



FTF | FREESCALE TECHNOLOGY FORUM
POWERING INNOVATION

An Open Source, Off-the-Shelf Powertrain Reference Design

FTF-AUT-F0018

Mike Garrard

Freescale Powertrain Systems

Bill Lucas for Bruce Bowling, Megasquirt

Al Grippo, Megasquirt

Phil Tobin, EFI Analytics



June 2012

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Introduction

This session will introduce the Megasquirt Qorivva Engine Control Unit (ECU)

This session is for you if you are involved in powertrain controls and want to know more about and/or have access to the design materials used to create the ECU, including

- Hardware design: schematics, Bill of Materials
- Software: low level drivers and application code
- Tools: software, debug and calibration

This ECU has been developed by Freescale in conjunction with Megasquirt and EFI Analytics. You will meet:

- Mike Garrard: Senior Powertrain Systems Engineer, Freescale
- Al Grippo: Co-Owner and designers of Megasquirt products
- Bill Lucas: Megasquirt design engineer
- Phil Tobin: Author of Tuner Studio Calibration Application



Session Objectives

After completing this session you will know:

- The origin, purpose and capability of a Megasquirt Qorivva ECU
- Where to access existing material
- What tools make up the development environment and how to obtain them
- The plans for open source code and further ECU release



Agenda

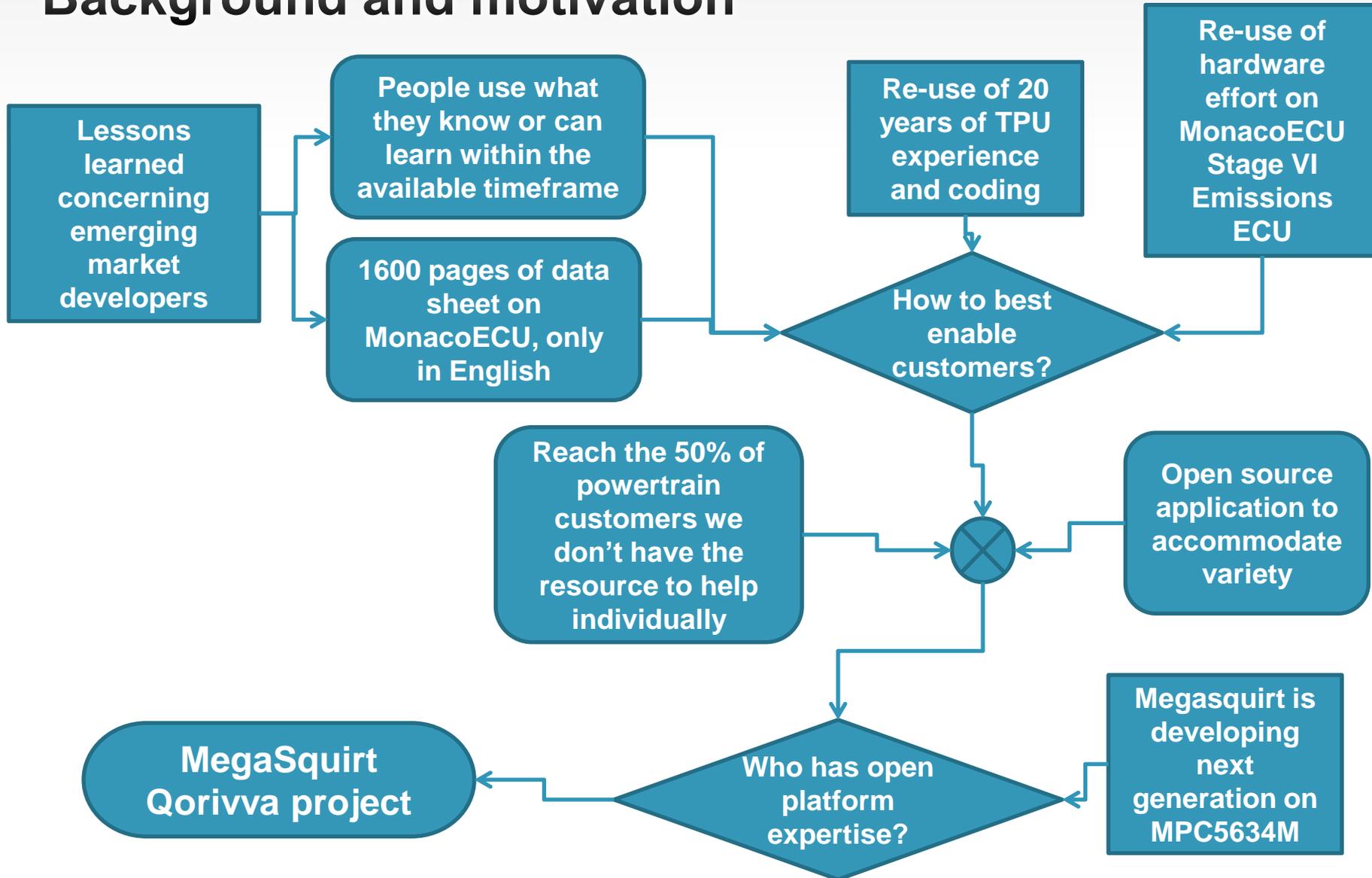
- Background and motivation
- Freescale in powertrain
- Megasquirt overview and products
- MSQorivva hardware description
- Software structure
- Calibration tool
- Online resources
- Work products and timelines
- Summary and Q&A



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Background and motivation

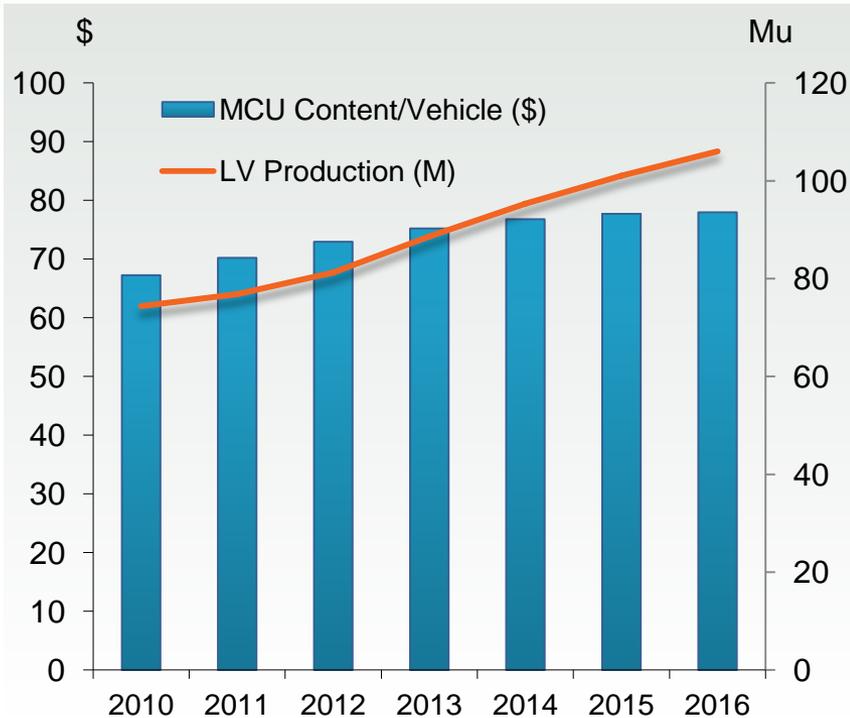




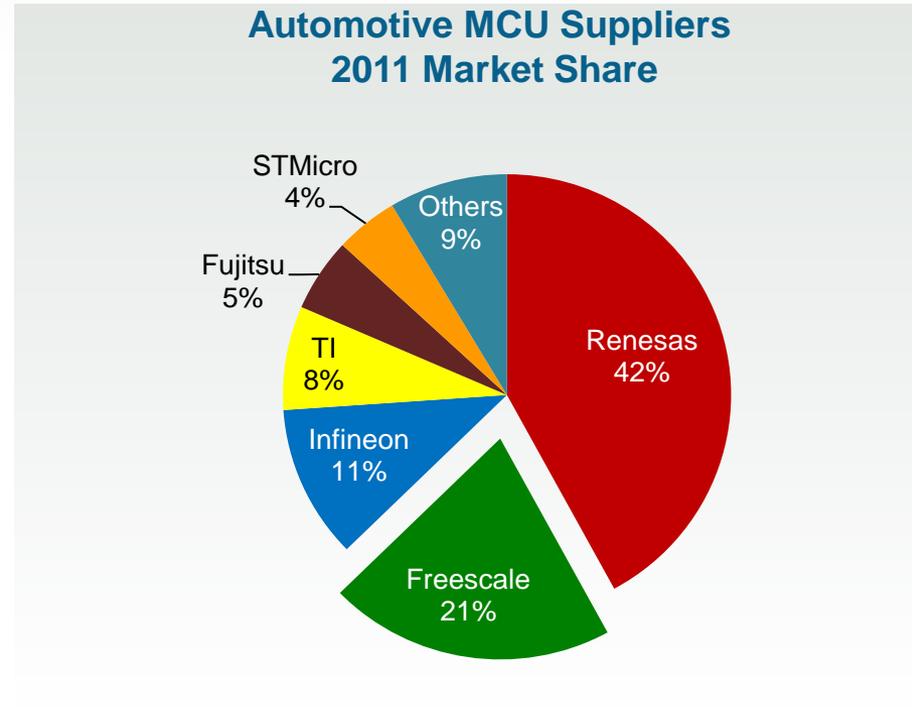
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Automotive Microcontroller Share



