Automotive **General Purpose** and **Integrated Solutions** Overview

EUF-ACC-T1639

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SAFE ASSURE™
by Freescale

Freescale Automotive MCU Focus

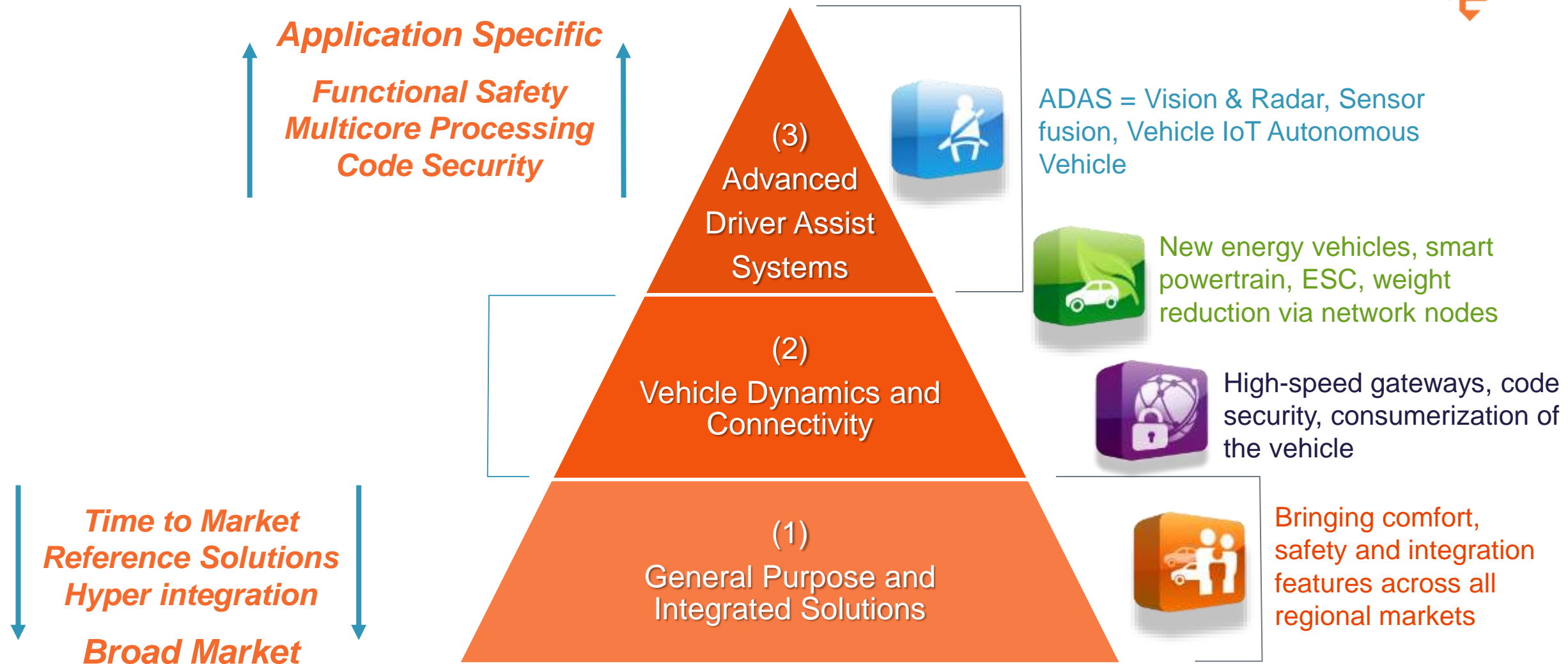| Safer & Autonomous Travel		A Greener World	Secure Connectivity	Mobility for Everyone	
Advanced Driver Assistance		Powertrain	Vehicle Connectivity	Driver Information	Broad Market
			CAN lin FlexRay WiFi **Ethernet**		
Radar	Vision/Fusion	Engine & Motor Control	Advanced Vehicle Networking	Instrument Cluster/ Infotainment	Body & General
Panther/S32R	**Monitor/S32V**	**Mamba/Cobra/S32P**	**Bolero/Calypso/S32G**	**i.MX**	**S12/KEA/MagniV/S32K**
Advanced safety MCU's with integrated high-performance analog and DSP	Multicore MCU with advanced image processing and SW enablement	Quad-core safety MCUs with advanced timer and instrumentation systems	Advanced MCU with integrated hardware security for high-performance vehicle connectivity	Multicore MCU's with advanced multimedia features and extensive OS support	Broad General Purpose ARM Cortex Solutions and MagniV Analog and power integration for easy solution development.

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WE MAKE CAMERAS SMART

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Automotive Product Lines & Global Megatrends

Application Specific

Functional Safety
Multicore Processing
Code Security

(3)
Advanced
Driver Assist
Systems

ADAS = Vision & Radar, Sensor fusion, Vehicle IoT Autonomous Vehicle

New energy vehicles, smart powertrain, ESC, weight reduction via network nodes

(2)
Vehicle Dynamics and Connectivity

High-speed gateways, code security, consumerization of the vehicle

Time to Market
Reference Solutions
Hyper integration

Broad Market

(1)
General Purpose and Integrated Solutions

Bringing comfort, safety and integration features across all regional markets

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GPIS Roadmaps

What is GPIS & Target Market

Lighting   Body Controller   HVAC

General Purpose

Doors/Seats   Sensors   Pumps/Fans

Integrated Solutions

A few facts:
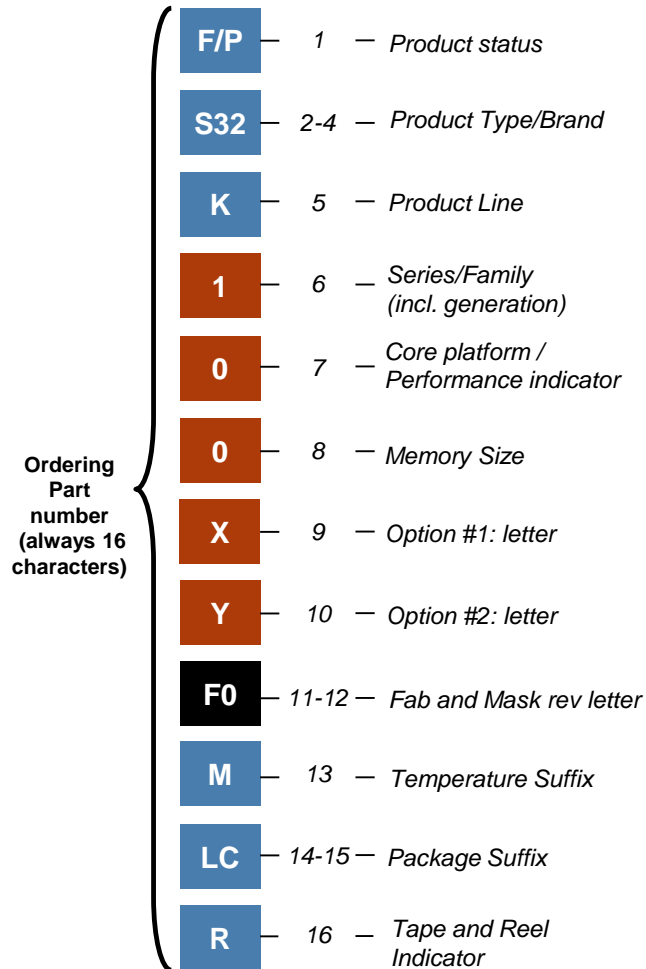- >4500 registered opportunities (S08, S12, BoI, KEA, MagniV, S32K)
- ~500 customers worldwide
- Average oppty LTR ~$600K

S32K Part Numbering: Freescale GP&IS Products

Ordering Part number (always 16 characters)

Field	Position	Description
F/P	1	Product status
S32	2-4	Product Type/Brand
K	5	Product Line
1	6	Series/Family (incl. generation)
0	7	Core platform / Performance indicator
0	8	Memory Size
X	9	Option #1: letter
Y	10	Option #2: letter
F0	11-12	Fab and Mask rev letter
M	13	Temperature Suffix
LC	14-15	Package Suffix
R	16	Tape and Reel Indicator

