GPIS – PRODUCT LINE OVERVIEW + MAGNIV ANNOUNCEMENTS

AMF-AUT-T2343

OCTOBER 2016

PUBLIC

SECURE CONNECTIONS FOR A SMARTER WORLD

NXP Automotive MCU- Product Lines

Products developed for automotive and industrial applications targeting:

- Highest component quality and reliability (AECQ100, up to 150C ambient, zero defect)
- Functional Safety for fault tolerance + hardware security for secure execution

ADAS

Advanced Driver Assistance System

Market:

- Radar Based ADAS
- Vision, Highly Automated Driving

Gateway

Connectivity & Security

Market:

- Secure FOTA Vehicle Networks
- ENET, CAN, Flexray Networks

GPIS

General Purpose & Integrated System

Market:

- Body Electronics
- Actuators and Sensors

VDS

Vehicle Dynamics and Safety

Market:

- Powertrain and Hybrid
- Chassis and Safety

GPIS: Many Applications, Varied Requirements

ASIL-B to D

Body control module

Human machine interface

Wireless charging

Battery Management

Tire pressure monitoring receiver

Steering column lock

Antenna (house keeping)

Climate control

Door/Window/sunroof

Near Field Communication

Lighting

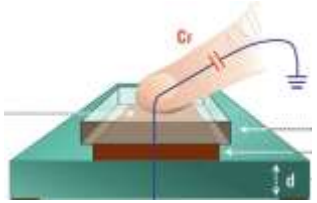
Secure transmission / encryption

Firmware update

Gateway

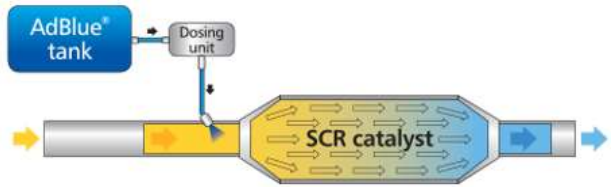
Chassis systems

PMSM/BLDC motorcontrol



Touch sensing

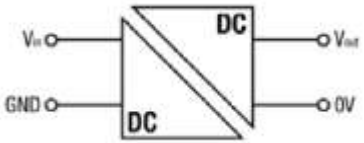
Park assist



Nox reduction systems / sensors

Seat heating

Motorbike ECU/ABS

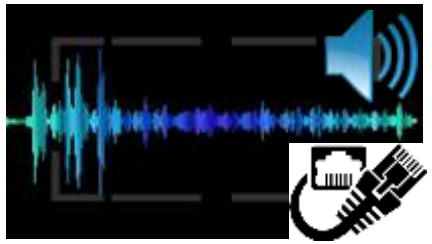


DC/DC converters

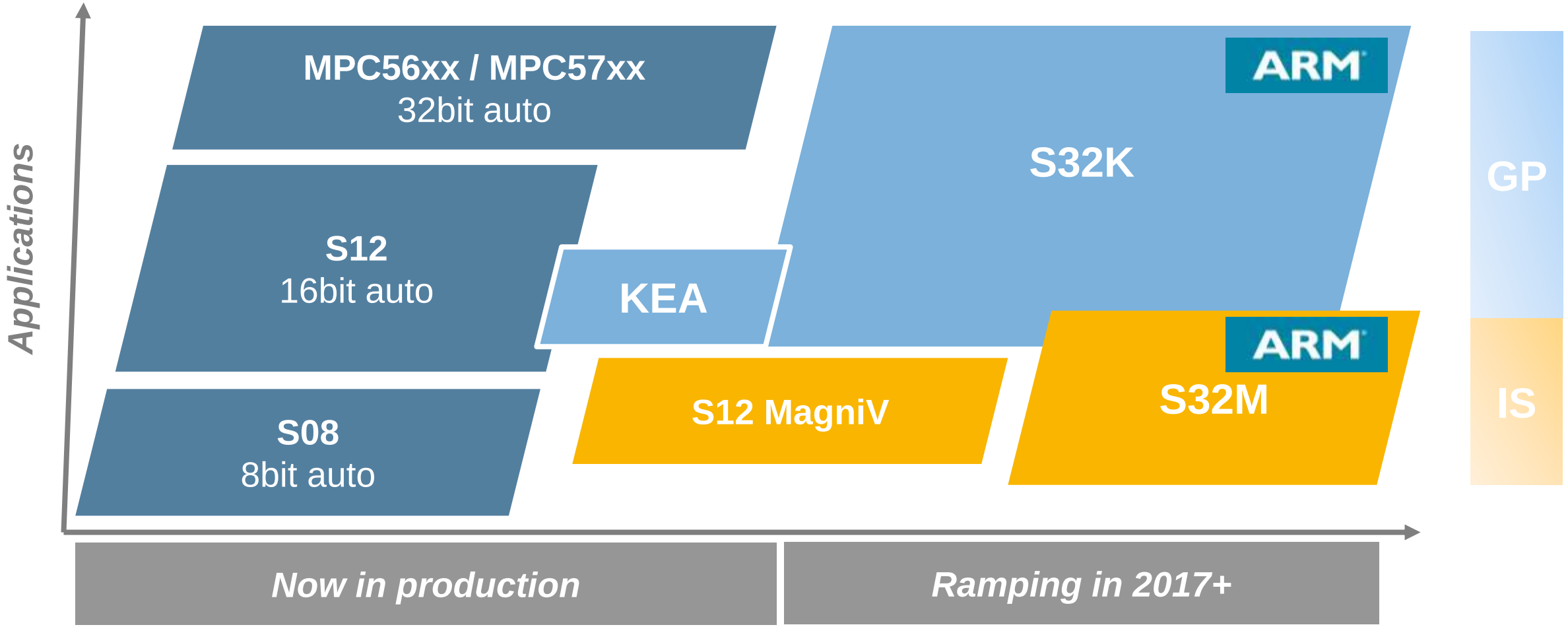
E-shifter

Rear view camera tilt

Steering wheel electronics


Ethernet audio amplifier

GPIS Portfolio in Transition



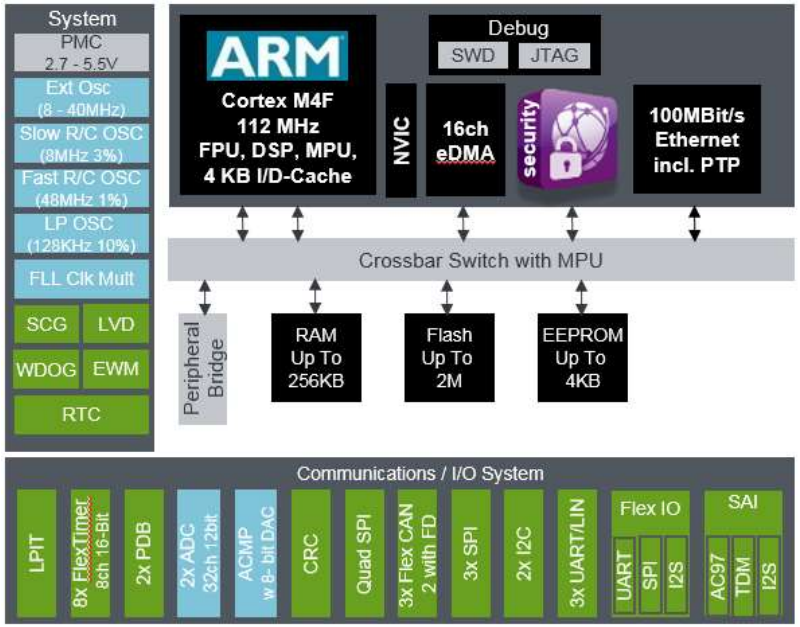
preliminary & subject to change

Last Updated 12 FEB 2016

GENERAL PURPOSE

S32K – The First Auto MCU designed for SW Engineers

