Release Notes

MCE Software Package

MCE Software V1.03.07 for IMC102T-F048
iMOTION ™ Platform Turnkey Software

Summary

Product Name	MCE_IMC102T-F048_V1.03.07.zip
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Previous Versions	- V1.03.03 - V1.03.01 - V1.02.01 -

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1 Released Items

This chapter lists the artifacts, the items of the test package and the test environment. It also presents the changes in the current version, the limitations and deviations as well as the known issues.

The iMOTION2.0 MCE addressing 3-phase Permanent Magnet Synchronous Motor (PMSM) control using Sensorless/Hall sensor based Field Oriented Control (FOC) schemes and Power Factor Correction (PFC). This software is primarily targeted for end applications of industrial/consumer drives, pumps, and compressors.

List of Features

- PFC: Cycle-by-Cycle over-current protection for boost mode PFC and Vac peak detection
- Interface: Scripting based configurable UART driver
- Motor Control: Motor peak current tracking for single shunt configuration when phase shift window is set to zero
- Analog Hall: ArcTan based rotor angle estimation added
- Motor Control: Duty Control scheme has been removed. Duty control mode can be realized using scripting function
- System: CPU Internal oscillator calibration at runtime based on internal temperature sensor
- Motor Control: Hall sensor support : 3/2 Digital hall and 2 Analog hall
- Motor Control: Low noise phase shift PWM for single shunt motor current measurement
- System: IEC/UL60730-1 ClassB support
- Scripting: Scripting language support
- Sensorless FOC control: High performance sensorless Field Oriented Control (FOC) of Permanent Magnet Synchronous Motor.
- Sensorless FOC control: Angle sensing for initial rotor angle detection.
- Sensorless FOC control: Startup schemes: Parking, Open loop and Catch-Spin free running motor.
- Motor Control: Single shunt or leg shunt motor current sensing.
- Motor Control: Support 3ph and 2ph PWM modulation.
- PFC Control: Supports Boost Mode and Totem-Pole Power Factor Correction (PFC).

1.1 Artifacts

This release V1.03.07 consists of the following artifacts:

Artifact	Description
IMC102T_F048_A_V1.03.07.ldf	Encrypted binary file for IMC102T-F048 device.
IMC102T_V1.03.07.irc	MCEDesigner project file. MCEDesigner tool is used to program binary file and control parameter configuration.
IMC102T-F048_Parameter.txt	Sample parameter file, generated from MCEWizard.
IMC102T-F048_V1.03.07_Default.map	Default MCEDesigner map file, to reset the Design_ID value
iMOTION_Software_License_Agreement.pdf	License agreement document.
IMC102T-F048_V1.03.07_ReleaseNotes.pdf	This release note.
Readme.txt	Readme file brief description of how to use tools.

1.2 Test Environment

The MCE software was tested, using the following environment.

- Control Board: EVAL-M3-102T
- Power Board: Eval-M3-CM615PN
- Motor Specification: 8Pole, 0.4A R=38.5ohm, Lq= 196mH, Ld=196mH, Ke= 36V, 2730 RPM

1.3 Changes and Enhancements

The following items have been changed in release V1.03.07. Please refer to the revision history for previous versions.

Enhancements

- System: Monitoring of background task execution (UART interface, Control input and script Task1) has been added. If any of the background tasks are not executed at least once every 60s period, then the MCE triggers execution fault.
- System: User can configure bit 8 of “SysTaskConfig” parameter (by default this bit value is not set) to perform controller reset if any of the background tasks are not executed at least once every 60s.
- System: If safety function is enabled and any of background tasks are not executed for 1s, the MCE enters failsafe mode.
- System: Scripting based controller reset support has been added. Controller reset can be performed by setting “Script_command = 0xAE51;” from script Task0 or Task1 function.
- Motor Control: Enabled PG output in current offset calibration state (2) for hall / hybrid mode of operation.

Bug Fixes

- System: Fixed blocking of background task (UART interface, Control input and script Task1), if executing for more than 149 days of continuous operation of MCE without power cycle.
- Motor Control: Fixed motor speed calculation in hall/hybrid mode while the MCE exits from fault state. Motor speed is kept intact while exit form fault state in hall/hybrid mode of operation.
- Interface: Fixed wrong command (0x3F) in User UART transmit message while using transmit delay.

1.4 Limitations and Deviations

This section lists features that are missing or were incompletely implemented in the current release, but may be provided in future releases.

- Sensorless FOC: Limited up to 150% rated speed field weakening and requires further tuning for higher operation
- FOC: 2Phase modulation only Type3 is supported
- PFC: Tracking mode PFC is not supported
- Hall Support: Analog Hall is not supported for leg shunt configuration
- Analog Hall: Only 2 Analog Hall interface is supported
- Control Input: Control Input via Frequency or Duty control input is not supported in case of Hall sensor or Hybrid mode
- FOC: Angle sensing startup method can't be used when Low noise phase shift PWM for single shunt motor current measurement is enbled
- System: Sleep modes are not supported

2 Supported Tools and Packages

The following items are compatible with the current release.

2.1 Tools

Tool	Description
MCEWizard (V2.3.0.0)	MCEWizard is an interactive design tool that calculates control IC parameters in digital counts based on the system specifications expressed in engineering units.
MCEDesigner (V2.3.0.0)	MCEDesigner is the drive evaluation software that communicates with the digital IC and allows on the fly tuning of drive parameters.

3 Revision History

This chapter lists the changes and enhancements of the previous releases.

3.1 Revision V1.03.03

Enhancements

- Motor Control: Performance Enhancment in Torque Compensation function
- Scripting: PGOUT pin (GPIO01) can be controlled as GPIO from Scripting, if PG functionality is disabled.

Bug Fixes

- Interface: User UART wrong status reponse issue has been fixed
- Motor Control: Open loop angle gerenation issue has been fixed

3.2 Revision V1.03.01

Features

- PFC: Cycle-by-Cycle over-current protection for boost mode PFC and Vac peak detection
- Interface: Scripting based configurable UART driver
- Motor Control: Motor peak current tracking for single shunt configuration when phase shift window is set to zero
- Analog Hall: ArcTan based rotor angle estimation added
- Motor Control: Duty Control scheme has been removed. Duty control mode can be realized using scripting function
- System: CPU Internal oscillator calibration at runtime based on internal temperature sensor

Enhancements

- Hall Support: PLL based rotor angle estimation for hall sensor has been added.
- Scripting: Read and write rate of user GPIO via scripting has been changed from 10ms to 1ms.
- Scripting: Access rate of user analog input via scripting has been changed from 10ms to 1ms
- Motor Control: Control input (Frequency/duty cycle) values are accessed from scripting

Bug Fixes

- Interface: User UART command3 issue fixed. Command #3 set motor start command if TargetSpeed value is non zero value and set motor stop command if TargetSpeed value is zero.
- Motor Control: IPM motor control, Id reference value. generation issue has been fixed. Id reference value is generated based on “AngDel” parameter value.
- Motor Control: Over modulation issue for leg shunt configuration has been fixed.
- Motor Control: Unwanted active vector PWM after BTS charge has been fixed.

3.3 Revision V1.02.01

Features

- Motor Control: Hall sensor support : 3/2 Digital hall and 2 Analog hall
- Motor Control: Low noise phase shift PWM for single shunt motor current measurement

Enhancements

- Interface: Lock/unlock mechanism to update STATIC parameters from MCEDesigner
- System: CPU load peak value capture function

Bug Fixes

- Motor Control: Sensorless FOC: Flux estimator angle compensation problem has been fixed. No need to double the "ATanTau" parameter for those who had manually adjusted it before.

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