1st Character
Product Status for ordering and marking

P for prototype and
F for qualified ordering P/N

2nd, 3rd & 4th Character
Product Type / Brand

S32 for Automotive MCU

5th Character
Product Line

K = ARM Cortex MCUs
M = MagniV / Mixed Signal

6th Character
Series / Family

1 = 1st product family
2 = 2nd product family

7th Character
Core platform / Performance indicator

1 = M0+
4 = M4F

8th Character
Product/Memory

	1	2	3	4	5	6	7	8	9
M0+	16k	32k	48k	64k	96k	128k			
M4F		256k		512k		1M		2M	

9th & 10th Characters
Ordering options

X: Speed
  L = 80MHz
  H = 112MHz

Y: Optional feature
  N = No / none
  F = CAN FD & FlexIO
  S = Security
  A = CAN FD, FlexIO & Security

11th & 12th Character
Fab and Mask rev

Fx = ATMC
Tx = GF
XX = Flex #

x0 = 1st fab revision
x1 = 2nd fab revision

13th Character
Temperature

C = -40C to 85C
V = -40C to 105C
M = -40C to 125C
W = -40C to 150C

14th & 15th Character
Package Suffix

pins	TSSOP	LQFP	LQFP-EP	QFN	BGA
16	TG	-	-	-	-
32	-	LC	-	FM	-
48	-	LF	KF	FT	-
64	-	LH	KH	-	-
80	-	LK	KK	-	-
100	-	LL	-	-	MH
144	-	LQ	-	-	-
176	-	LU	-	-	-

16th Character
Tape & Reel

T = Trays/Tubes
(in order to fill the 16 char

R = Tape & Reel

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KEA/S32K144 – Introduction

KEA Series MCUs : General Purpose for Challenging Environments

KEA Series MCUs: 32-bit ARM-based MCUs for Automotive

- Based on a 32-bit ARM® Cortex®-M0+ 48 MHz core which equals high performance with ultra-low power

- 8 K to 128 K embedded flash, pin-to-pin compatible

- **AEC-Q100 qualified, -40°C to 125°C**

- **Enhanced ESD/EMC (6kV HBM)**

- **Automotive connectivity: CAN, LIN (UART), SPI and I²C**

- **Automotive IPs: 12-bit ADC, ACMP, Timers (FTM, PWM, PIT, PWT, RTC)**

- V_{DD} = 2.7 - 5.5 V, 3.3 V or 5 V convenience

Start Your Design Easily Today!

- **Most complete MCU + development environment**

- **24-hours to prototype, 2 months to production grade**

- Samples and Evaluation Boards (8K to 128KB)

- **Fully Qualified and Released.**

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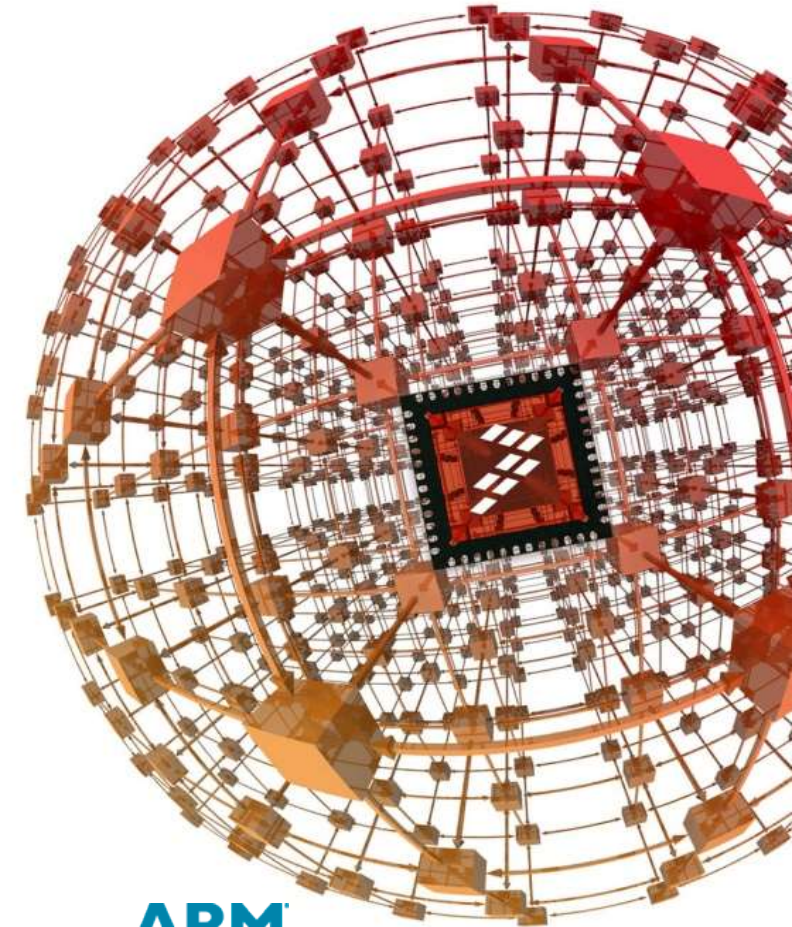
Kinetis EA series comparison table

KEA has at least the same overall quality level as existing 0.25um 16bit Auto MCU and 0.18um 8bit Auto MCU, but notably higher performance and richer enablement's.

KEA has perfect runway to **S32K** M4/M0+ Core series solutions with even greater Low Power enablement, system enhancements and wider memories options.

Features													
	Flash	RAM	EE PROM	Freq	MS CAN	SCI	SPI	ATD	PWT	Flex-Tim	ACMP	IIC	GPIO	Packages
KEAZN8	8 K	1 K	emulate	48 MHz	0	1	1	12c12b	1	6c+2c 16b	2	1	Up to 22	16 TSSOP/ 24 QFN
KEAZN16	16 K	2 K	256B	40 MHz	0	3	2	16c12b	NA	6c+2c+2c 16b	2	2	Up to 57	32/64 LQFP
KEAZN32	32 K	4 K	256B	40 MHz	0	3	2	16c12b	NA	6c+2c+2c 16b	2	2	Up to 57	32/64 LQFP
KEAZN64	64 K	4 K	256B	40 MHz	0	3	2	16c12b	NA	6c+2c+2c 16b	2	2	Up to 57	32/64 LQFP
KEAZ64	64 K	8 K	emulate	48 MHz	1	3	2	16c12b	1	6c+2c+2c 16b	2	2	Up to 71	64/80 LQFP
KEAZ128	128 K	16 K	emulate	48 MHz	1	3	2	16c12b	1	6c+2c+2c 16b	2	2	Up to 71	64/80 LQFP