Flash	Pin Count								
	16/24	32	48	64	80	100	100 BGA	144	176
2M							S32K148	S32K148	S32K148
1M						S32K146	S32K146	S32K146	
512K				S32K144		S32K144	S32K144		
256K			S32K118	S32K142 / S32K118		S32K142			
128K		S32K116	S32K116	KEAZ128	KEA128				
64K		KEAZN64		KEAZN64	KEAZ64				
32K		KEAZN32 /		KEAZN32					
16K		KEAZN16		KEAZN16					
8K	KEAZN8								



Most Scalable Portfolio

- *8K to 2M Flash*
- *16-176 pin*
- *HW and SW compatibility*

→ ***Reduce R&D***

Superior Performance and Features

- *Cortex M with FPU & DSP*
- *Best low-power: 25uA stop*
- *ASIL-B Safety*
- *Security HW support*
- *ISO CAN-FD, Ethernet, Audio*
- *FlexIO*

→ ***Future proof designs***

Enablement

- *S32 Design Studio IDE*
- *SDK, freeRTOS & low-level drivers*
- *AUTOSAR, MCAL and OS*
- *Third-party ecosystem*
- *Model-based design support*
- *Low cost demo boards*

→ ***Reduced time-to-Market***

S32 Design Studio

Traditional Approach

New Development Environment

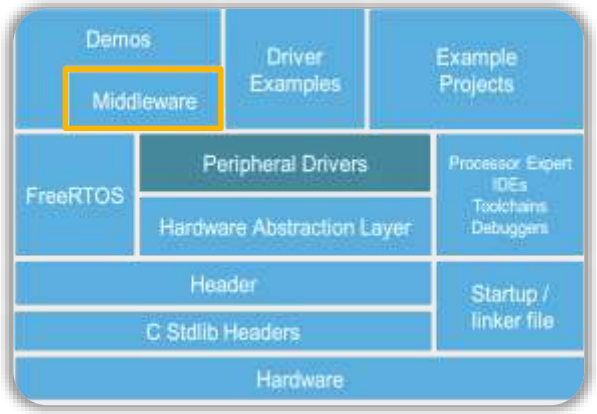
S32K- Complete Enablement Package

Hardware Platform

- Low cost development board compatible to Arduino shields
- Onboard debugger and system basis chip

Full Hardware evaluation and Development Platforms

+ Software



- Full-featured, no cost development platform (S32 DS)
- Production grade NXP Software Development Kit (SDK)
- NXP Middleware e.g. Core Self Test, LIN Stack, Automotive Math and Motor Control Library
- Autosar 4.0 and 4.2 MCAL

Complete software package to streamline software development

+ Ecosystem

- IAR and Cosmic toolchains, more to follow
- Including community software – FreeRTOS
- Design services
- Training
- Arduino shields

Technology alliances for building smarter, better connected solutions

Middleware is sold separately

EVBs and Runtime SW – Faster Development

Tools:

Product Name
CES
MCQual
Internal Tools
Code Warrior for MCU
S32 Design Studio
Build Tools (GCC Compiler)
Debugger
IDE
Software Integration in IDE
Target Simulator
Special Accelerator Tools
OpenCL Tools
FreeMASTER
Boot Loader
RAppID Suite
Pin Mux Tool
Device Configuration
Processor Expert
Pin Mux Tool
Device Configuration
SDK Configuration
DDR Configuration Tool
DDR Test Tool
SOC Simulation Models
System Tools
MC/MBD Toolbox
AMMCLIB SDK Integrated
MCAT 2.0
External Tools
Green Hills Software - MULTI
IAR - Embedded Workbench
WindRiver - DIAB
COSMIC
iSystem - Debugger
Lauterbach - Debugger
P&E Micro - Debugger
Segger - Debugger
PLS - Debugger
Keil Tools Support
ARM GCC - Compiler

SW:

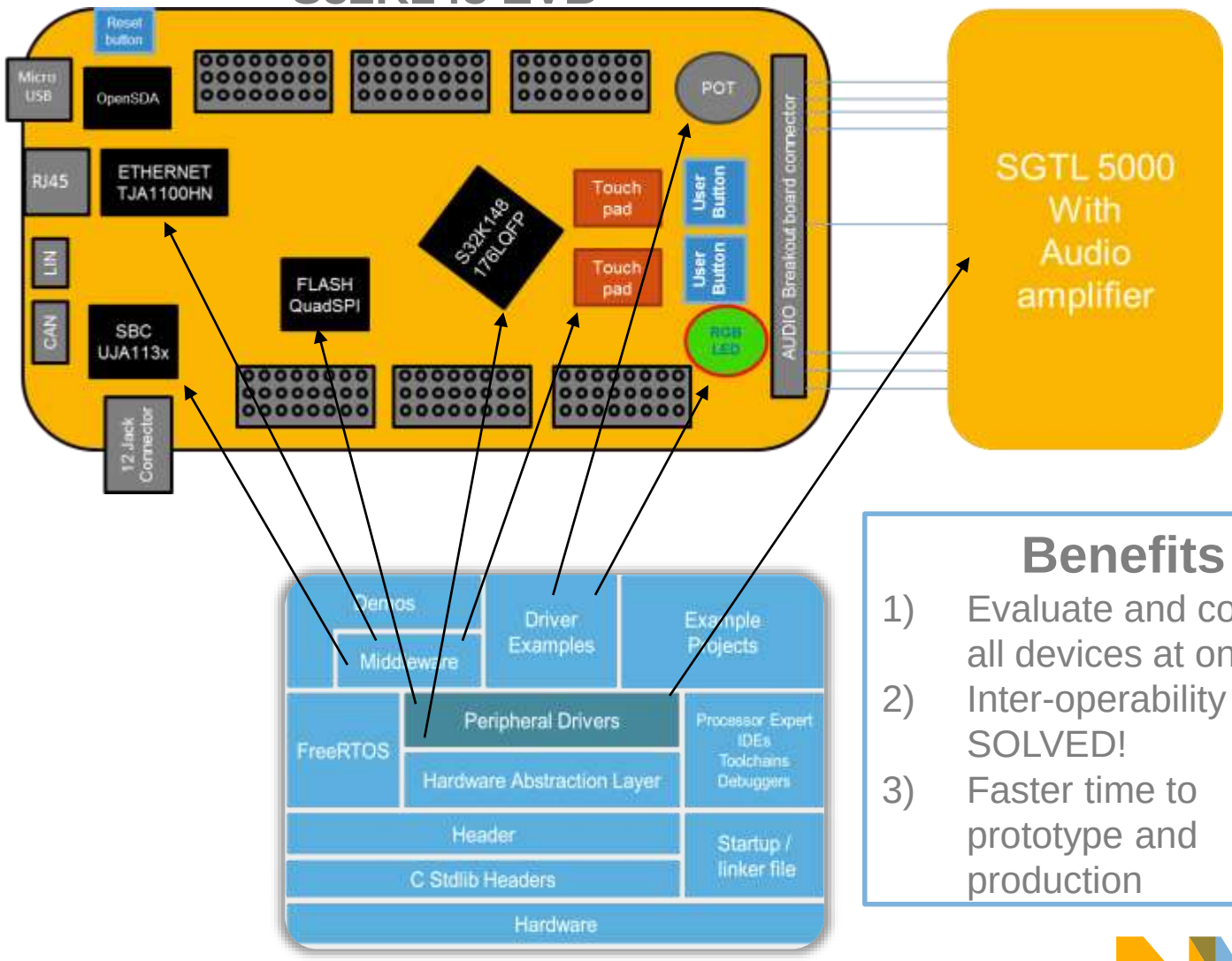
AUTOSAR

- MCAL
- OS
- SCST
- PTlib
- AVB Stack

SDK

- Drivers
- FreeRTOS
- LIN Stack
- MotorControl
- Touch Sense
- Examples