Source: Strategy Analytics, January 2012



Source: IHS iSuppli, March 2012

Freescale Shipped **360M** auto MCUs (> 4/car) in '11

We are in **Approx 50 million** new vehicles / year





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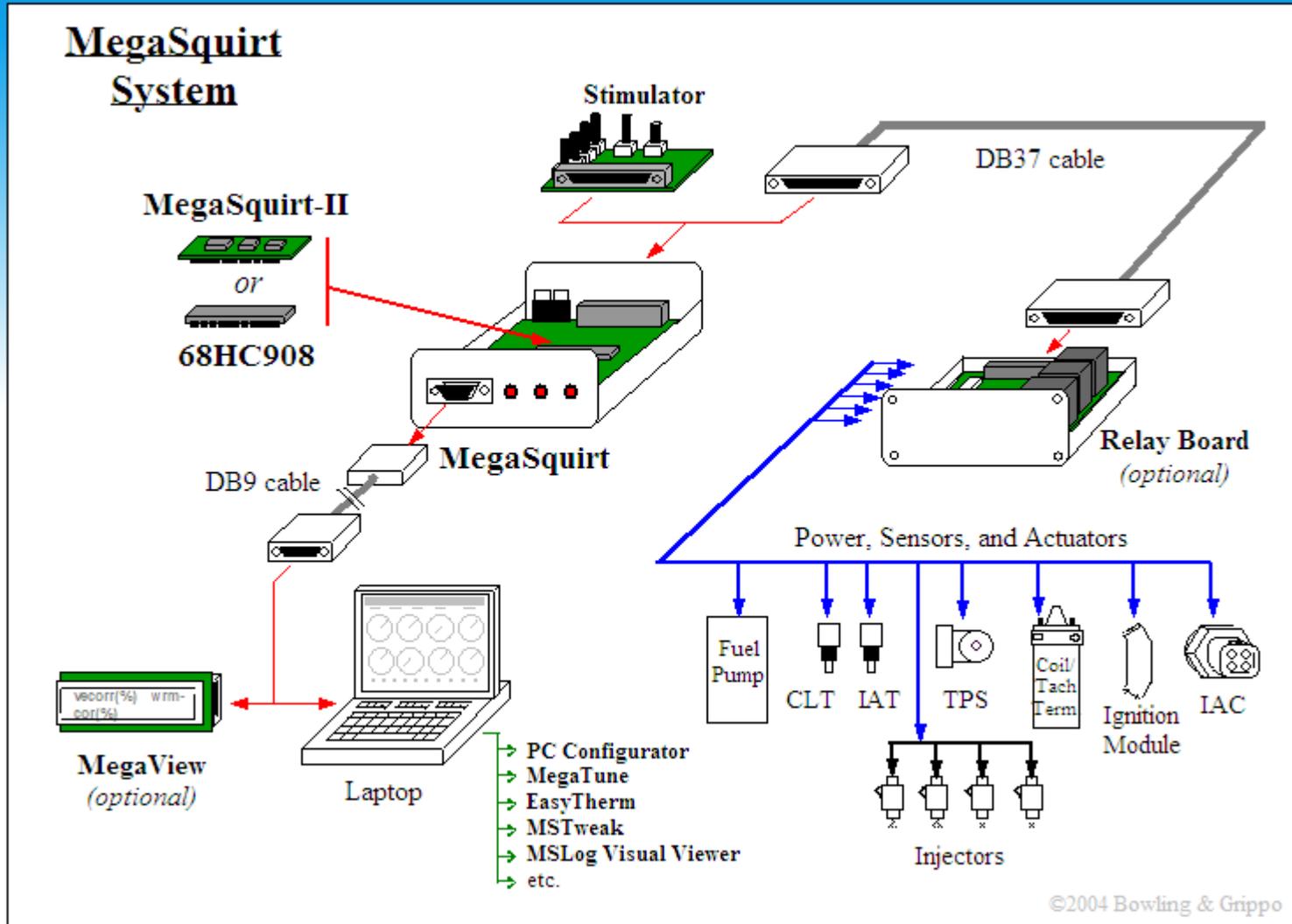
Do-it-Yourself Engine Controls

- MegaSquirt was created in 2001 as a simple aftermarket fuel injection controller for internal-combustion engines
- Project details were first published in Circuit Cellar Magazine in January 2002 as a do-it-yourself fuel controller
- MegaSquirt has evolved into a fully-featured engine management system, controlling fuel delivery requirements, ignition control, and auxiliary function management (boost, nitrous, traction, etc)
- Megasquirt successfully controls thousands of internal combustion engines worldwide, from chainsaws to land-speed record vehicles!

MegaSquirt

- Many different versions of MegaSquirt hardware exist today, each addressing different engine applications:
 - Do-it-yourself assembly kits and modules (MS1/MS2/MS3)
 - Plug-and-Play OEM-replacement ECUs (MS-PnP)
 - Small-engine ECUs (MicroSquirt)
 - Aftermarket High-end Engine Management Systems (EMS)
 - Spin-off hardware for transmission and data acquisition (MS-GPIO)
- Source code availability to end-users presents opportunity for custom modifications and functional additions (MS-Extra)

MegaSquirt DIY: System Block Diagram



©2004 Bowling & Grippo

MegaSquirt – Hardware Processor Evolution

- MegaSquirt has evolved in processor technology use over the years, improving performance with each step:
 - MS1 – MC68HC08GP32 8-bit microcontroller
 - MS2 – MC9S12C128 16-bit microcontroller
 - MS3 – MC9S12XEP100 16-bit microcontroller + XGATE
- MS-Qorivva is the next step in CPU performance and capability, providing the following enhancements:
 - E200z3 Power Architecture 32-bit CPU core
 - 1.5MB flash, 94KB RAM
 - eTPU2 for engine crankshaft position tracking and real-time hardware-based fuel and ignition events
 - DMA - performs peripheral data movement without CPU intervention

