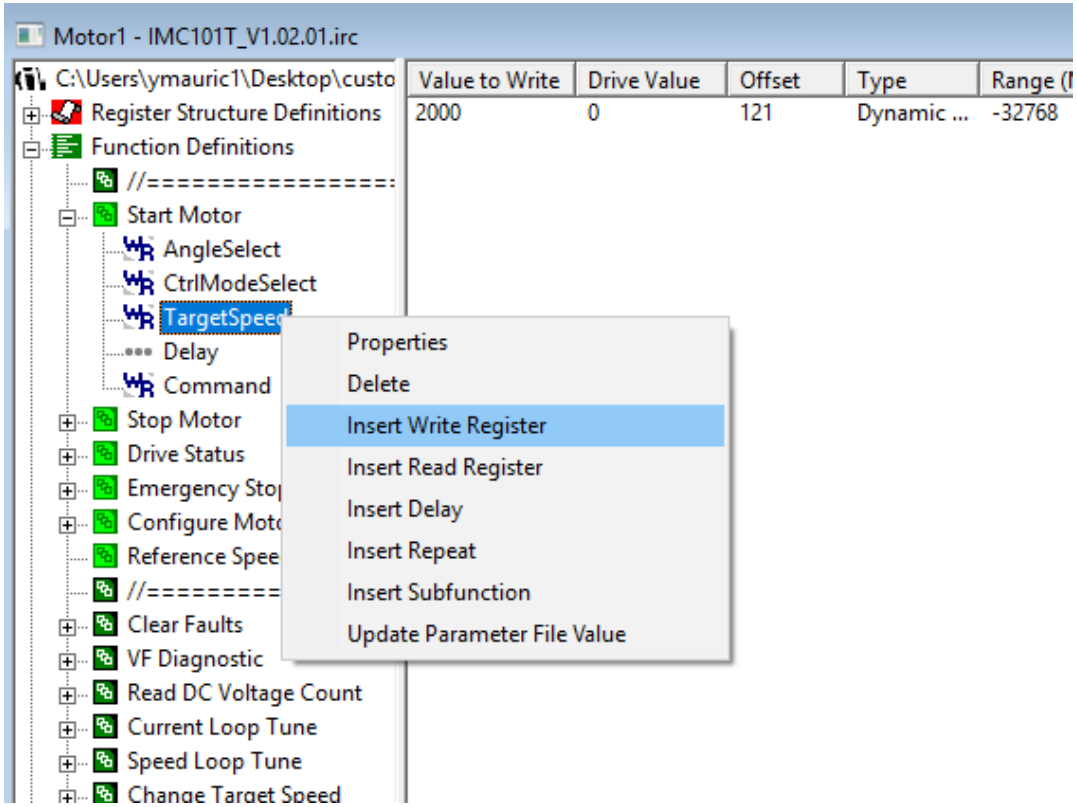
Step 9 Quick programing



- In MCEDesigner Function are accessible
- Clicking on the green light to start motor will enable “Start Motor” Function. What is executed in this function can be modified by adding/deleting register and their value. Refer to programing manual to understand better register types and their functionalities

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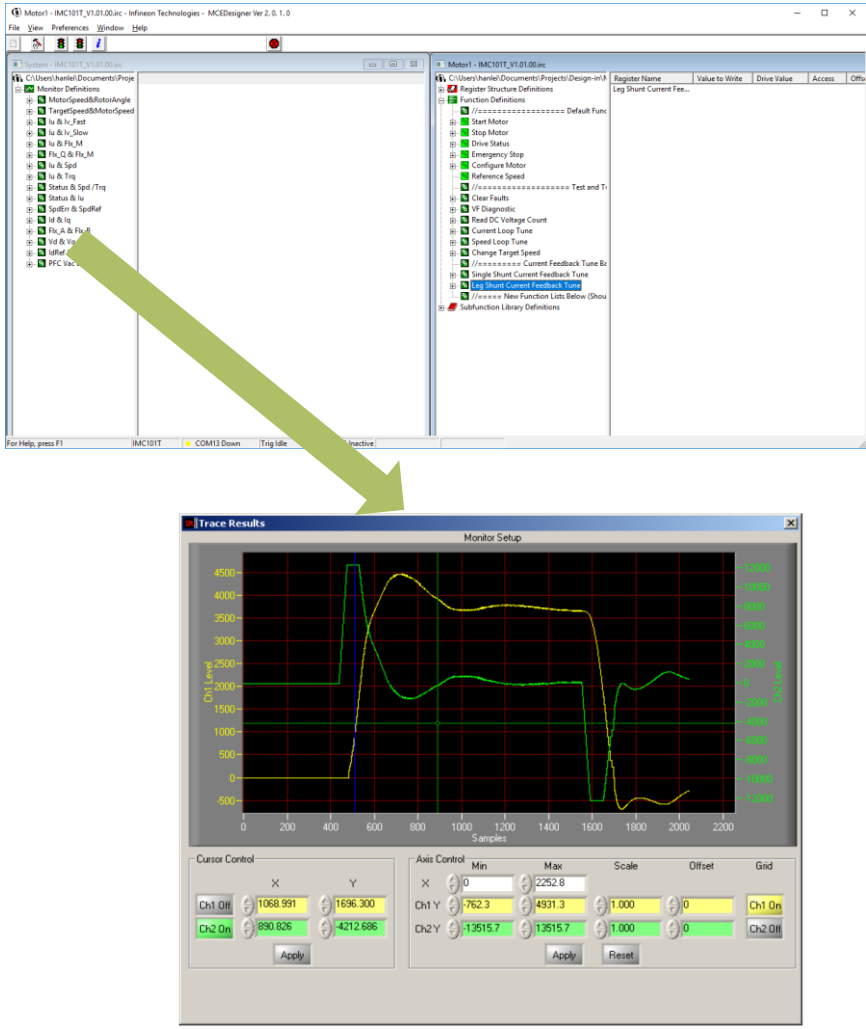
MCEDesigner: Debugging / Tuning

- Load FW / parameter / script file
- Start / Stop motor
- Tracing window
  - Multiple trigger sources
  - All parameters & variables can be monitored
    - Iu / Iv, Flux_M, MotorSpeed…
- Tuning parameters
  - Current feedback
    - SHDelay, TMinPhaseShift, PwmGuardBand
  - Current loop
    - KxIreg, KpIregD, KpIreg, VdqLim
  - Speed loop
    - KxSreg, KpSreg, SpdFiltBW, SpdRampRate
  - VF diagnostics
    - AngleSelect = 0, CtrlModeSelect = 0, Vd_Cmd = 500, Command = 1…



Documentation

- IMC100 : https://www.infineon.com/dgdl/Infineon-IMC100-DataSheet-v01_04-EN.pdf?fileId=5546d46265487f7b016584a0147e7660
- IM231-L6S1B :https://www.infineon.com/cms/en/product/power/intelligent-power-modules-ipm/im231-l6s1b/
- EVAL-M1-101T: https://www.infineon.com/cms/en/product/evaluation-boards/eval-m1-101t/
- EVAL-M1-IM231: https://www.infineon.com/cms/en/product/evaluation-boards/eval-m1-im231/
- iMOTION™ MCE User Manual: https://www.infineon.com/dgdl/Infineon-MCESW-RM-UserManual-v01_02-EN.pdf?fileId=5546d4626b2d8e69016b7bfb7c04786d



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