S32K148 EVB



S32 SDK

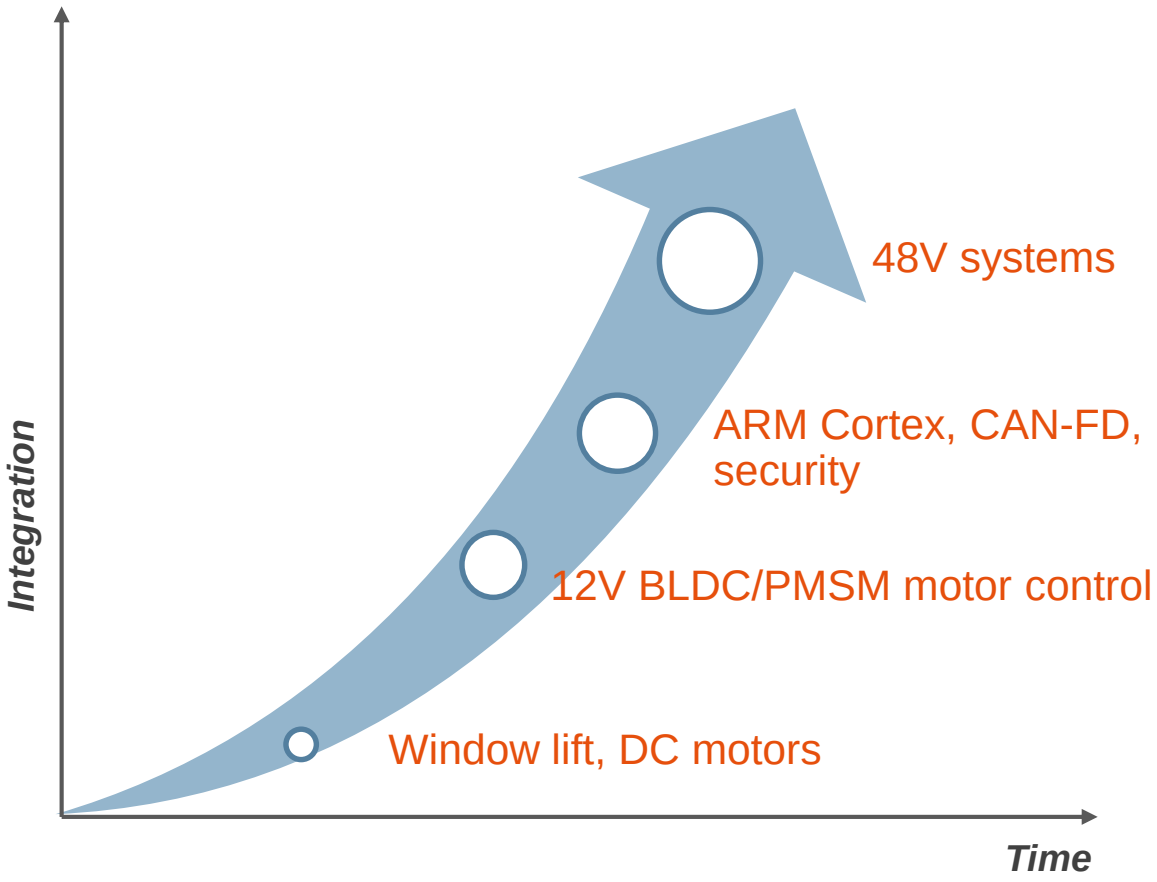
Benefits

1) Evaluate and confirm all devices at once
2) Inter-operability SOLVED!
3) Faster time to prototype and production

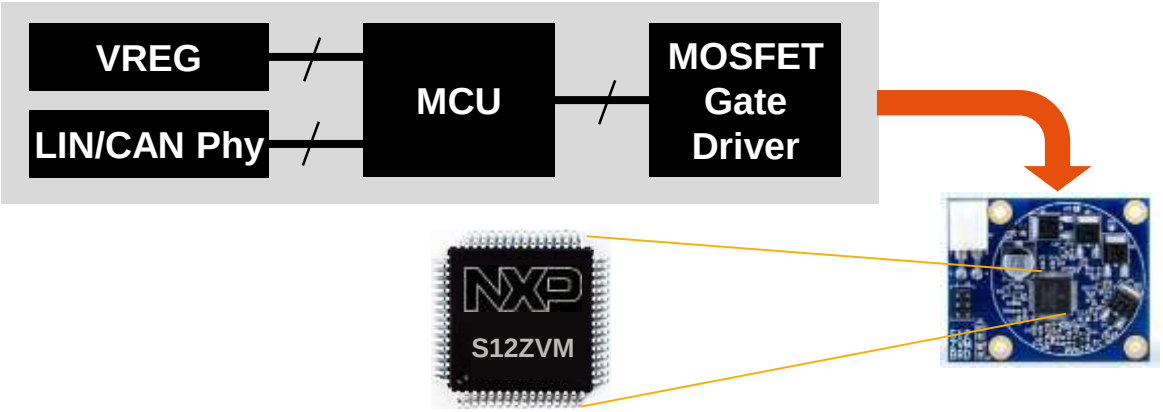
INTEGRATED SOLUTIONS

Integrated Solutions – MagniV

Technology Development



Single Chip Integration: MCU + HV Analog

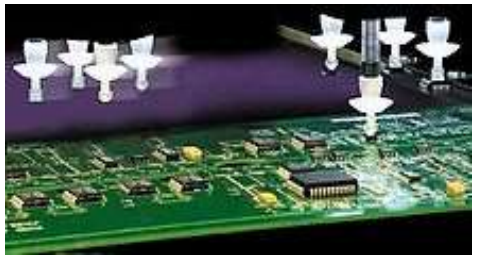


Electrification

Miniaturization

MagniV: Integration Benefits

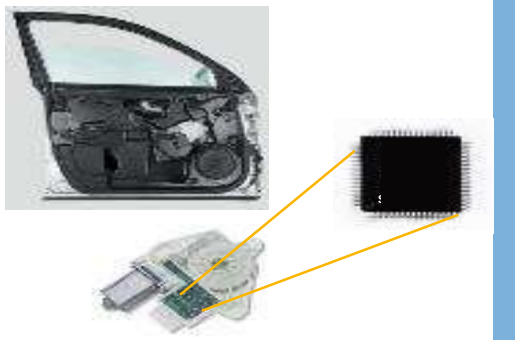
- **Reduced size**
  - Smaller PCB
  - Smaller housing
  - Increased design flexibility
- **Fewer components**
  - Fewer devices to pick and place
  - Fewer solder joints
- **Fewer test points**
  - Integration offers a pre-tested subsystem
- **Quality**
  - Fewer points of failure
- **Simplified Logistics**
  - Fewer parts to qualify, source, store, track