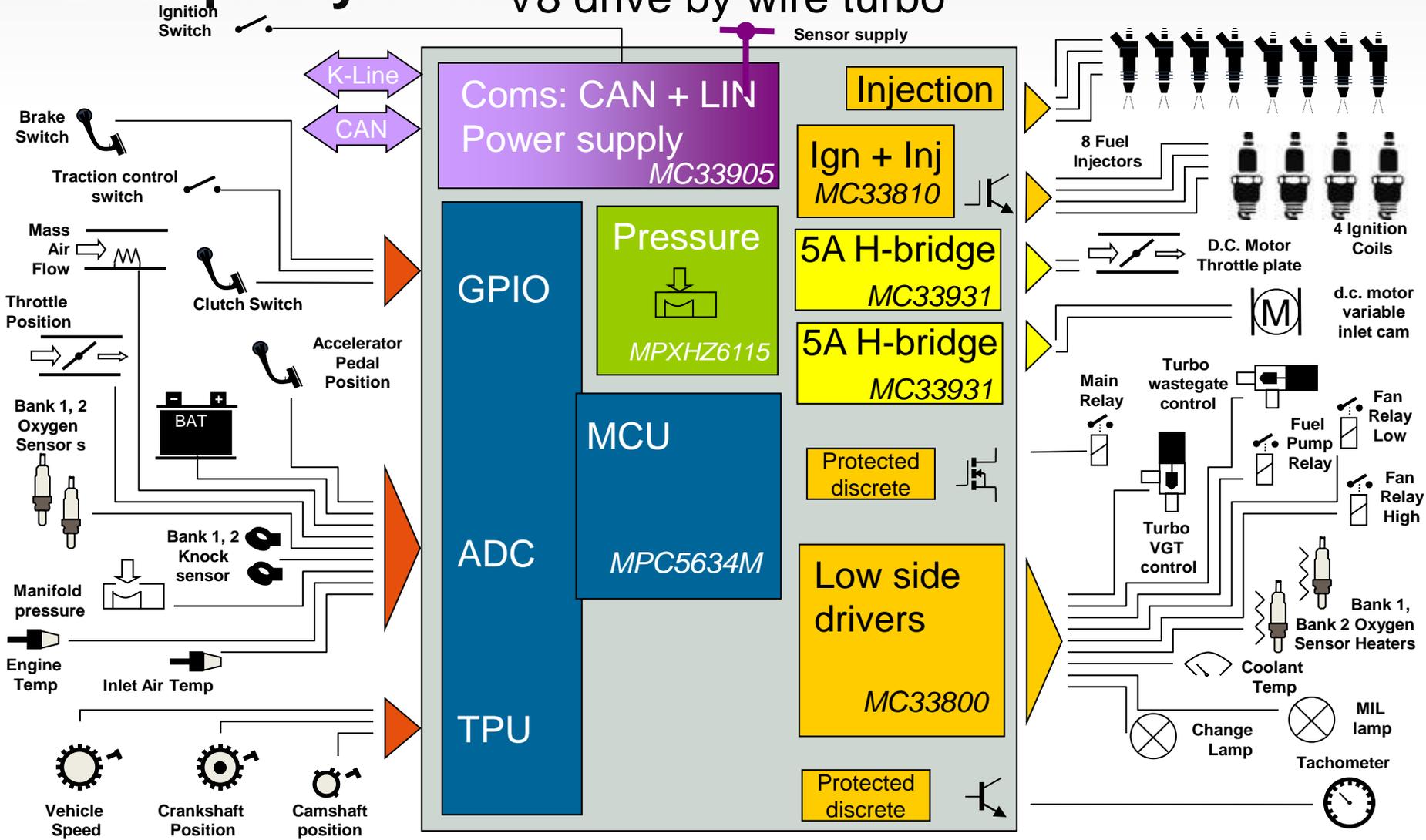


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Megasquirt Qorivva

Example System V8 drive by wire turbo



MC33905 System Bases Chip

- **Scalability :**

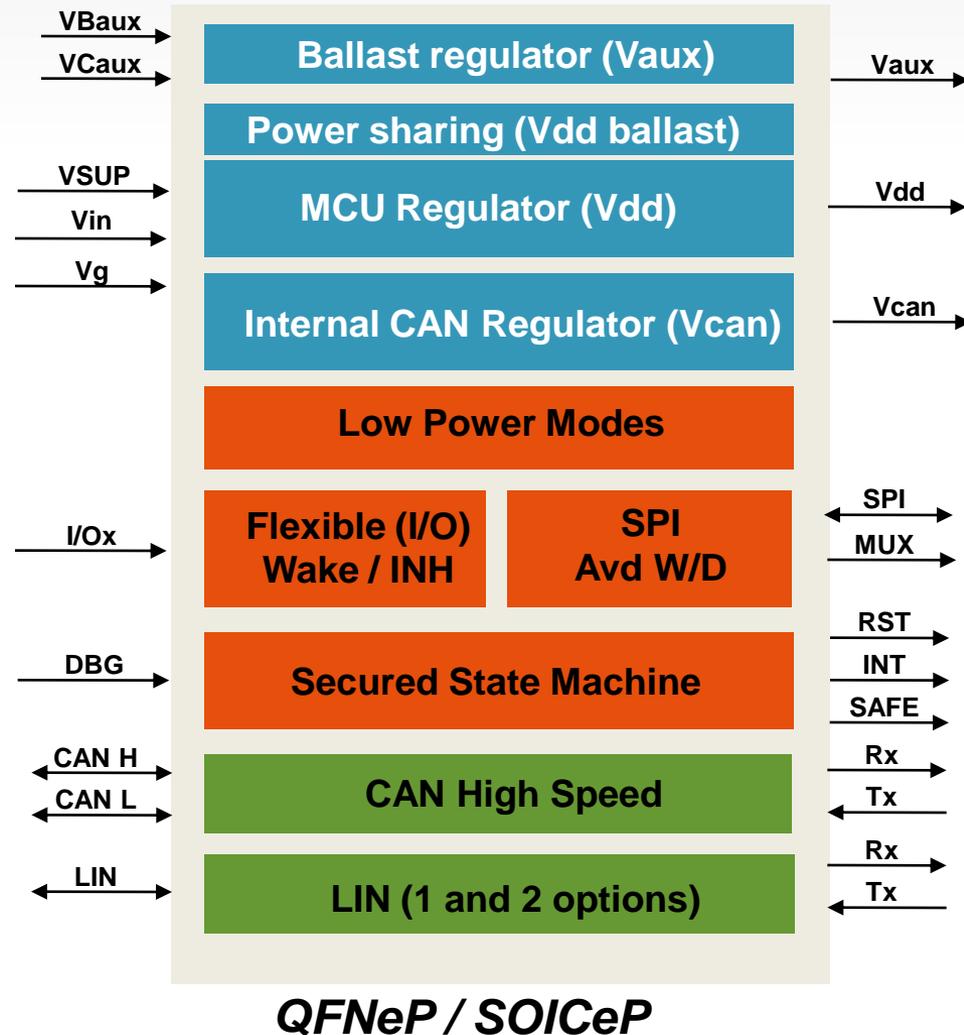
- Low drop out split regulators for adaptable application power and configuration
- Power sharing to lower thermal effects

- **Safety :**

- Failsafe State Machine accessible by SAFE pin
- Secured SPI with Watchdog Capabilities
- High protection on outputs

- **Diagnostics :**

- Feedback on feature health
- Multiple Analog monitoring to MUX output
- High Precision VSupply Voltage Monitoring via SENSE pin

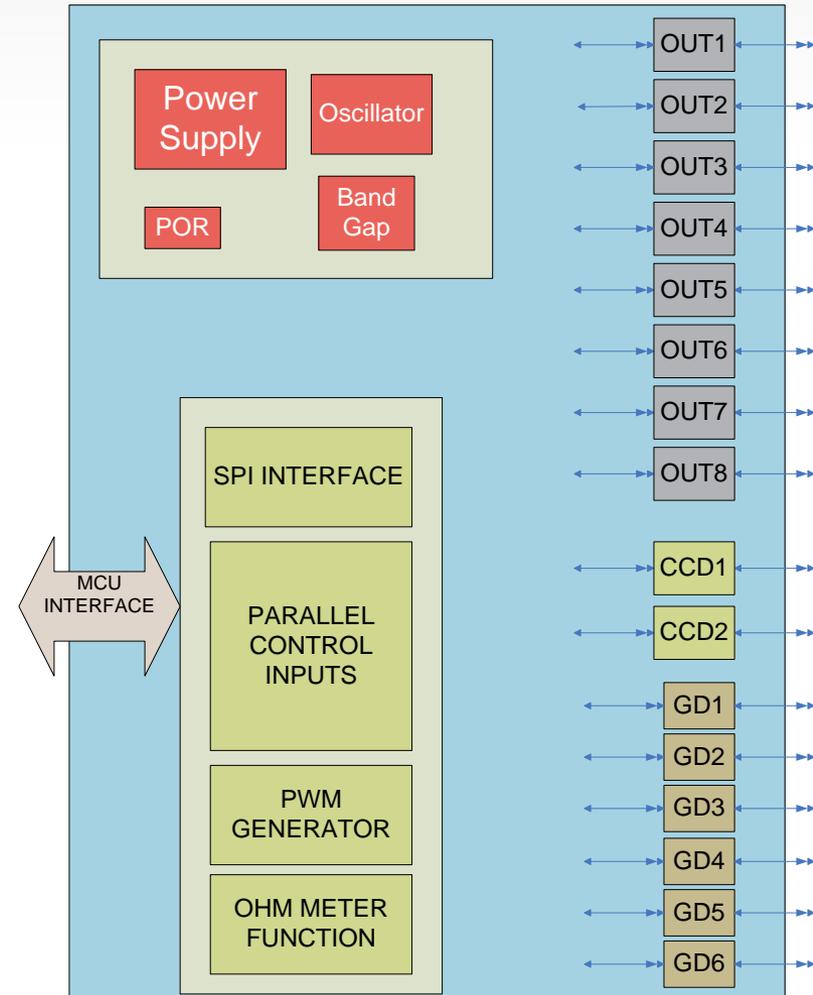


MCZ33800 Multi-Function Driver

- Mops up all miscellaneous ECU outputs
 - OR
- Drives a whole transmission!