Kinetis EA128 Block Diagram

- **Applications:**
  - Automotive general purpose
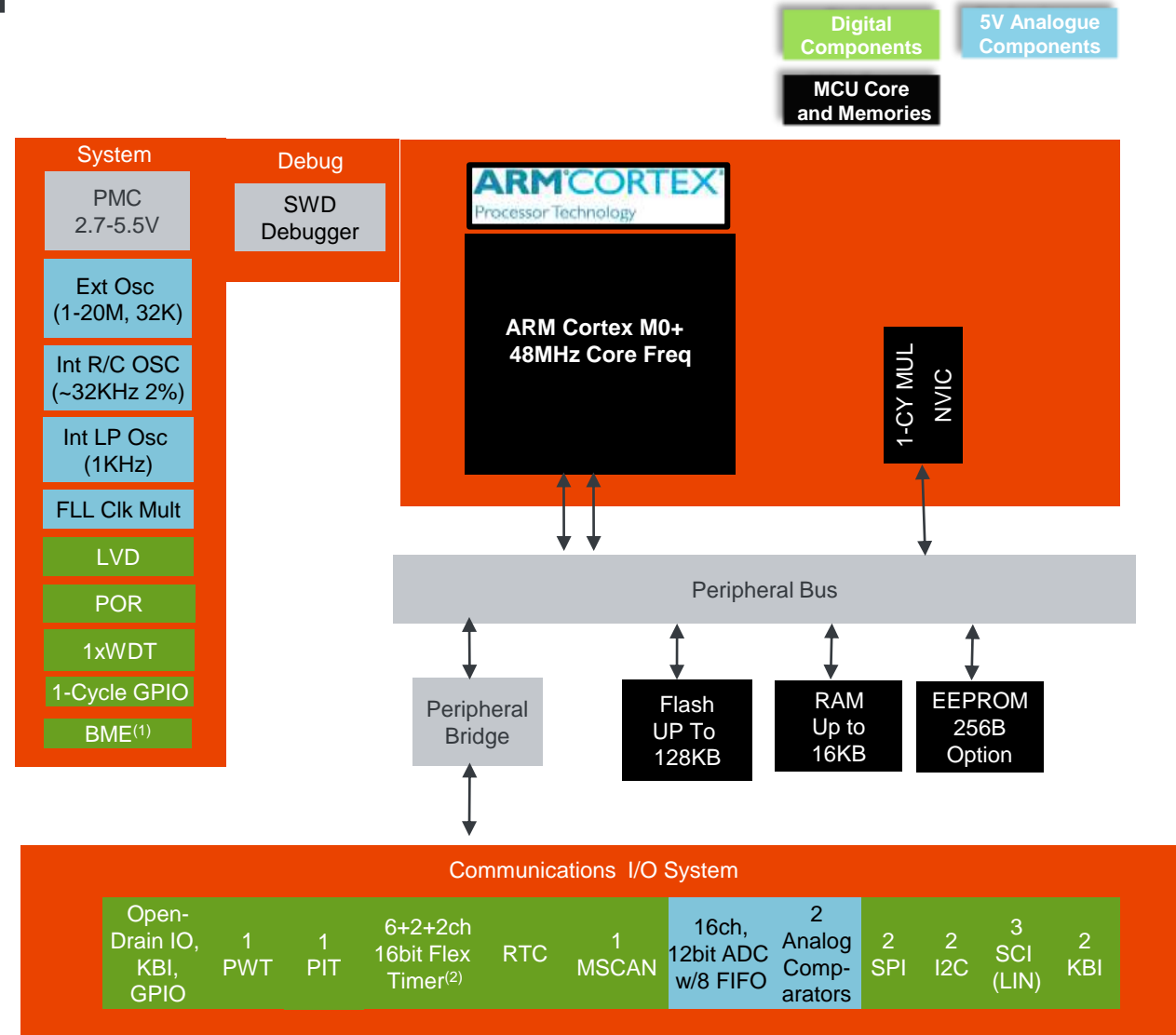- **Operating Characteristics**:
  - Voltage range: 2.7 to 5.5 V
  - Temperature range: -40 to 125°C
- **Key Features:**
  - Cortex M0+ core 48 MHz
  - Up to 128 K embedded flash
  - Up to 1 6K RAM
  - External OSC + internal ICS for clock
  - System functions: LVD, WDG, CRC, LP modes
  - Communication: SPI, SCI, IIC, CAN
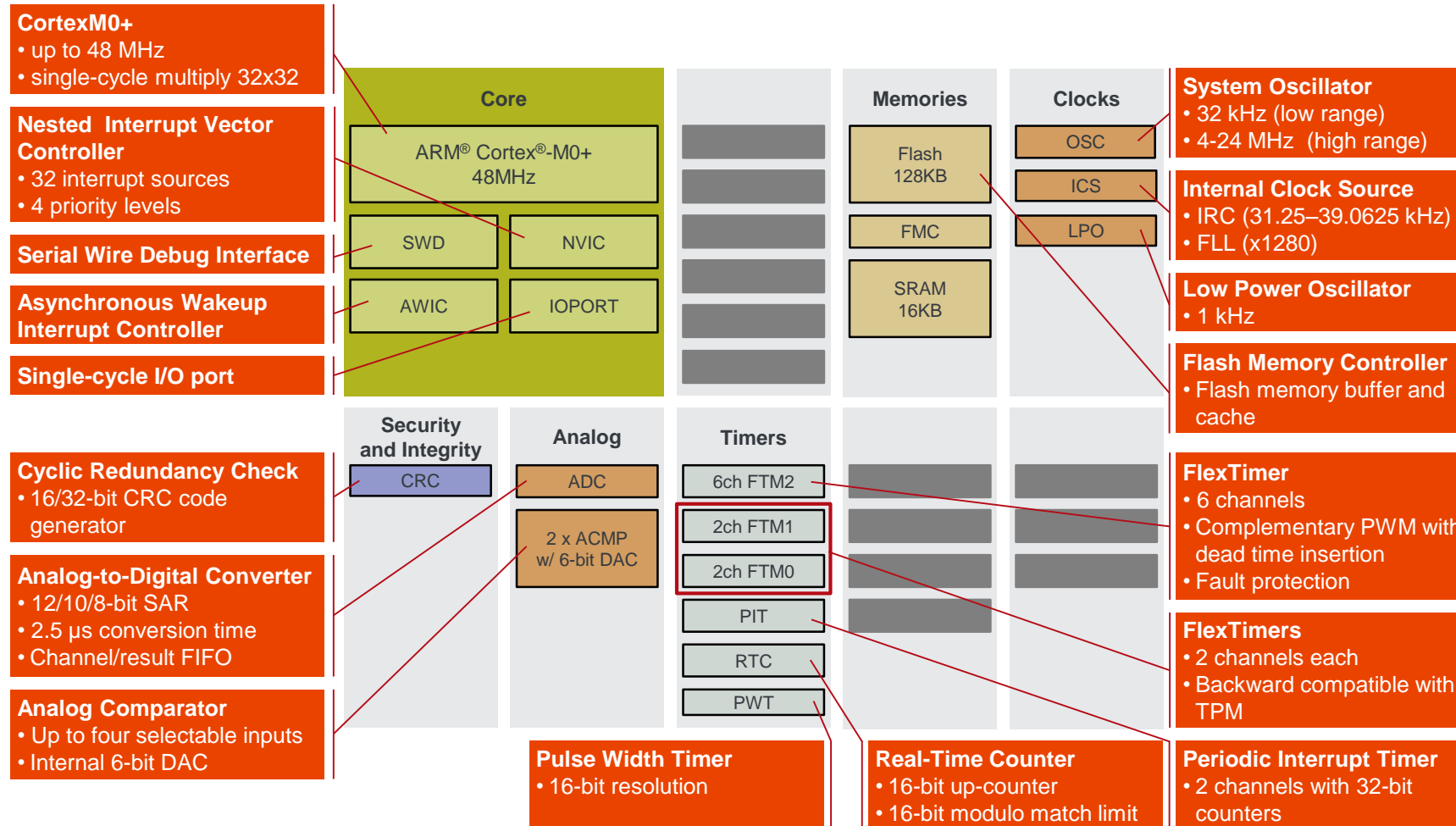 - Timers: FTM, PWM, PIT, PWT, RTC
  - 12-bit ADC and ACMP
- **Packages:**
  - 16TSSOP, 24QFN, 32/ 64/ 80LQFP
  - Pin compatible within KEA family

Digital Components

5V Analogue Components

MCU Core and Memories

System	Debug		
PMC 2.7-5.5V	SWD Debugger	**ARM CORTEX** Processor Technology	
Ext Osc (1-20M, 32K)		**ARM Cortex M0+ 48MHz Core Freq**	1-CY MUL NVIC
Int R/C OSC (~32KHz 2%)			
Int LP Osc (1KHz)			
FLL Clk Mult			
LVD			
POR			
1xWDT			
1-Cycle GPIO			
BME(1)			

Peripheral Bus

Peripheral Bridge

Flash UP To 128KB

RAM Up to 16KB

EEPROM 256B Option

Communications I/O System

| Open-Drain IO, KBI, GPIO | 1 PWT | 1 PIT | 6+2+2ch 16bit Flex Timer(2) | RTC | 1 MSCAN | 16ch, 12bit ADC w/8 FIFO | 2 Analog Comp-arators | 2 SPI | 2 I2C | 3 SCI (LIN) | 2 KBI |

(1) Support bit operation in RAM
(2) Faster timer running 2 x core clock

Kinetis EA128 Block Diagrams Details

CortexM0+
- up to 48 MHz
- single-cycle multiply 32x32

Nested Interrupt Vector Controller
- 32 interrupt sources
- 4 priority levels

Serial Wire Debug Interface

Asynchronous Wakeup Interrupt Controller

Single-cycle I/O port

Cyclic Redundancy Check
- 16/32-bit CRC code generator

Analog-to-Digital Converter
- 12/10/8-bit SAR
- 2.5 µs conversion time
- Channel/result FIFO

Analog Comparator
- Up to four selectable inputs
- Internal 6-bit DAC

Core
ARM® Cortex®-M0+ 48MHz

SWD | NVIC
AWIC | IOPORT

Memories
Flash 128KB
FMC
SRAM 16KB

Clocks
OSC
ICS
LPO

Security and Integrity
CRC

Analog
ADC
2 x ACMP w/ 6-bit DAC

Timers
6ch FTM2
2ch FTM1
2ch FTM0
PIT
RTC
PWT

System Oscillator
- 32 kHz (low range)
- 4-24 MHz (high range)

Internal Clock Source
- IRC (31.25–39.0625 kHz)
- FLL (x1280)

Low Power Oscillator
- 1 kHz

Flash Memory Controller
- Flash memory buffer and cache

FlexTimer
- 6 channels
- Complementary PWM with dead time insertion
- Fault protection