S12 MagniV: Product Families

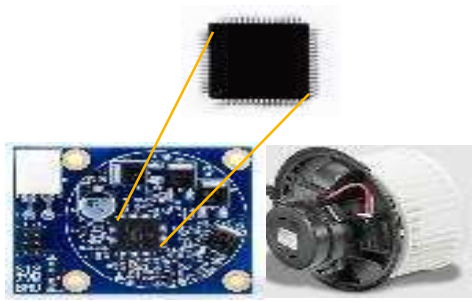
MagniV offers a broad portfolio of solutions for motor control or interface nodes

S12VR
Relay driven motors



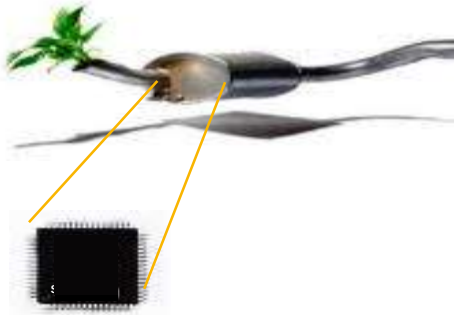
- Window lift
- Sunroof
- Power doors

S12ZVM
BLDC/DC motors



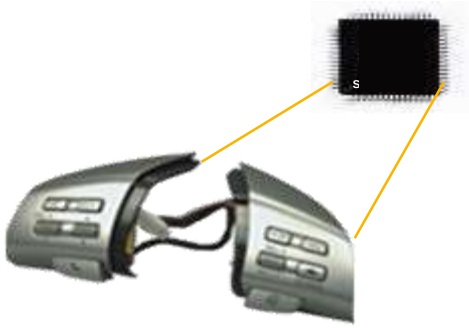
- Fuel pump
- Oil pump
- Fans
- Wipers

S12ZVC
CAN nodes



- Safety sensors
- Emission sensors
- Gear shift
- Space-constrained CAN nodes

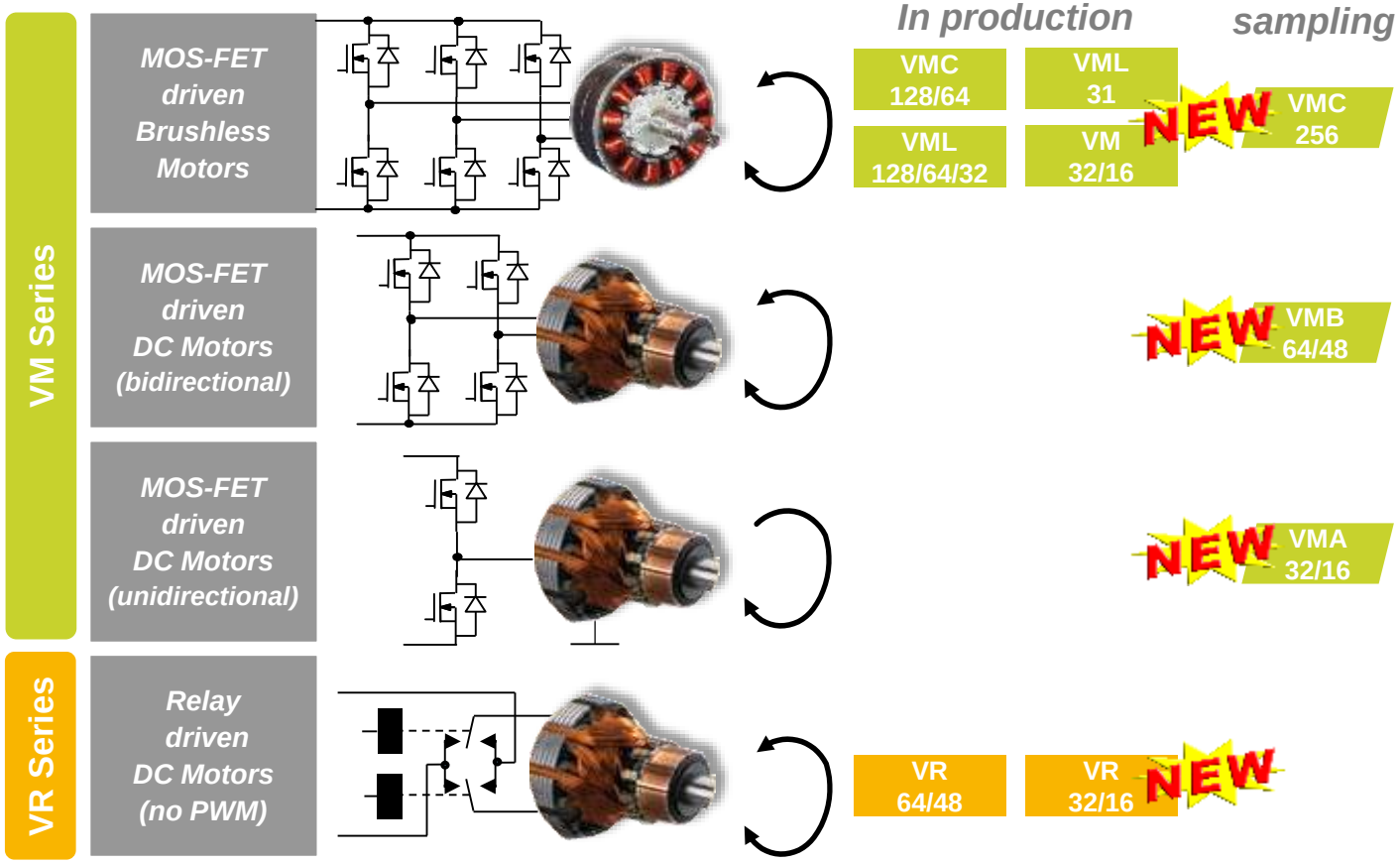
S12ZVL
LIN Nodes



- Steering wheel switches
- Door modules
- Space-constrained LIN nodes

NEW PRODUCT ANNOUNCEMENT

New S12 MagniV Mixed-Signal MCUs for Motor Control



Brushless Motors:

Launching S12ZVML31, S12ZVM32/16

Announcing S12ZVMC256 extends portfolio:

- Wider Memory range (16-256kB)