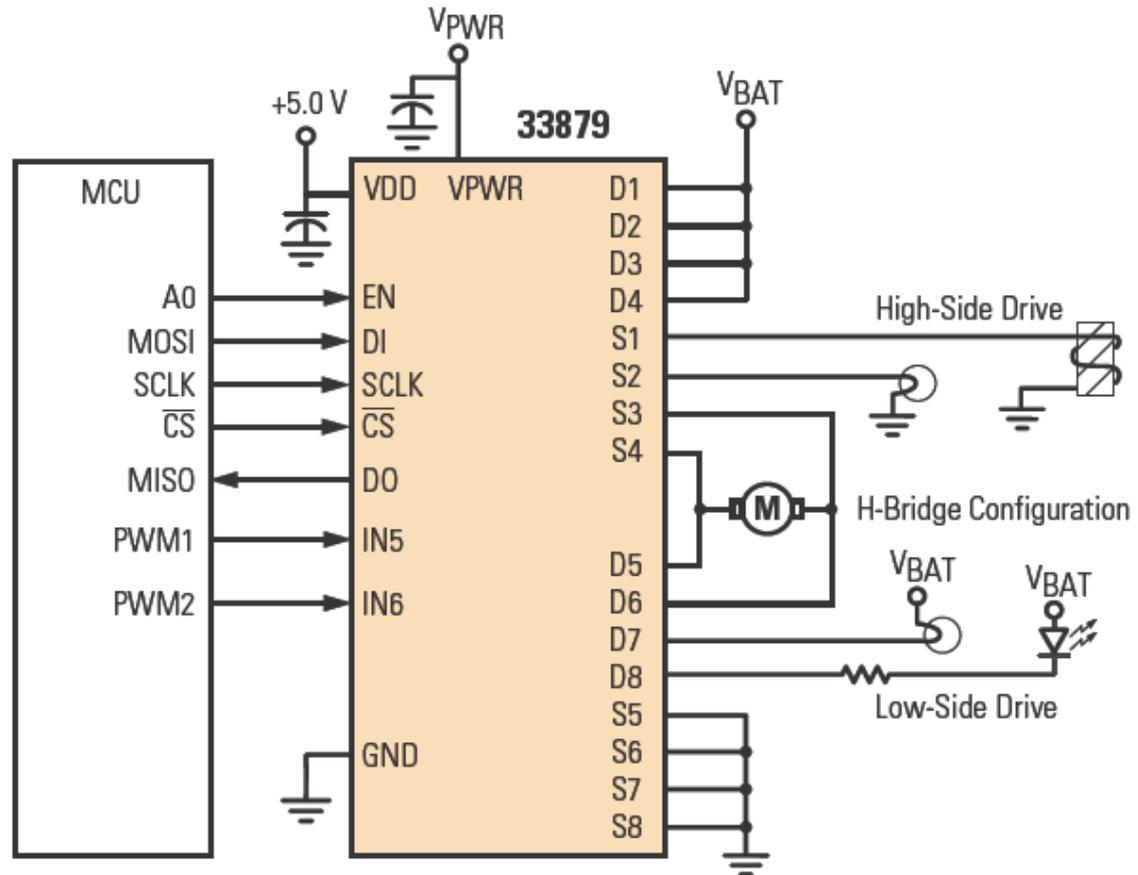
Automotive Applications

- Air Bypass Solenoid
- EGR vacuum control
- Temperature gauge
- Tacho
- HEGO heaters
- Purge control
- Fuel economy gauge
- Relays
- MIL etc.

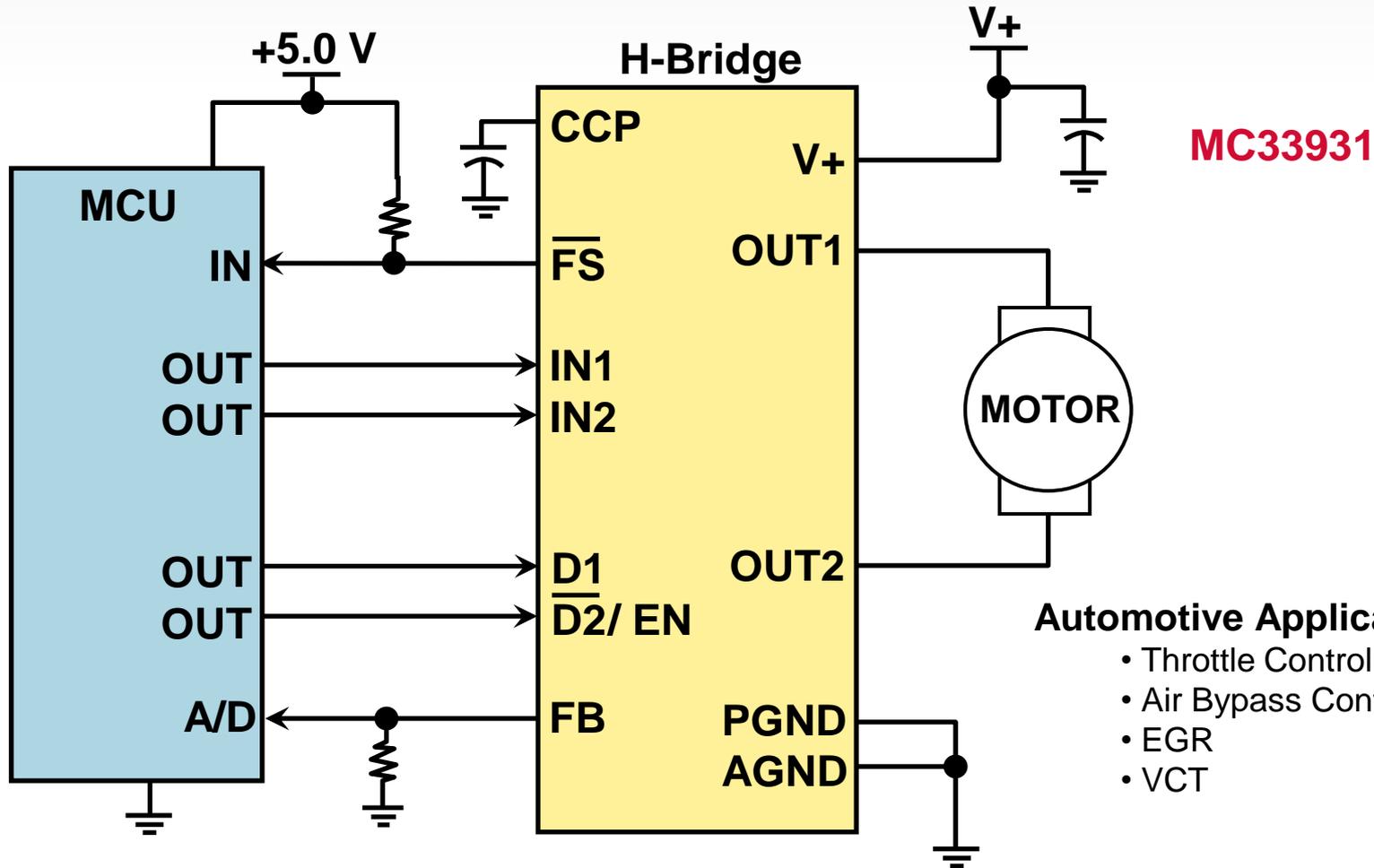


MC33879 Configurable Low/High Side Driver

- Eight floating MOSFETS
- Configure as high side or low side
- Combine to increase current
- Pair up for bridge driver
- Protection
- Diagnostics