FlexTimers
- 2 channels each
- Backward compatible with TPM

Pulse Width Timer
- 16-bit resolution

Real-Time Counter
- 16-bit up-counter
- 16-bit modulo match limit

Periodic Interrupt Timer
- 2 channels with 32-bit counters

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Kinetis EA128 Block Diagrams Details (Continued)

System Integration Module
- System interconnection
- Pin re-map control
- System clock gating

Power Management Controller
- LVD, POR, bandgap

Miscellaneous Control Module
- Crossbar switch config.
- FMC configuration

Bit Manipulation Engine
- Decorated storage

Peripheral Bridge

Watchdog Timer
- IRC, LPO, ext. clk. Sources
- 16-bit window value

Serial Peripheral Interface
- 8-bit data length
- bus clk / 2 (master)
- bus clk / 4 (slave)

Inter-Integrated Circuit
- Up to 100 kHz
- SMBus v2 support

Universal Asynchronous Receiver/Transmitter
- LIN support

Freescale Scalable Controller Area Network
- 5x Rx (FIFO) / 3x Tx buffers

System
- SIM
- PMC
- MCM
- BME
- AIPS
- WDOG

Comm. Interfaces
- 2x SPI
- 2x I²C
- 3x UART
- MSCAN

HMI
- GPIO
- 2x KBI
- IRQ

General Purpose Input/Output
- Port I/O data registers
- Port data direction regs.
- Zero wait state IOPORT

Keyboard Interrupts
- 32 keyboard interrupt pins
- Exit from LP modes

Interrupt
- Maskable interrupt inputs

Kinetis EA Series QFN Package Option

KEA8 QFN Definition

Document No: 98ASA00474D

QFN Thermally Enhanced

4 x 4`x 0.9 – 0.5 Pitch

- **Notes.**
  - All dimensions are in millimetres
  - Dimensioning and tolerancing per ASME Y14.5M-1994
  - This is a non-JEDEC registered package
  - Minimum metal gap should be 0.2MM
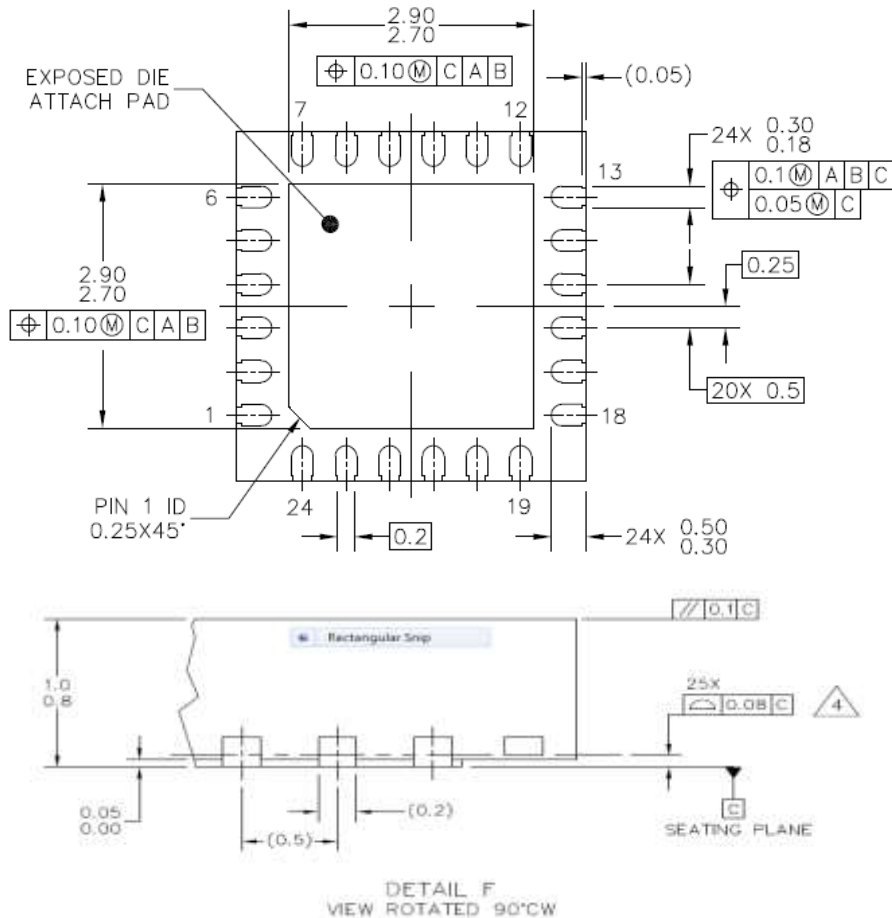
Kinetis EA Easy Enablement:

Rapid Prototyping for Quality Software Development

- **Freescale library and tool:**

  - Automotive Math and Motor Control Library for Cortex M0+

  - Motor Control Application Tuning (MCAT) tool

  - FreeMASTER

- **IDE Debugger/Compiler**

  - CodeWarrior 10.6, Processor Expert integrated

  - S32-DS IDE

  - IAR

  - Keil

  - Cosmic IDE for Kinetis ARM MCUs

Operating Systems:
MQX Lite

Drivers
Split Gate Flash Driver Software for Kinetis
EA Series MCU
Flash driver for EEPROM emulation
LIN driver
CAN driver
Other peripherals and IO drivers

Debugger Interface
P&E Micro: Umultilink

Kinetis EA Low Cost StarterTRAK Boards

TRK-KEA8

- KEA8 MCU in a 24 QFN package
- On-board openSDA debugging and programming circuit using K20 MCU
- LIN communications interface
- Analog interface with potentiometer
- High efficiency LEDs
- SCI serial communication interface

TRK-KEA64

- KEA64 MCU in a 64 LQFP package
- On-board openSDA debugging and programming circuit using the K20 MCU
- LIN communications interface
- Analog interface with potentiometer
- High efficiency LEDs
- SCI serial communication interface

TRK-KEA128

- KEA128 MCU in a 80 LQFP package
- On-board openSDA debugging and programming circuit using K20 MCU
- LIN communications interface
- Analog interface with potentiometer
- High efficiency LEDs
- SCI serial communication interface
- CAN communications interface
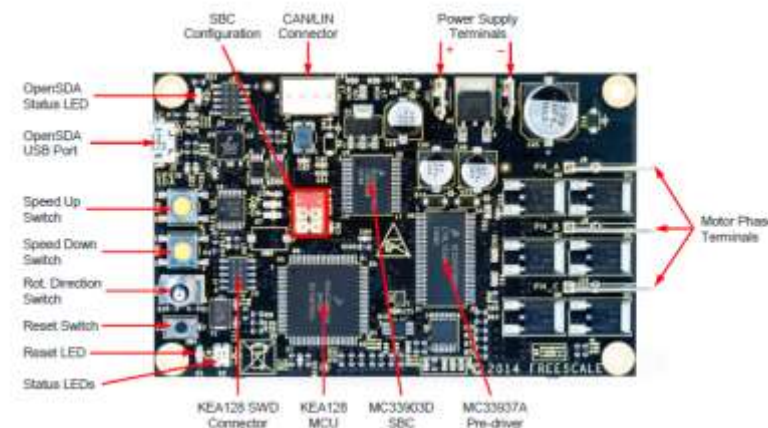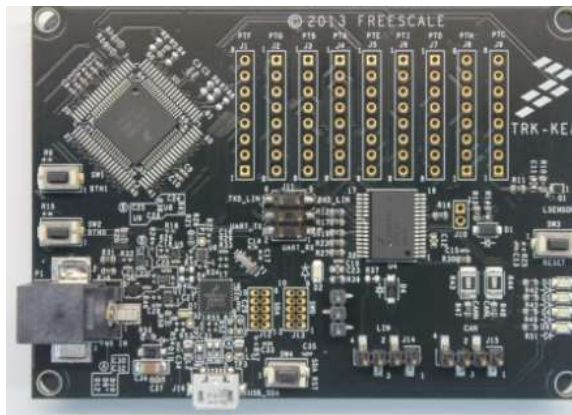
Freescale Freedom Development board for Ultra-Reliable MCUs

The **Freescale Freedom development platform** is a small, cost effective evaluation and development system for quick application prototyping and demonstration for Ultra-Reliable Microcontroller (MCU) families.

Each platform offers an easy-to-use USB mass-storage device mode flash programmer, virtual serial port and classic programming and run-control capabilities.