- More Package options (48/64/80 pin)
- New CAN-PHY & HV-PWM PHY options
- Fewer ext components (integrating bootstrap diodes)

→ *New smaller and more cost optimized solutions*

→ *VMC256 for CAN nodes with capability to run Switch reluctance motors*

DC motor with FET-drive:

Announcing S12ZVMB64/48 & S12ZVMA32/16:

- VMB with H-Bridge drive MOSFET Gate predriver
- VMA with half-bridge MOSFET Gate predriver
- LIN or HV-PWM PHY options
- Current sensing Op Amp
- HS-drivers and HVIs on VMB (for user interface)

→ *Cost optimized solutions for bi- or unidirectional DC motors*

→ *VMB- user interface suitable for window lift / sun roof*

DC motor with Relay drive:

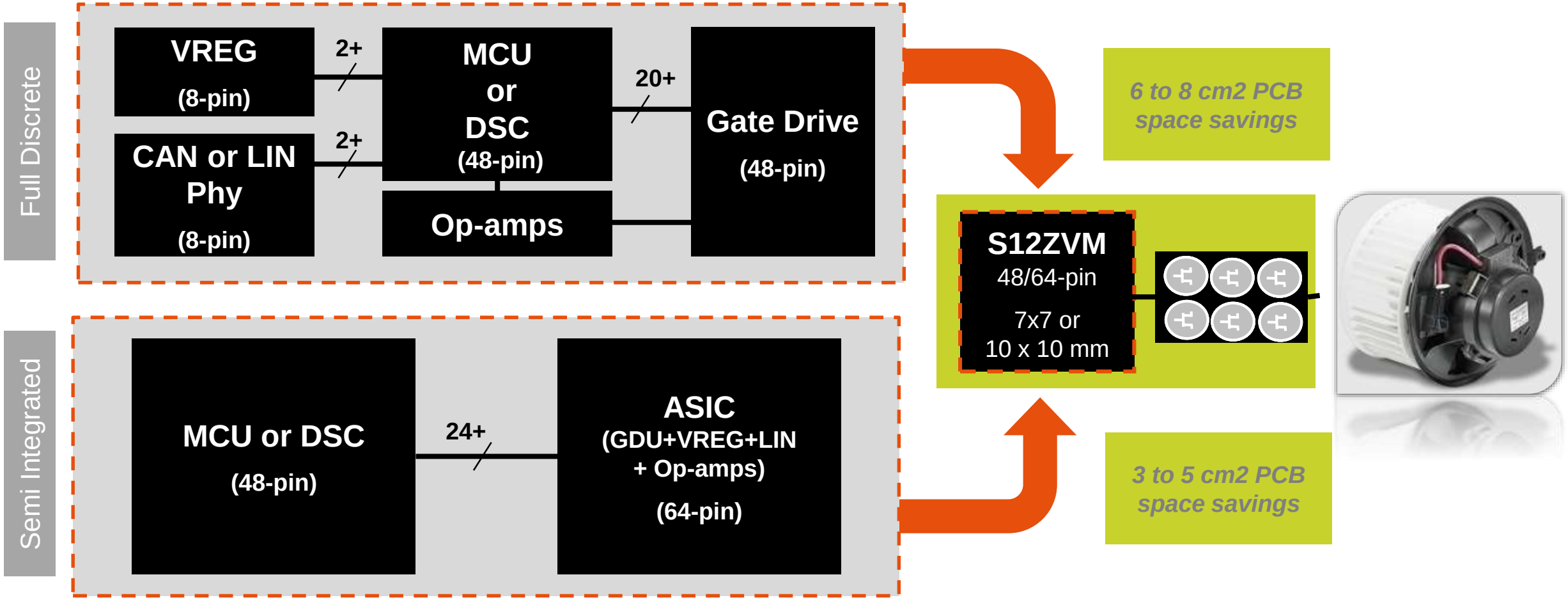
- S12VR32/16 extends existing portfolio with cost optimized solution for anti pinch or non-antipinch window lifters