MC33931 Five Ampere H-Bridge

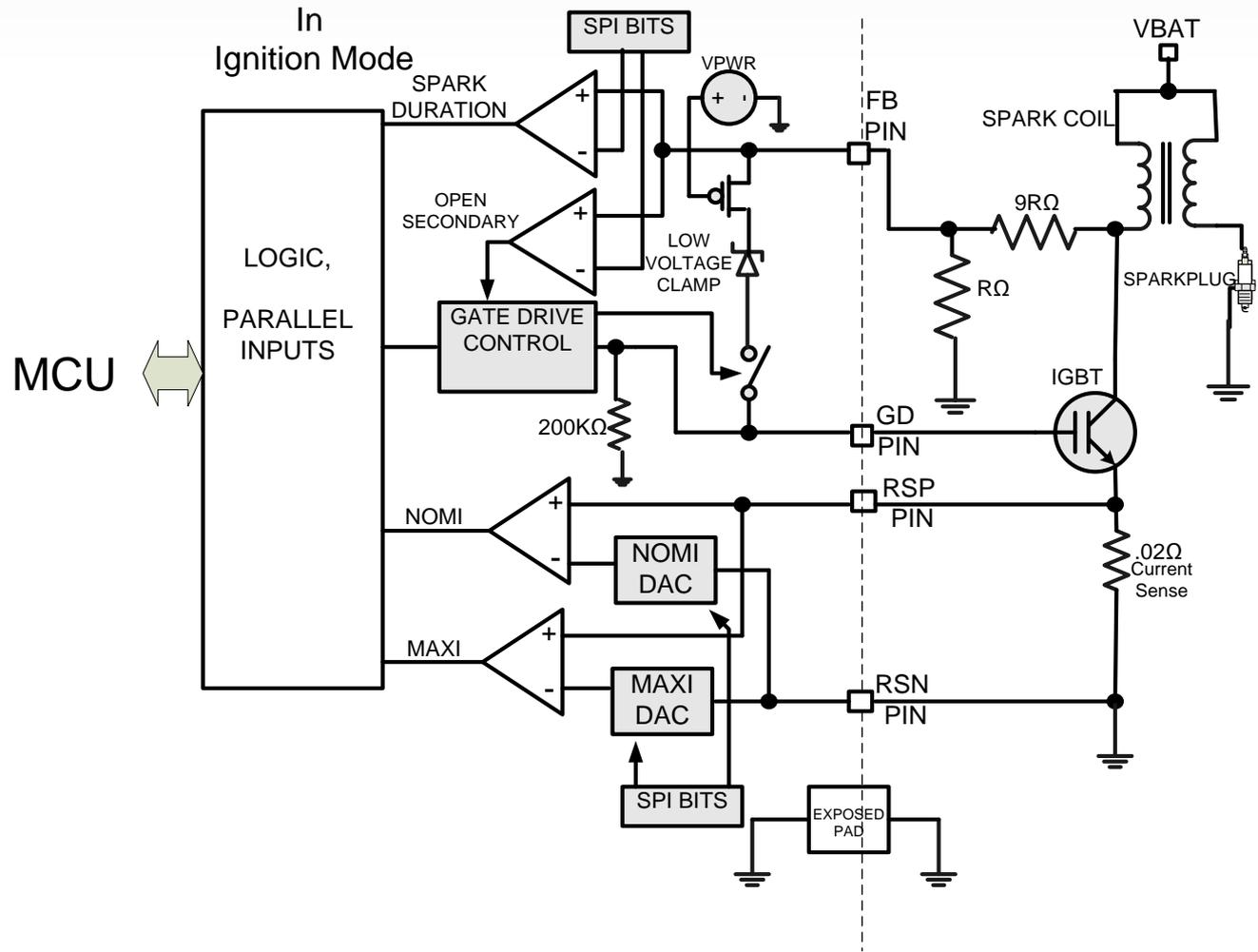


Automotive Applications

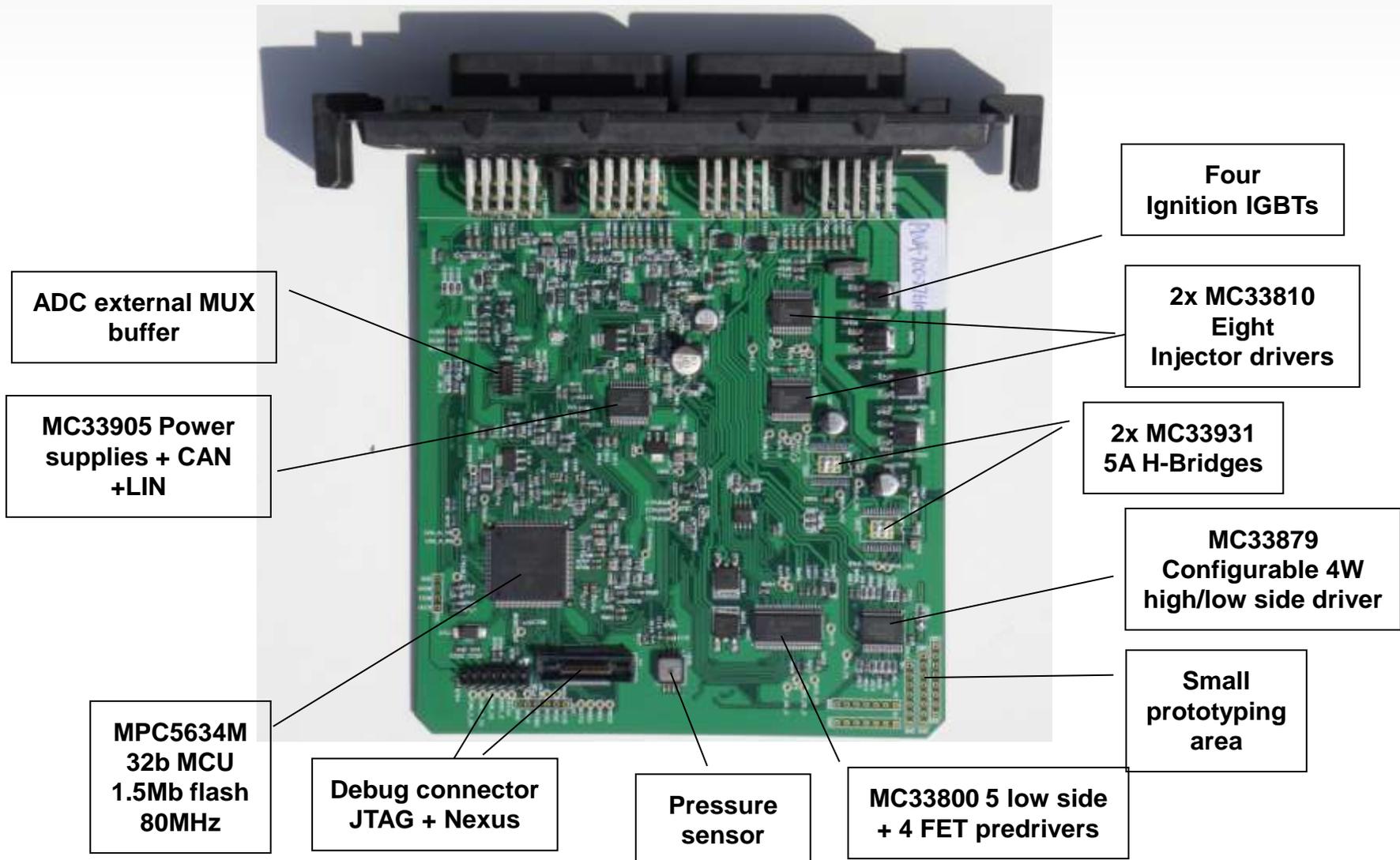
- Throttle Control
- Air Bypass Control
- EGR
- VCT

MC33810: Ignition Pre-Driver Mode

- **4 Ignition Pre-Drivers**
- Parallel Input only
- Low Voltage Clamp
- Coil Current Detection
 - NOMI – Nominal I
 - MAXI – Maximum I
- Max Dwell Timer
- Overlapping Dwell
- Spark Duration
- Open Secondary Detect
- Only one Sense resistor needed per bank
- Can be individually selected to be GPGD pre-drivers via SPI