Expansion shield adapters provide plug-in options for expanded functionality and capabilities from connectivity (BLE, WiFi) to motor control (BLDC, PMSM)

It's easy to get started.
Simply choose your preferred Freescale Freedom development board and download our **free S32 Design Studio IDE software**

FRDM-KEA

3 New Members of the Freescale Freedom Development Board Family

FRDM-KEAZ128

- KEAZ128 MCU in a 80 LQFP package
- On-board OpenSDA debugging and programming circuit using K20 MCU
- CAN communications interface
- LIN and SCI communications interface
- Analog interface with potentiometer
- High efficiency RGB LED
- 2 x push button switches
- Power supply options: USB or 12V

FRDM-KEAZ64

- KEA64 MCU in a 80 LQFP package
- On-board OpenSDA debugging and programming circuit using K20 MCU
- CAN communications interface
- LIN and SCI communications interface
- Analog interface with potentiometer
- High efficiency RGB LED
- 2 x push button switches
- Power supply options: USB or 12V

FRDM-KEAZN32

- KEAZN32 MCU in a 64 QFP package
- On-board OpenSDA debugging and programming circuit using K20 MCU
- LIN and SCI communications interface
- Analog interface with potentiometer
- High efficiency RGB LED
- 2 x push button switches
- Power supply options: USB or 12V

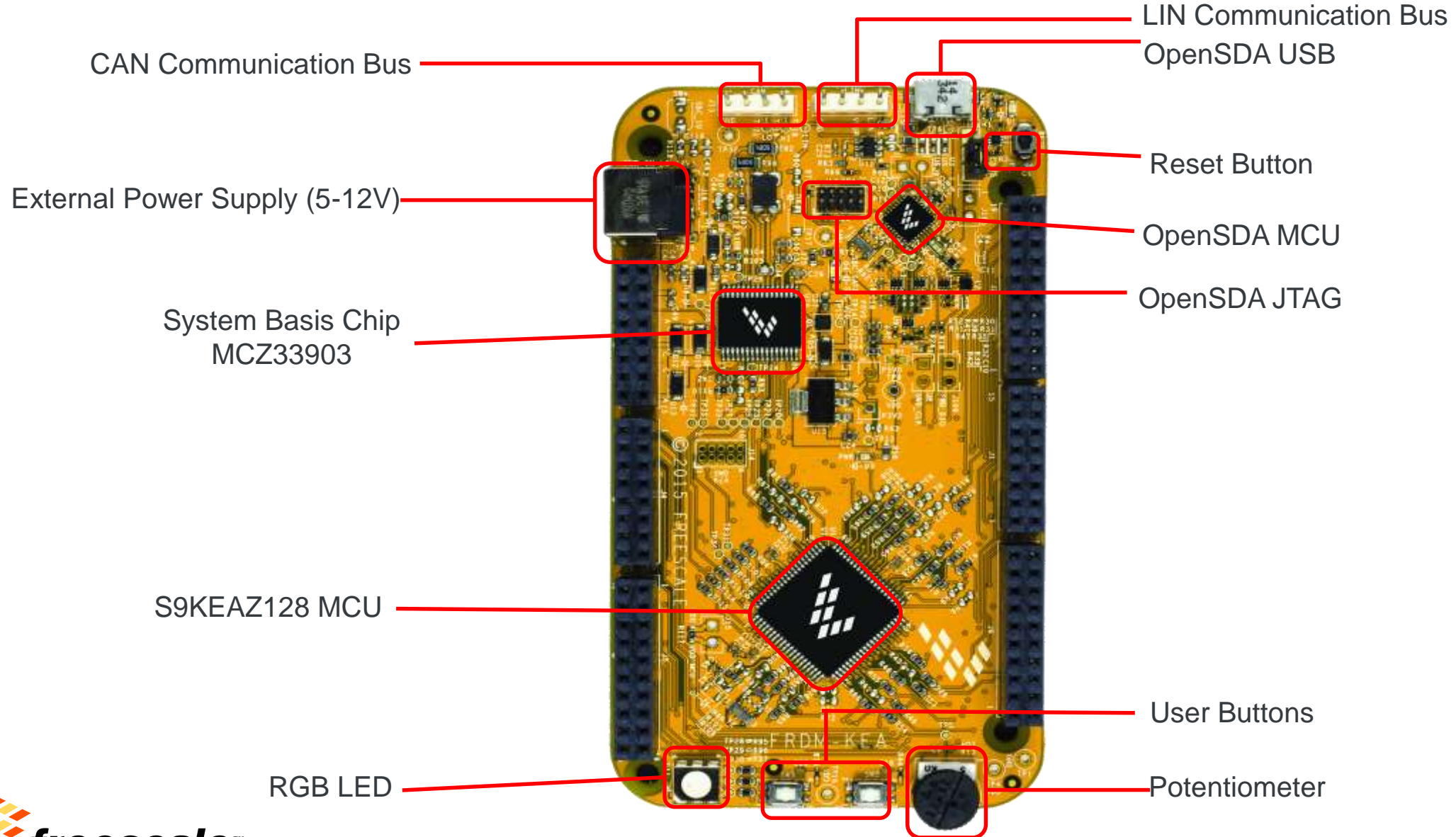
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FRDM-KEA

Features:

- Supports KEAZ128, KEAZ64 and KEAZN32, 5 V Microcontrollers
  - KEA qualified to Automotive Grade1 and -40 to +125 °C
- Small form factor size up to 6 x 4 inches
- Platform supports scalability up to 176 pins
- Arduino™ UNO footprint-compatible with expansion "shield" support
- Easy access to the MCU I/O header pins for prototyping
- On-chip connectivity for CAN, LIN, UART/SCI and SPI
- Potentiometer for precise voltage and analog measurement
- RGB LED
- Integrated open-standard serial and debug adapter (OpenSDA) with support for several industry-standard debug interfaces
- Flexible power supply options
  - microUSB or
  - external 12V power supply
- Similar hardware across ARM ®, S12 and Power Architecture® architecture based MCUs
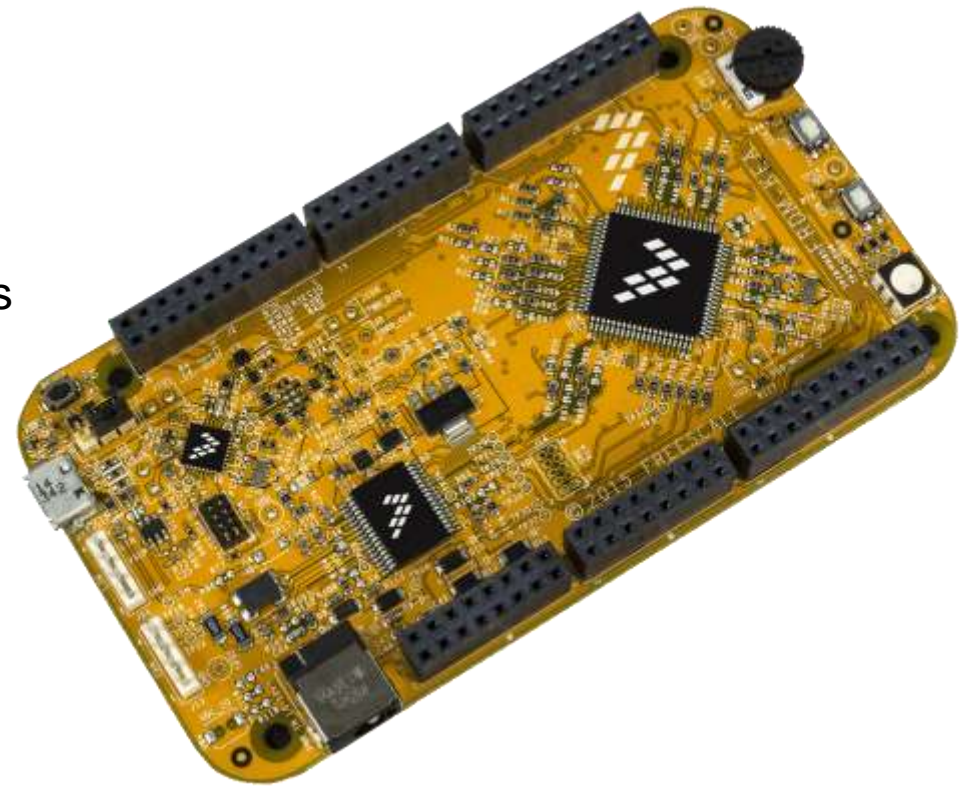
FRDM board start at $29

- Includes:
  - Freescale Freedom board
  - USB cable
  - URL to online Quick Start Guide (QSG) and tools
  - Complimentary KDS and S32 Design Studio IDEs