Common Features → *Benefits:*

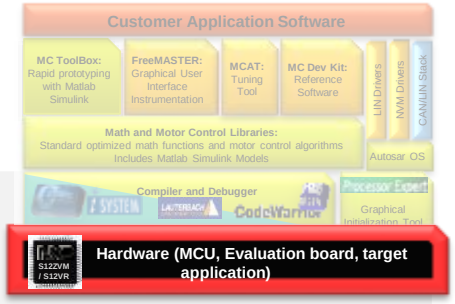
- Integrated Vreg → *for operation straight from car-battery*
- Most S12ZVM-solutions Grade0 qualified → *operates up to 150°C ambient*

Reduced System Footprint

Save PCB space, reduce interconnects on PCB, reduce testing effort



S12ZVM Ecosystem – Hardware



Motor Control Development Kits

All Motor Control DevKits

- EVB, Powerstage, Motor & SW
- Fully documented SW- and HW-Reference
- Supported by MCAT 1.0

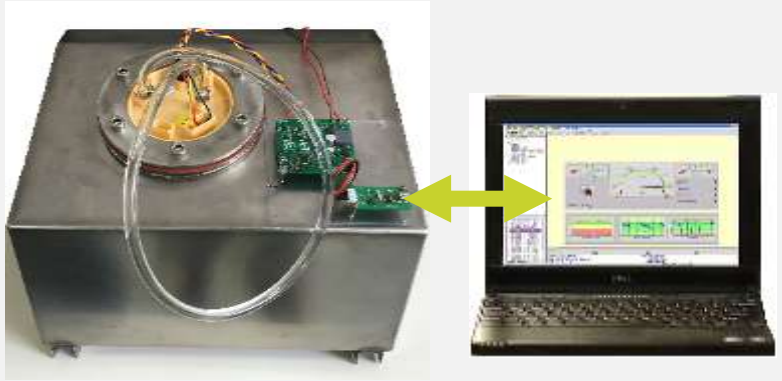
VML128 3-phs Sensor less PMSM DevKit

- Single shunt or dual shunt current sensing

VML128 3-phs Sensor less BLDC DevKit

- Sensor-less or Hall-sensor based operation

Demo



S12ZVML31 Fuel Pump Demo

- 3-phase sensor less Single-shunt PMSM Motor Control Development Kit:
  - motor replaced by a real automotive fuelpump
  - PI-parameters tuned with MCAT tuning tool
- Using NXP LIN-stack
- startup time 0 to 7k RPM in <100ms visualized on PC with FreeMASTER

→80% reuse of production ready HW / SW
→save significant R&D time

EVB

5 New Evaluation Boards (EVBs):

- S12VR32EVB with double relay (as used in windowlifters)
- S12ZVM32EVB with powerstage (6 x N-FET)
- X-S12ZVMC256EVB with powerstage (6 x N-FET)
- X-S12ZVMBEVB with powerstage (4 x N-FET)
- X-S12ZVMAEVB with powerstage (2 x N-FET)

S12ZVM Ecosystem – Motor Control Software

MC_TOOLBOX:
Motor Control Development Toolbox

IDE & tool chain for configuring and generating software to execute motor control algorithms on NXP MCUs:

- Automotive Math and Motor Control Library
- Plug in to MATLAB™/Simulink™ model-based design environment
- Optimized for fast execution on our MCUs

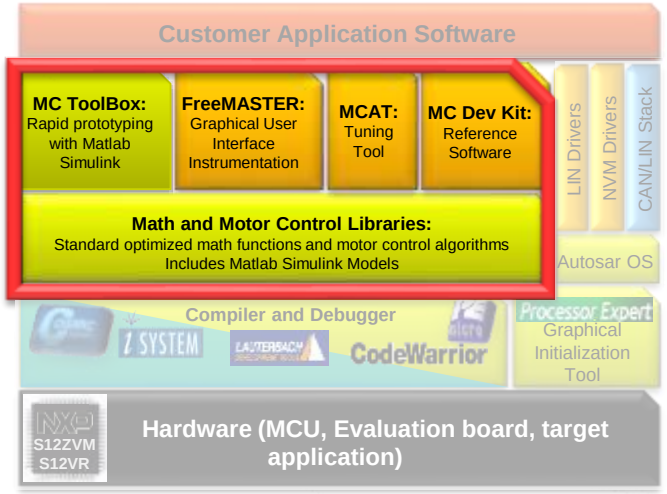
- → ***support rapid application development***

MCAT: Motor Control Application Tuning Tool

Tune your drive:

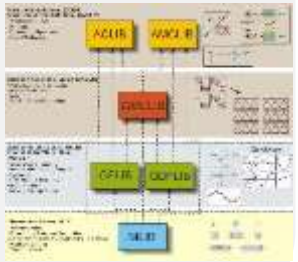
- Graphical User Interface, plugin to FreeMaster
- Runtime MCU interface, modify software variables to tune motor control algorithms

→ ***Saves time in getting started & finetuning***



AMMCLib: Automotive Math and Motor Control Library Set

- Precompiled software building blocks for a wide range of motor control applications
- Easy migration between platforms with minimized effort
- Production ready SW (SPICE Level 3, CMMI and ISO9001/TS16949)
- Control loop modeling with Matlab/Simulink® models



FreeMASTER

Real-time Debugger:

- Graphical User Interface
- Real-time Monitor Tool
- Modify variables run-time
- Track & trace
- Demonstration Platform
- Design your own dashboard

→ ***Reduce development time***
→ ***Faster Time to Market***

Motor Control Devkit SW

Comprehensive solution:

- All Motor Control Development Kits include hardware and are supported by documented application code
- Source code available