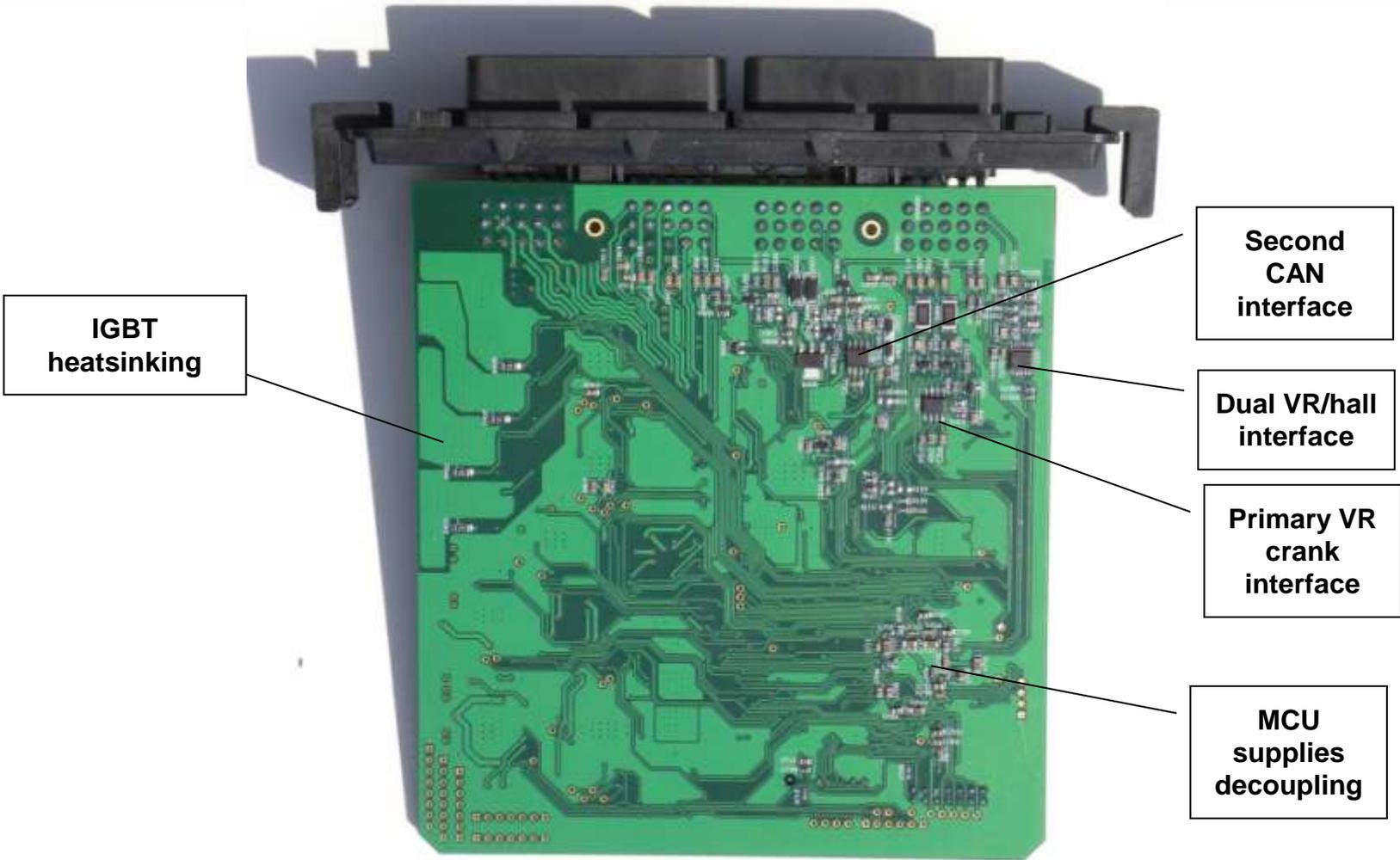


Topside Component Layout

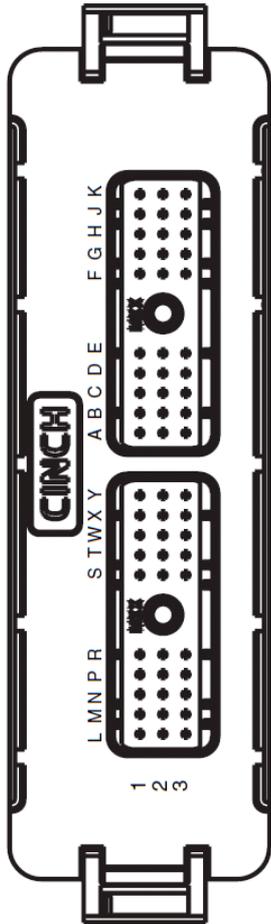


Underside Component Layout

- Acknowledgement: a quality job from Shanghai office



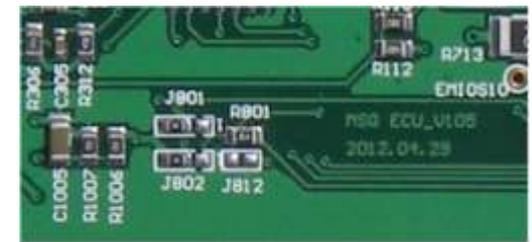
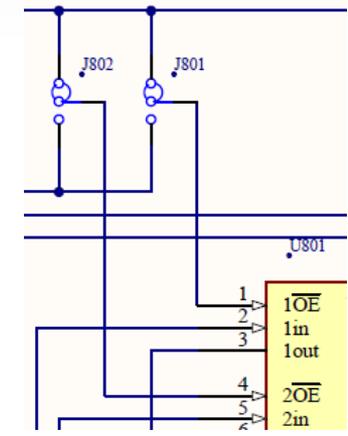
Configuration Options



Ign2	Ign1	Ign4	IGBT	IGBT	IGBT	Ign2	Ign1	Ign4
Inj2	GndIgn	Ign3	2A LS	Gnd	IGBT	Inj2	GndIgn	Ign3
Inj1	Inj3	Inj4	2A LS	2A LS	2A LS	Inj1	Inj3	Inj4
5A HS or LS	5A HS or LS	GndLR	5A half-bridge	5A half-bridge	Gnd	ETC1M	ETC1P	GndLR
Inj8	Inj7	Inj6	2A LS	2A LS	2A LS	Inj8	Inj7	Inj6
1A HS or LS	1A HS or LS	Inj5	1A half-bridge	1A half-bridge	2A LS	StepB	StepA	Inj5
4A FET	4A FET	Vbat	1A half-bridge	1A half-bridge	Vbat	StepD	StepC	Vbat
5A half-bridge	5A half-bridge	Tacho	1A Const	1A LS	10mA LS	IACV	ML	Tach
GndSY	FP_Rly	UpHeat	Gnd	3A LS	9A FET	GndSY	FP_Rly	UpHeat
Vign	FanRly	DnHeat	Wake	3A LS	9A FET	Vign	FanRly	DnHeat
Vspeed	ADC common	GPIO	GPIO	1A LS	Comms	Vspeed	Purge	CAN_C H
20mA HS	ADC common	GPIO	GPIO	1A LS	Comms	BrakeSw	TempOut	CAN_C L
GndAE	GPIO	PwrRly	Gnd	Comms	1A LS	GndAE	K_Line	PwrRly
ADC	CAN_A H	50mA 5V	GPIO	Comms	GPIO	FPdiag	CAN_A H	PAS_Sw
TPS_A	CAN_A L	50mA ADCmux	ADC	Comms	ADC	TPS_A	CAN_A L	IAT
MAP	50mA ADCmux	VCC5_Sns	ADC	ADC	VCC5	MAP	ECT	VCC5_Sns
GndSns	CPSP	Knock 2P	Gnd	YR+	ADC	GndSns	CPSP	TPS_B
50mA ADCmux	CPSN	Knock 2M	ADC	YR-	ADC	UpO2	CPSN	PedalB
YR	YR	KnockP	ADC	ADC	diff.	PedalA	DnO2	KnockP
CamExM	CamInM	KnockN	Hall I/P	Hall I/P	diff.	CamEx	CamIn	KnockN
YR	YR	KnockN			ADCM			
CamExP	CamInP							

Second options for pin function

Primary pin function colored by type



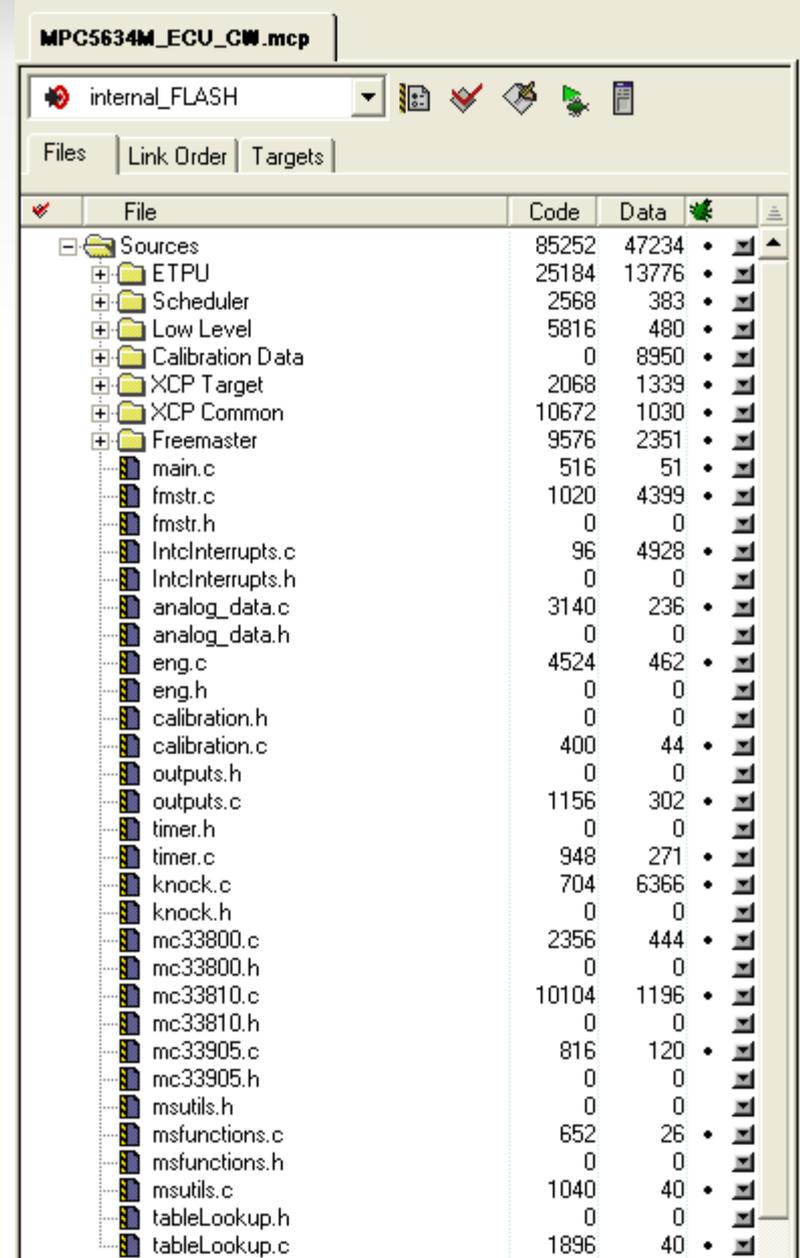


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Curret codebase folders

- ETPU functions from GCT
- Scheduler folder: CocoOS files
- Low Level folder: MCU peripheral files eg: siu.c, dma.c
 - Initial configuration
- Calibration data
 - Engine specific calibration
- XCP: ETAS INCA (restricted)
- Freemaster
 - Knock demonstration
- Chip specific files eg: MC33800.c, MC33905.c
 - Register definitions
 - SPI configuration and quizzing



