

Tools and Software

# Motor Control Development Toolbox

## Overview

The motor control development toolbox is a comprehensive collection of tools that plug in to the MATLAB™/Simulink™ model-based design environment to support rapid application development targeting Freescale MCUs. The toolbox includes support for motor control application development and is designed to enable control engineers and embedded developers to meet the demands of shorter project life cycles. The motor control development toolbox includes an integrated Simulink-embedded target supporting Freescale MCUs for direct rapid prototyping and processor-in-the-loop (PIL) development workflows. The toolbox contains peripheral device interface blocks and drivers, target-optimized math and motor control algorithm blocks for efficient execution on the target MCU and bit-accurate simulation results in the Simulink simulation environment.

## Development Tools

The motor control development toolbox generates all code required to start up the MCU and run the application code supporting builds with multiple compilers. Integrated into the toolbox are utilities to profile execution on the target MCU for rapid prototyping or PIL modes of operation.

The toolbox has built-in support for direct code download to the target MCU through the RAppID boot loader utility. Freescale's FreeMASTER real-time debug monitor and data visualization tool interfaces are also built in to provide an interface to monitor signals in real time on the embedded target as well as to support data logging, signal capture and parameter tuning. FreeMASTER provides visibility into the target MCU for algorithm calibration and tuning that is often required in advanced control systems and those required by motor control development.

## MathWorks Product Requirement

- MATLAB (32-Bit or 64-Bit)\*
- Simulink
- MATLAB Coder
- Simulink Coder
- Embedded Coder

\*Earlier released products only support 32-bit

## Product Part Numbers

### Standard Suite: Motor Control Development Toolbox

- Perpetual node locked
  - Part number: CWP-MCTB-564xL-N
  - Part Number: CWP-MCTB-567xK-N
  - Part Number: CWP-MCTB-574XP-N
  - Part Number: CWP-MCTB-S12ZV-N
  - Part Number: CWP-MCTB-MKVxx-N
  - Part Number: CP-MCTB- MC56F82-N

Contact your local Freescale representative for more information.



## Target Applications

- Aerospace and defense
- Automotive control design
- Embedded system development
- Industrial automation
- Machinery real-time systems



## Support Policy

### Online help and documentation includes:

- 12-month technical support
- Free time-limited evaluation license available

Contact your local Freescale representative for more information

## MCU Support

### Summary of Device Driver Blocks Provided

MCUs	CAN	SPI	PWM	ADC	GPIO	Timers	ISR	GDU	CTU	PDB	LIN	PTU	I <sup>2</sup> C
MPC564xL	x	x	x	x	x	x	x		x				
MPC567xK	x	x	x	x	x	x	x		x				
MPC574XP	x	x	x	x	x	x	x		x				
MCS12ZVM	x	x	x	x	x	x	x	x			x	x	
MKV1x		x	x	x	x	x	x			x			x
MKV3x		x	x	x	x	x	x			x			x
MKV4x	x	x	x	x	x	x	x			x			x
MC56F82	x	x	x	x	x	x	x						x

## Automotive Math and Motor Control Libraries

### GFLIB

Trigonometric Functions	<ul style="list-style-type: none"> <li>• GFLIB_Sin</li> <li>• GFLIB_Cos</li> <li>• GFLIB_Tan</li> <li>• GFLIB_Asin</li> <li>• GFLIB_Acos</li> <li>• GFLIB_Atan</li> <li>• GFLIB_AtanXY</li> </ul>
Limitation Functions	<ul style="list-style-type: none"> <li>• GFLIB_Limit</li> <li>• GFLIB_LowerLimit</li> <li>• GFLIB_UpperLimit</li> <li>• GFLIB_VectorLimit</li> </ul>
PI Controller Functions	<ul style="list-style-type: none"> <li>• GFLIB_ControllerPlr</li> <li>• GFLIB_ControllerPlrAW</li> <li>• GFLIB_ControllerPlp</li> <li>• GFLIB_ControllerPlpAW</li> </ul>
Linear Interpolation	<ul style="list-style-type: none"> <li>• GFLIB_Lut1D</li> </ul>
Hysteresis Function	<ul style="list-style-type: none"> <li>• GFLIB_Hyst</li> </ul>
Signal Integration Function	<ul style="list-style-type: none"> <li>• GFLIB_IntegratorTR</li> </ul>
Sign Function	<ul style="list-style-type: none"> <li>• GFLIB_Sign</li> </ul>
Signal Ramp Function	<ul style="list-style-type: none"> <li>• GFLIB_Ramp</li> </ul>

### GMCLIB

Clark Transformation	<ul style="list-style-type: none"> <li>• GMCLIB_Clark</li> <li>• GMCLIB_ClarkInv</li> </ul>
Park Transformation	<ul style="list-style-type: none"> <li>• GMCLIB_Park</li> <li>• GMCLIB_ParkInv</li> </ul>
Duty Cycle Calculation	<ul style="list-style-type: none"> <li>• GMCLIB_SvmStd</li> </ul>
Elimination of DC Ripples	<ul style="list-style-type: none"> <li>• GMCLIB_ElimDcBusRip</li> </ul>
Decoupling of PMSM Motors	<ul style="list-style-type: none"> <li>• GMCLIB_DecouplingPMSM</li> </ul>

### GDFLIB

Finite Impulse Filter	<ul style="list-style-type: none"> <li>• GDFLIB_FilterFIR</li> </ul>
Moving Average Filter	<ul style="list-style-type: none"> <li>• GDFLIB_FilterMA</li> </ul>
First Order Infinite Impulse Filter	<ul style="list-style-type: none"> <li>• GDFLIB_FilterIIR1init</li> <li>• GDFLIB_FilterIIR1</li> </ul>
Second Order Infinite Impulse Filter	<ul style="list-style-type: none"> <li>• GDFLIB_FilterIIR2init</li> <li>• GDFLIB_FilterIIR2</li> </ul>

### For more information, please visit [freescale.com](http://freescale.com)

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