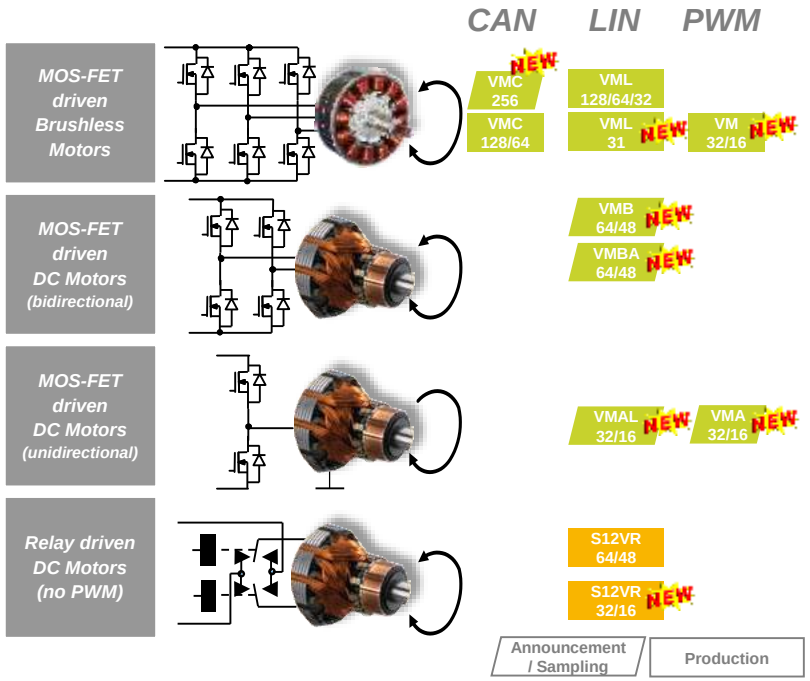
Major Price Reduction on Motor Control Software

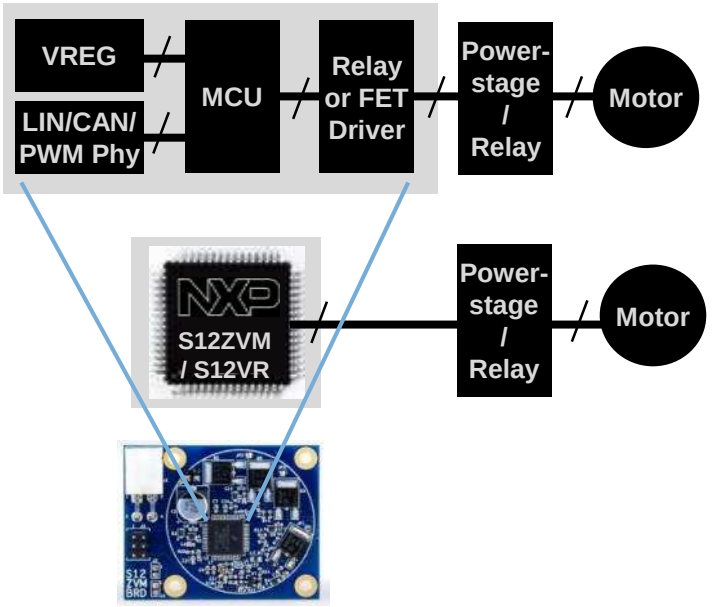
License	Pricing today	Pricing as of 01OCT16
A. Motor Control Toolbox (evaluation)	30 day‘s free	Obsolete (no more timelimit)
A. Motor Control Toolbox (license)	$8k per seat	Free
AMMCLIB Production (Object Code License)	$10k	$5k per device family
AMMCLIB Production (Source Code License)	$60k	$30k per device family

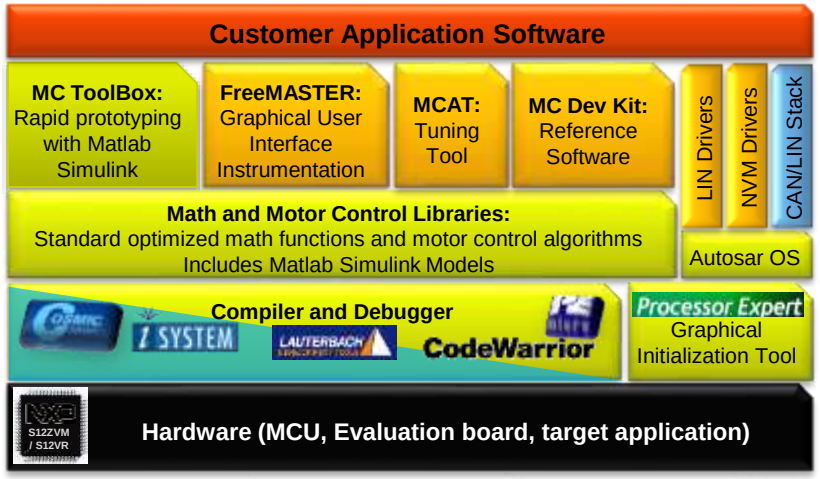
Community support only

Support via NXP product specific community

Tripling NXP's MagniV Motor Control Portfolio







NEW *5 new EVBs*

NEW *2 new/updated development kits:*

- *S12ZVML128 PMSM DevKit (single or 2 shunt)*
- *S12ZVML128 BLDC DevKit (sensor less or Hall)*

NEW *S12ZVML31 fuelpump demo / reference design*

Broadest Portfolio for scalability

Shrink your application

Comprehensive enablement

SECURE CONNECTIONS
FOR A SMARTER WORLD