File	Code	Data
Sources	85252	47234
ETPU	25184	13776
Scheduler	2568	383
Low Level	5816	480
Calibration Data	0	8950
XCP Target	2068	1339
XCP Common	10672	1030
Freemaster	9576	2351
main.c	516	51
fmstr.c	1020	4399
fmstr.h	0	0
IntcInterrupts.c	96	4928
IntcInterrupts.h	0	0
analog_data.c	3140	236
analog_data.h	0	0
eng.c	4524	462
eng.h	0	0
calibration.h	0	0
calibration.c	400	44
outputs.h	0	0
outputs.c	1156	302
timer.h	0	0
timer.c	948	271
knock.c	704	6366
knock.h	0	0
mc33800.c	2356	444
mc33800.h	0	0
mc33810.c	10104	1196
mc33810.h	0	0
mc33905.c	816	120
mc33905.h	0	0
msutils.h	0	0
msfunctions.c	652	26
msfunctions.h	0	0
msutils.c	1040	40
tableLookup.h	0	0
tableLookup.c	1896	40

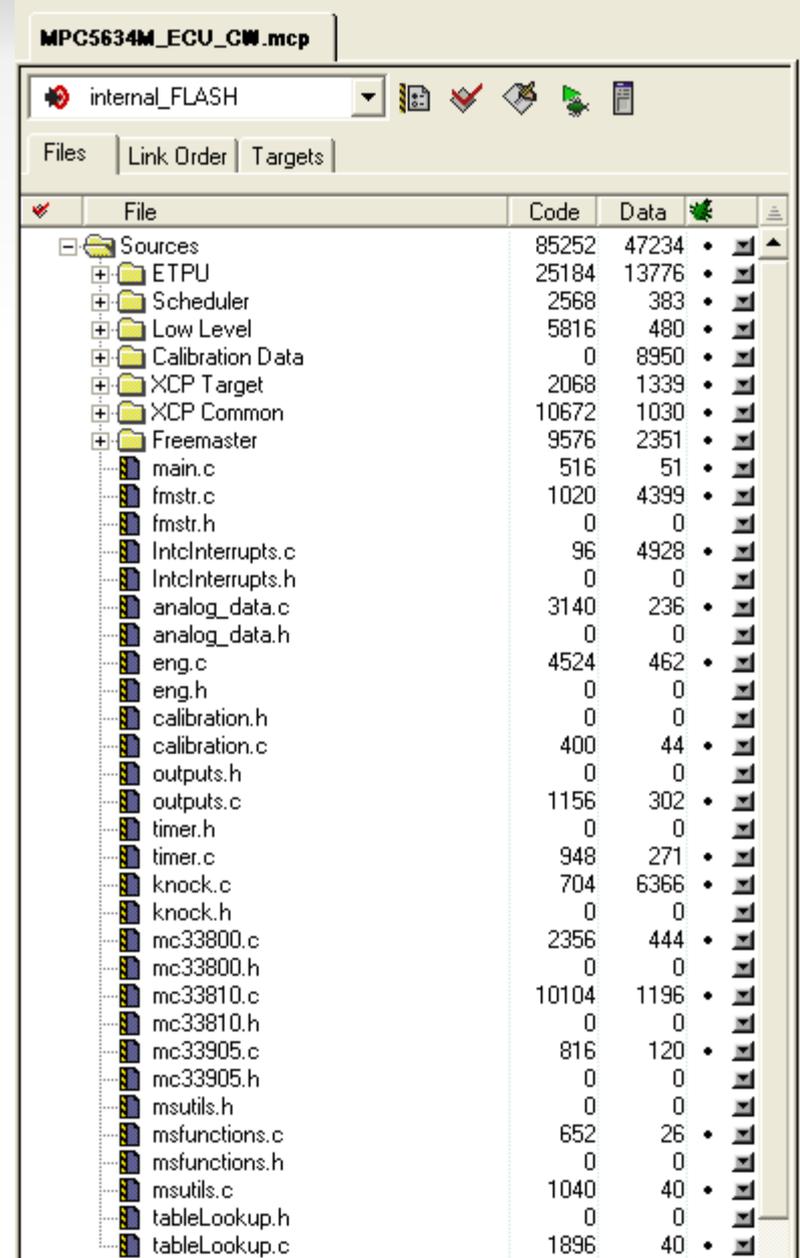
Curret codebase files

- Fmstr = Freemaster
 - Routes and manages interrupts
- IntcInterrupts
 - Reads queue and scales vars
- Eng
 - Main engine operations
 - Read sensors and set actuators
- Knock
 - Get old window and set up new
- Outputs
 - Functions to set pins or modules

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Curret codebase files

- Timers
 - Operates a timebase for sensors and actuators
- Chip specific files eg: MC33800.c, MC33905.c
 - Register definitions
 - SPI configuration and quizzing
- Msfunctions
 - Warm up enrichment
- Msutils
 - 1D interpolation lookup
- Tablelookup
 - 2D interpolation lookup



The screenshot shows the MPC5634M_ECU_CW.mcp IDE interface. The top toolbar includes icons for internal_FLASH, a dropdown menu, and several utility icons. Below the toolbar are tabs for Files, Link Order, and Targets. The main window displays a tree view of the project structure under 'Sources', listing folders like ETPU, Scheduler, Low Level, Calibration Data, XCP Target, XCP Common, and Freemaster, along with individual source files. To the right of the tree is a table with columns for File, Code, and Data, showing the size of each file in bytes.

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TunerStudio MS 2.0

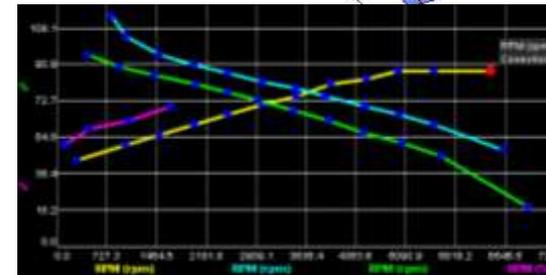
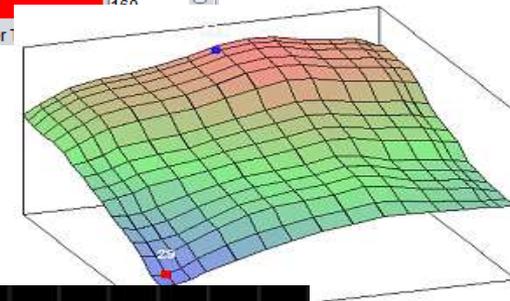
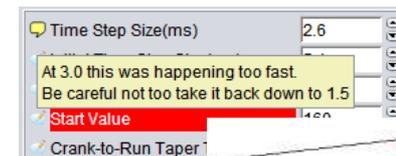


TunerStudio

- Calibration and Configuration application used by MegaSquirt
- MS Edition Primarily targeted toward tuning shops and retail customers, providing for
 - Quick, simplified end user setup
 - Powerful & independent configuration for firmware developers
 - Low Cost Licensing for retail users
 - Refined user centric feature set focusing on needs of hobbyist and serious installer & tuners

Features

- Large selection of Dashboards & Dashboard designer to create and customize your own.
- Flexible Configuration of data structures, Configuration tools, UI Menus & Dialog and Analytics
- Automatic UI Component rendering based on data type
- High speed Math Parser for Runtime values, enable conditions, Log transformations
- Broad set of available Configuration settings UI widgets
 - 2D Tables
 - 3D Tables
 - Curve Graphs
 - Bit and scalar value
 - Logger Control
 - Real-time Clock calibration
 - Command buttons
- Graphical Difference Reports
- Automatic Restore Points - Tune settings are automatically saved on key events.
- Offline / Online tuning with synchronization
- Configuration Settings easily restored to new firmware versions
- Internet integration - Automatic configuration file look up, Translation services, remote connectivity
- Contextual Help Support
- Tuners Notes Log, Free form notes at the Tune and Setting level
- Multi-Language Support. - Currently contains translations for 19 Languages
- VE Analyze – Fuel Table Auto Tuning
- Plug-in Support
- Refined UI features for a rich, smooth user experience
- High speed memory loggers -Ignition Logger, MAP logger
- Multi-Controller and CAN Pass through support