Get to know the FRDM-KEAZ128Q80

LIN Communication Bus

OpenSDA USB

CAN Communication Bus

Reset Button

External Power Supply (5-12V)

OpenSDA MCU

OpenSDA JTAG

System Basis Chip
MCZ33903

S9KEAZ128 MCU

User Buttons

RGB LED

Potentiometer

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Motor Control Reference Design Overview

Highlights

- Based on the Kinetis KEAZ128 32-bit ARM Cortex-M0+ automotive MCU
- Motor control solution for 12 V automotive systems 3-phase sensorless brushless DC (BLDC)
- Hardware solution consists of the KEAZ128 MCU, MC33903 SBC and MC33937A 3-phase FET pre-driver
- LIN & CAN connectivity support

Integrated Software

- Automotive Math and Motor Control Library set for ARM Cortex-M0+, Application Software
- Application data visualization and control with FreeMASTER run-time debugging tool included
- Motor Control Application Tuning (MCAT) tool allows run-time tuning of the application parameters included

NPI S32K Microcontroller Portfolio

S32K100 Product Series

- S32K148
- S32K146
- S32K144
- S32K142
- S32K115
- S32K114
- S32K113

- **32 KB to 2 MB+ Flash**

- **16 to 176 pins**

- **ARM® Cortex®-M0+ up to M4**

- **Pin and IP module compatibility within the product series and with KEA products**

Target Application Areas:

Body & Chassis Control

Infotainment connection module

Climate control (HVAC)

Windows/door/sun roof

Powertrain companion chip

PMSM/BLDC motor control

• Passive safety	• Park assistance	• Immobilizer
• Touch sensing	• Security	• Motorcycle CDI/EFI
• Battery Management	• Pump/fan controller	• Airbag
• Exhaust gas aftertreatment	• Gateway	• General Purpose

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NPI S32K100 Benefits

Improved Performance

- High speed ARM Cortex-M4 CPU (80>112MHz)

- HW floating point unit without SW overhead

- Harvard architecture accelerates data handling

- Combined D/I cache for direct execution

- Concurrent, low latency bus accesses over crossbar

- Parallel DMA operation (16ch up to 63 Request sources)

- Dedicated EEPROM (4KB)

Energy Efficiency

- Low leackage technology (C90TFS)

- Multiple low power modes (VLPR 1.5mA)

- Best in class STOP current (VLPS 25µA)

Improved Software Friendliness

- Same peripheral modules implemented among the series

- ARM instruction set and ecosystem

- Freescale SW packages (S32DS)

Kinetis EA/S32K1xx Key differentiators…

KEA MCU is cost-effective auto-grade scalable 32-bit product family with complete ARM ecosystem for a wide range of automotive applications

Customers can start design easily today for fast prototyping!

- **Complete enablement to save development cost & time**
  - Massive options of development tools, SW and HW references
  - ONE Complete EcoSystem
- **Super scalable product family**
  - 8K to 2M embedded flash, pin to pin compatible
  - Super HW & SW Portability, one learning curve
- **Automotive grade Quality**
  - AEC Q100 certified, Proven automotive IP on board, Enhanced EMC/ESD performance
  - ISO26262 ASILB minimum
- **High-Performance**
  - 32-bit ARM M0+ & M4FPU cores. With core self test and protected memories

- **Low power consumption**
  - M0+ core optimized for low power
  - M4F core low power manager with FPU, DSP, eDMA, Wake-up on analog thresholds
  - Chip level low power design
  - Deep sleep modes throughout the series
- **Advanced automotive connectivity**
  - Plenty of automotive peripherals including CAN, LIN(SCI), SPI, I2C etc
  - Market leading Automotive IP: QualSPI, HW Security, FlexIO
- **Wide operating range**
  - Vdd = 2.7 - 5.5V, 3.3V or 5V convenience
  - Ta = -40C to 125C

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MagniV – Introduction

S12 MagniV Benefits

S12 MagniV solutions deliver optimal system cost and physical footprint for sensor and actuator applications.

✓ **Reduced PCB Space**
Up to 30%

✓ **Improved manufacturing efficiency**
Replacing typically 3 IC by 1 MagniV reduces assembly and test cost while quality improves

✓ **Reduced Bill Of Material (BOM)**
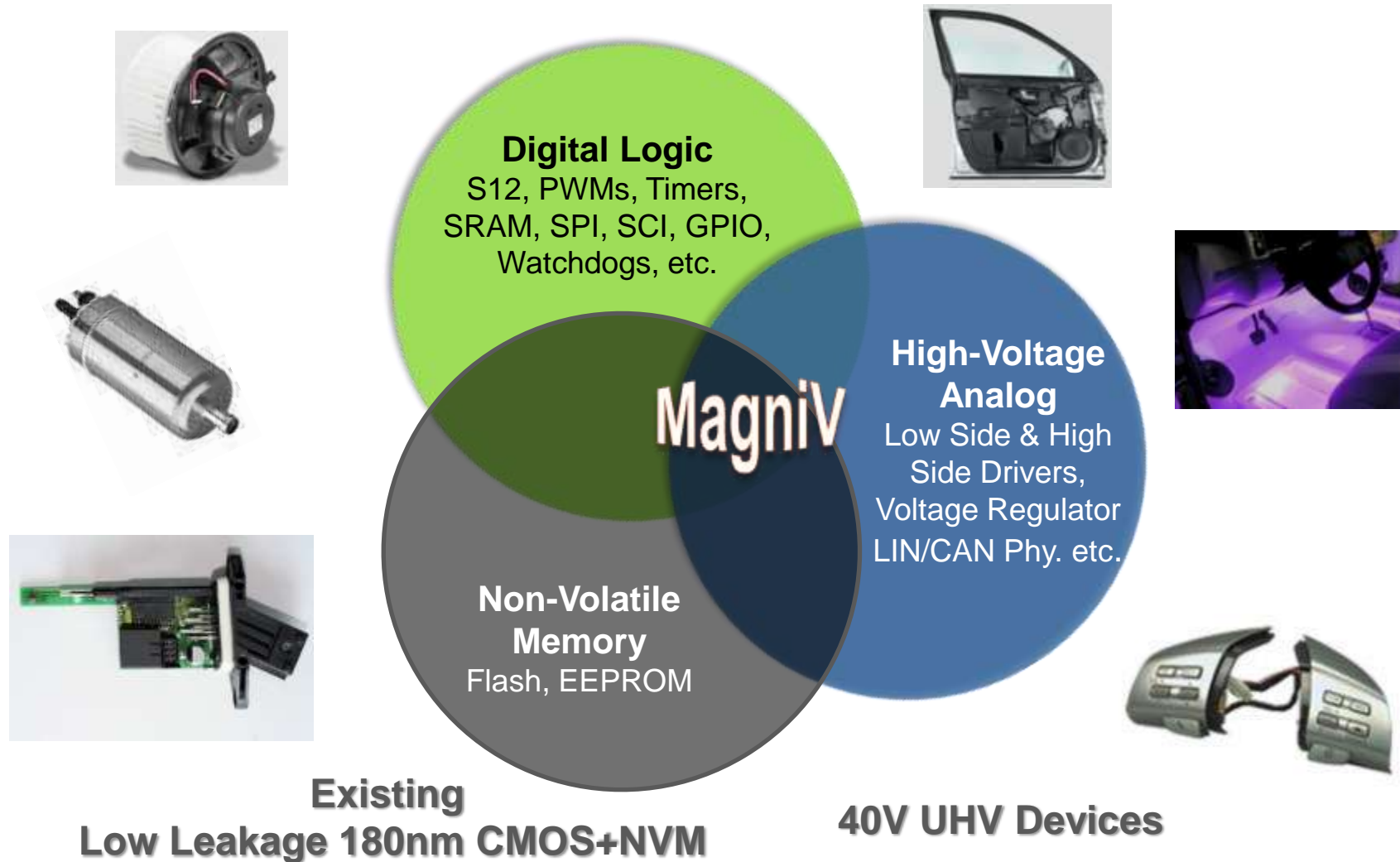Fewer components to purchase, handle, store and qualify

✓ **Simplified motor control that speeds up time-to-market**
Save up to 6 months on development, validation and ISO26262 implementation
- Abstract the complexity of 3-phase motor control software development
- Production ready Automotive quality SW and Tools
- SafeAssure program

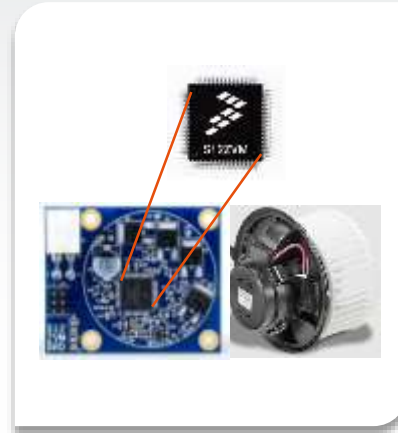# Integrated Solutions - Technology Sweetspot for Sensor and Actuators

Digital Logic
S12, PWMs, Timers, SRAM, SPI, SCI, GPIO, Watchdogs, etc.

MagniV

High-Voltage Analog
Low Side & High Side Drivers, Voltage Regulator LIN/CAN Phy. etc.

Non-Volatile Memory
Flash, EEPROM

Existing
Low Leakage 180nm CMOS+NVM

40V UHV Devices

S12 MagniV: Integration Beyond the MCU

Our **S12 MagniV** portfolio simplifies system design with the integration on High-Voltage (HV) analog features onto MCUs for automotive applications
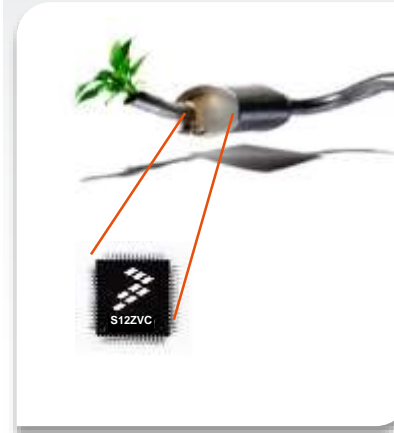
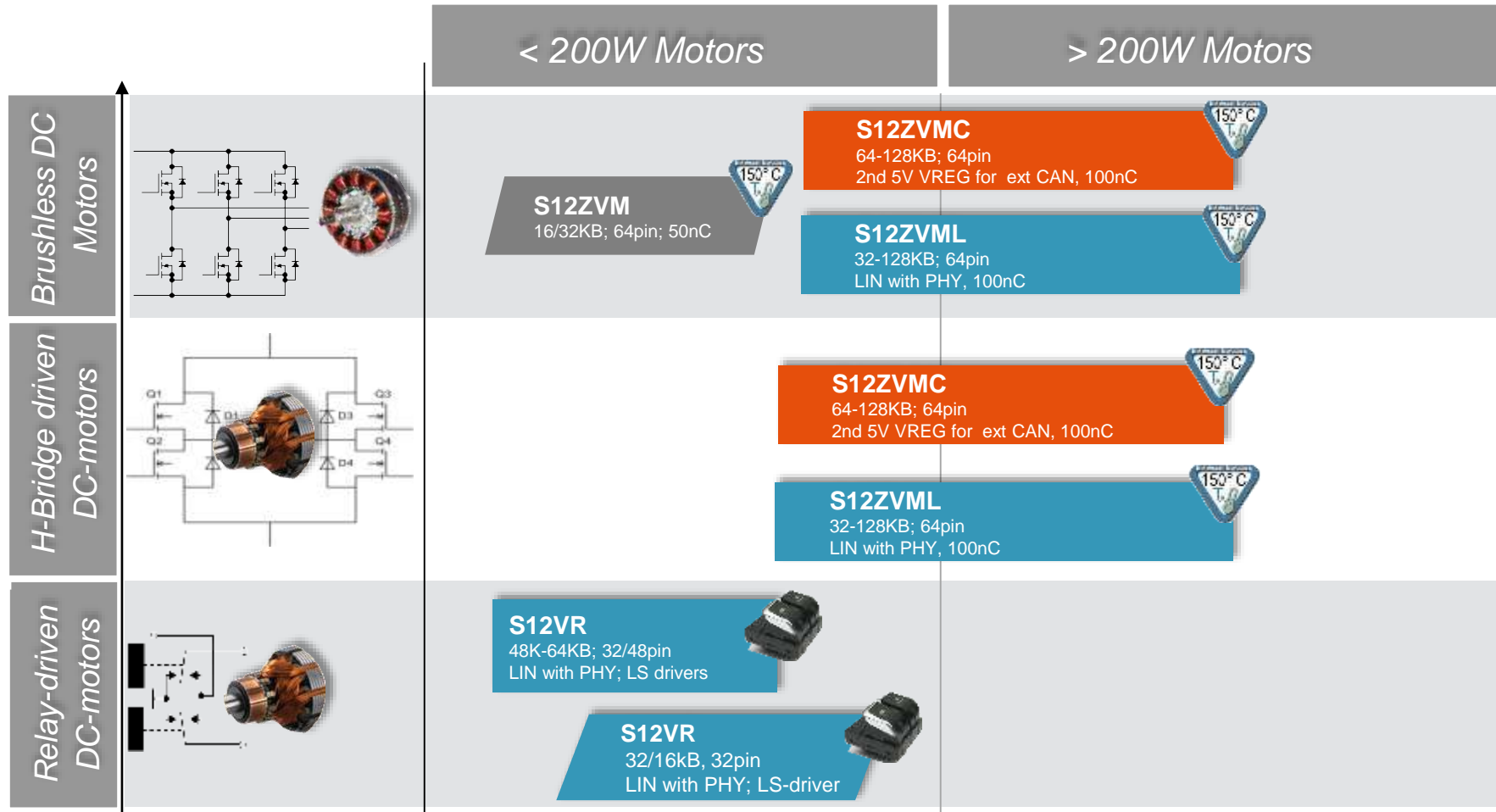| MM912/S12VR Window Lift	S12ZVM BLDC Motor Control	S12ZVC Small CAN nodes	S12ZVL LIN Nodes

✅ **Reduced PCB Space**

✅ **Reduced Bill of Material**

✅ **Improved manufacturing efficiency**

✅ **Simplified development**

Motor Control Solutions

	< 200W Motors	> 200W Motors

Brushless DC Motors

S12ZVM
16/32KB; 64pin; 50nC

S12ZVMC
64-128KB; 64pin
2nd 5V VREG for ext CAN, 100nC

S12ZVML
32-128KB; 64pin
LIN with PHY, 100nC

H-Bridge driven DC-motors

S12ZVMC
64-128KB; 64pin
2nd 5V VREG for ext CAN, 100nC

S12ZVML
32-128KB; 64pin
LIN with PHY, 100nC

Relay-driven DC-motors

S12VR
48K-64KB; 32/48pin
LIN with PHY; LS drivers

S12VR
32/16kB, 32pin
LIN with PHY; LS-driver

LIN applications

High temp option (AEC Grade 0)

Switch panel interface

Production	Execution	Planning	Proposal

SafeAssure™ Program Applied to S12 MagniV

Safety Hardware
Common safe hardware platform for application software:

- ✓ Voltage/clocks monitoring
- ✓ Memories w/ error correction
- ✓ Window Watchdog...

Safety Process

- ✓ ISO26262 development process for most products
- ✓ Safety-Element-Out-Of-Context

Functional Safety Standards
Automotive ISO 26262 — Industrial IEC 61508
Safety Support / Safety Hardware / Safety Software / Safety Process
Freescale Quality Foundation

Safety Support

- ✓ FIT rates
- ✓ Dynamic FMEDA
- ✓ Safety manual
- ✓ Technical support as required

Safety Software
S12Z core self-test available to complement the built-in hardware safety features

Product families	Part Codenames	Development Process	FMEDA Report Availability	Dependant Failure Analysis	Safety Manual	Core Self test and User Guide
S12VR	Tomar	Standard	Upon request		No	No
S12VR	Tomarino	Standard	Upon request			
S12ZVM	Carcassonne	Standard	yes			
S12ZVM	Obidos	ISO 26262	Q4 2014	Yes		
S12ZVH	Lumen2W	Standard	Upon request		Yes (www)	Yes
S12ZVH	Lumen4W	Standard	Upon request			
S12ZVL	Knox	ISO 26262	yes			
S12ZVC	Hearst	ISO 26262	yes			

S12 MagniV - Product Specific Benefits

		S12VR Tomar/Tomarino	S12ZVM	S12ZVL Knox
Product specific benefits	Bill of material reduction	LIN phy VREG + Vsense 2xLS for relays 2xHS	LIN phy VREG + Vsense Gate Driver 2xOp-amps	LIN phy VREG + Vsense
	PCB Space	2-3cm2	4-6cm2	1-2cm2
	Manufacturing cost	- Fewer components to mount (pick & place) - Less testing required for individual ICs		
General benefits	Quality	- Proven high volume LL18 base technology - Fewer solder joints → fewer points of failure		
	Logistics	- Fewer parts to qualify, source, store, track, etc…		

Hardware Tools Overview

Type	Evaluation Board	Motor Control Development Kit	Mini Eval Board
Purpose	Evaluation and software development for either CAN or LIN target device	Spin a BLDC motors within minutes, for demo and training purposes	Low cost and small 5x9cm board for evaluation and training purposes.
HW Features	- LIN and CAN interfaces - Onboard BDM-to-USB - SCI-to-USB interface for Freemaster - Hall sensor interface - Resolver interface - **6 N-channel FET with 10-15A drive capability**	- **S12ZVML12EVBLIN with pre-programmed S12ZVML128 part** - **BLDC motor with Hall-effect sensors mounted on plexiglas** - **PMSM version will also be available**	- S12ZVML128 part soldered - LIN connector - Onboard BDM-to-USB debug interface - **6 N-channel FET with 5-8A drive capability**
Software Package	MTRCKTSBNZVM128_SW	MTRCKTSBNZVM128_SW	MTRCKTSBNZVM128_SW
Availability	Prototypes now (XS12ZVMx12EVB)	Now for BLDC e/o Q1 14 for PMSM	Orderable in March 14 First shipments mid April 14
Partnumbers	S12ZVML12EVBLIN S12ZVML12EVBCAN	MTRCKTSBNZVM128 www.freescale.com/AutoMCDevKits	S12ZVML-MINIBRD www.freescale.com/S12ZVML-MINIBRD
Price	$349	$789	$69

Freescale S12ZVH Enablement

- Development Boards
  - TRK-S12ZVH128
  - TRK-S12ZVHY64
  - TRK-S12ZVFP64

- S12ZVH Reference Designs
  - (Available on request)

S12ZVH-REF-V1

S12ZVHY-REF-V1

Development Tools Ecosystem

- **Compilers**
  - CodeWarrior S12Z rev. 10.3 and newer
  - Cosmic
- **IDE**
  - CodeWarrior 10.3
  - Cosmic Zap
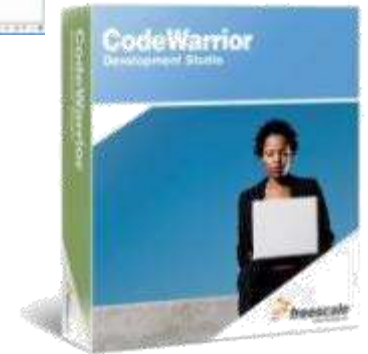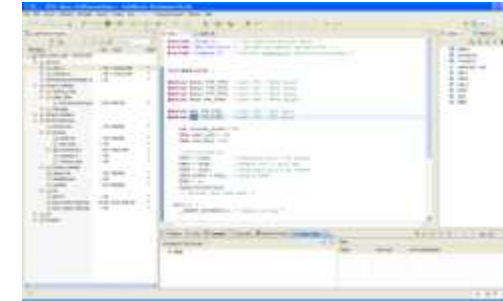 - eclipse
- **Programmers**
  - P&E PROGS12Z
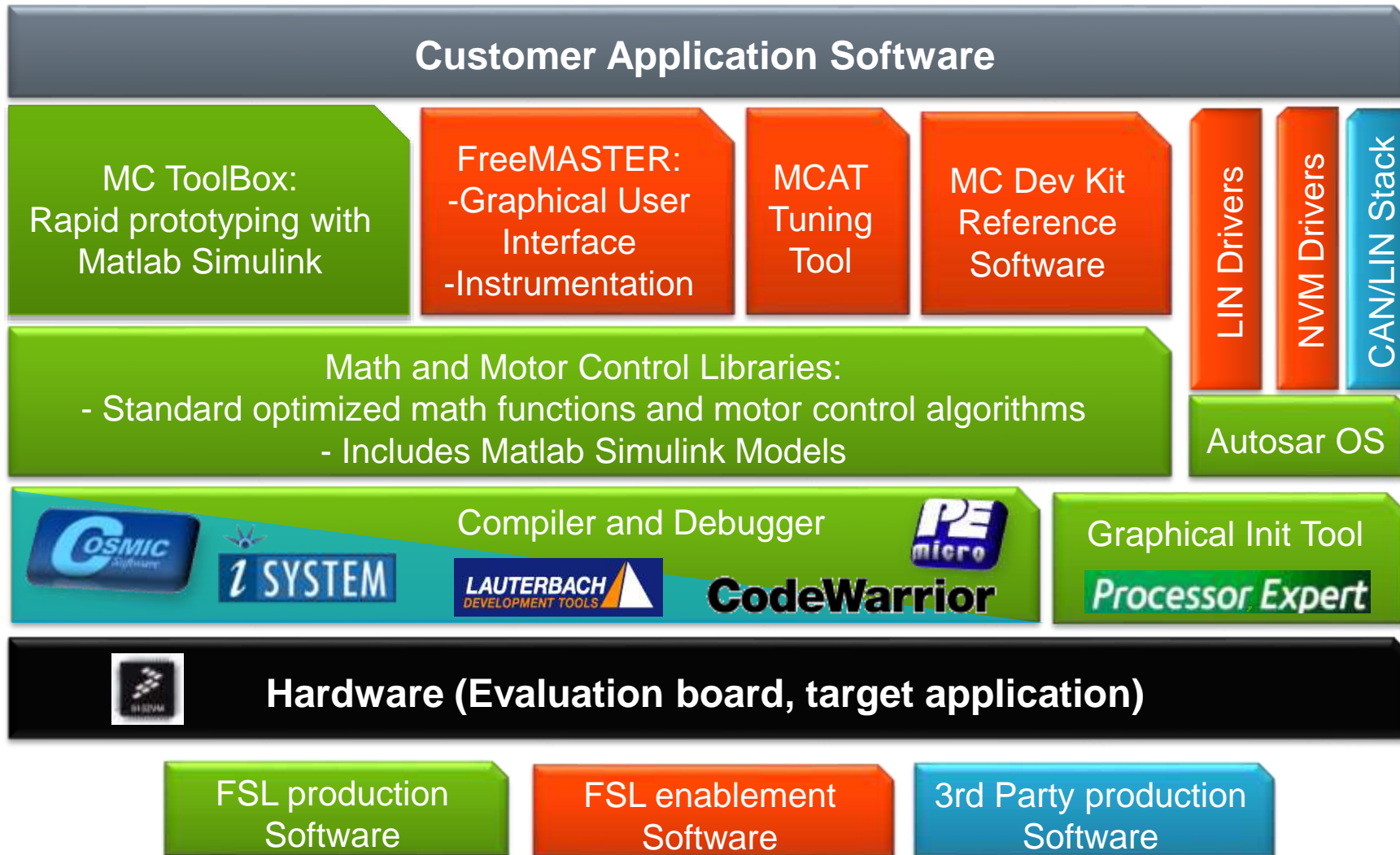 - Cyclone Pro Programmer
- **Debugger**
  - CW & P&E S12Z Debugger
  - Cosmic Zap Debugger
  - iSYSTEM winIDEA
- **Support Tools:**
  - Make utility – cygwin
  - FreeMASTER run time debugger and for instrumentation/calibration

Ecosystem – The Complete Solution

Customer Application Software

MC ToolBox: Rapid prototyping with Matlab Simulink

FreeMASTER:
-Graphical User Interface
-Instrumentation

MCAT Tuning Tool

MC Dev Kit Reference Software

LIN Drivers

NVM Drivers

CAN/LIN Stack

Math and Motor Control Libraries:
- Standard optimized math functions and motor control algorithms
- Includes Matlab Simulink Models

Autosar OS

Compiler and Debugger

Graphical Init Tool

Processor Expert

Hardware (Evaluation board, target application)

FSL production Software

FSL enablement Software

3rd Party production Software

S12 MagniV Benefits

S12 MagniV solutions deliver optimal system cost and physical footprint for sensor and actuator applications.

✅ **Reduced PCB Space**
Up to 30%

✅ **Improved manufacturing efficiency**
Replacing typically 3 IC by 1 MagniV reduces assembly and test cost while quality improves

✅ **Reduced Bill Of Material (BOM)**
Fewer components to purchase, handle, store and qualify

✅ **Simplified motor control that speeds up time-to-market**
Save up to 6 months on development, validation and ISO26262 implementation
- Abstract the complexity of 3-phase motor control software development
- Production ready Automotive quality SW and Tools
- SafeAssure program

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