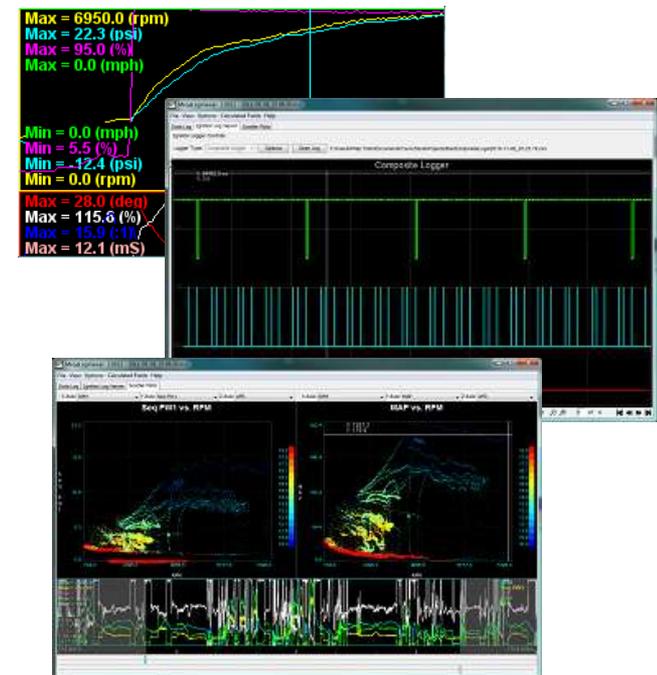
MegaLogViewer

Datalog View and Analysis software tool

- Adopted by many aftermarket communities
- Broad user base

Features

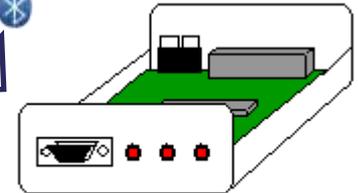
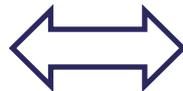
- Fast navigation through large data sets
- Universal Delimited File loader
- Pluggable Binary file Loaders
- Standard viewer displays up to 16 fields by default
 - 4 groups of 4
- Scatter Plots rendered almost instantly with hundreds of thousands of records.
 - Define data range
 - Apply filters
- Ignition Wheel Log Viewer
- Custom Calculated fields based on your own Mathematical Expressions
 - Reference log data, current record or historical
 - Include transform functions using lookup table
- Built in Common Calculated Fields
 - Instant MPG, HP, Tq, Vacuum, Boost, RPM/Sec, etc.
 - AFR from O2, MAF, AFR to Lambda
- Field Name mapping to canonical
- Scale change, from 1/10 to 10x zoom
- Auto Scale or Defined ranges
- Playback from 1/8 speed to 8x speed
- Tune File Table Editing
- Fuel Table Auto Tuning
- Auto Update - check here for more info on Auto update
- Compare mode - Overlay second file values
- Wideband O2 - AFR calculations
- Save Graph to Jpeg for easy posting to web
- Customizable colors, gauges and UI features.
- User-friendly interface that saves all settings and enables navigation by keyboard, buttons and mouse.



EFI Analytics Configuration Tools

Mobile and Internet integration for simplified, integrated user experience

- Collaborative tuning
- Project synchronization
- Remote access
- Store and Forward where practical



MegaSquirt



TunerStudio MS

- Windows
- Linux
- OS X

Works independently or take advantage of networked integration

ShadowTuner.com

- User portal
- Log file access
- Integration services
 - File synchronization
 - Project synchronization
- Application Services
 - Translation
 - Authentication
 - Entitlements



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Freescale Megasquirt ECU launch page, available shortly, meanwhile...

www.freescale.com/automotive

Search Product/Parametric using part number

freescale™

Locations | 中国 | 日本語 | 한국 | | My Freescale | Login

Keyword Product/Parametric Orderable Part

Search by keyword

Products Applications Design Resources Support Sample and Buy About

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Freescale ▶ Automotive

Automotive

Safe. Intelligent. Energy Efficient.
Your essential source for automotive applications

Whatever design challenges you encounter, Freescale's broad portfolio of automotive microcontrollers, integrated circuits and sensors solutions, plus our growing enablement and technical support, help you get back on track. We enable you to create the next breakthrough automotive designs for powertrain, body, chassis and safety, infotainment and telematics, and in-vehicle networking applications.

Automotive Applications

Optimizing Automotive Transmissions

The MPC564xA MCU delivers the performance and precision needed for next-generation transmission control and engine management needs. It supports up to 300 DMIPS performance while maintaining the low power required for high-temperature applications.

Order the MPC564xA 32-bit MCU today ▶

Training & Events

Events

- Freescale Technology Forum
- DwF Market Seminars

Functional Safety

SafeAssure Functional Safety Program

Solutions targeted to help meet IEC 61508 and ISO 26262 functional safety compliance

Read More

CodeWarrior

www.freescale.com/codewarrior

The screenshot shows the top navigation area of the Freescale website. On the left is the Freescale logo. To its right are links for "Locations", "中国", "日本語", "한국", a shopping cart icon, "My Freescale", and "Login". Below this is a search bar with tabs for "Keyword", "Product/Parametric", and "Orderable Part". The search bar contains the text "Search by keyword" and a search button. Below the search bar is a horizontal navigation menu with links: "Products", "Applications", "Design Resources", "Support", "Sample and Buy", and "About". At the bottom of the header is a dark grey bar with the text "Welcome Guest" followed by icons for user actions: "Register", "Login", "Annotate", "History", "My Recommendations", "Subscribe", and "My Favorites". On the right side of this bar are icons for social media and sharing: a printer, an envelope, Twitter, Facebook, and a plus sign labeled "Share".

CodeWarrior Development Tools

CodeWarrior Development Studio is a complete integrated Development Environment (IDE) that provides a highly visual and automated framework to accelerate the development of the most complex embedded applications.

Choosing the right CodeWarrior Suite

CodeWarrior Development Tools

- CodeWarrior Development Suites
- CodeWarrior Development Studios
 - CodeWarrior Development Studio for Microcontrollers
 - CodeWarrior Development Studio for Processors
 - CodeWarrior Development Studio for Digital Signal Processors and Controllers **UPDATED**
- CodeWarrior Run Control Devices
 - Freescale eTPU(2) Development Suite
 - Processor Expert Software

CodeWarrior Development Studio for StarCore v10.2.10

Freescale is pleased to announce the release of the Eclipse-based, CodeWarrior Developer Studio for StarCore DSP v10.2.10. This release includes an updated version of SmartDSP OS and preliminary support for PSC9132.

Start designing today ▶

Download

Click to download a Free Trial of CodeWarrior Suites, evaluation versions, updates, patches, and board support packages.

Download CodeWarrior now ▶

Featured Videos

How to Register CodeWarrior Development Studio

This Software Includes

The diagram shows a vertical stack of software layers. On the left, a vertical bar is labeled "Config / Dev Tools". The main stack consists of a grey bar at the bottom labeled "Processor". Above it are four boxes: "OS", "BSP", "HAL", and "Hypervisor". Above these are three boxes: "Drivers", "APIs", and "Libraries". At the top are two boxes: "Stacks" and "Applications".

Training & Events

- Live Training
- Freescale Technology Forum
- Designing with Freescale Market

eTPU

www.freescale.com/eTPU

<http://www.freescale.com/webapp/etpu>



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Keyword
Product/Parametric
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Freescale > eTPU > eTPU Function Selector

eTPU Function Selector

Step 1: Select a device your application will run on along with eTPU functions to include into your eTPU function set
 >>> (Click on links to learn more about each function)

*eTPU-equipped device: -Select device- Available code memory: **0 Bytes**. Remaining **0 Bytes**. *(required)

General Timing	Communication	Motor Control	Automotive
<input type="checkbox"/> General Pin Input / Output GPIO 216 Bytes	<input type="checkbox"/> Synchronous Peripheral Interface	<input type="checkbox"/> Stepper Motor	<input type="checkbox"/> Engine Position (CRANK)
<input type="checkbox"/> Pulse Width Modulation PWM 392 Bytes	SPI 428 Bytes	SM 812 Bytes	ENGINE_POSITION 2184 Bytes
<input type="checkbox"/> Input Capture IC 304 Bytes	<input type="checkbox"/> Universal Asynchronous Receiver / Transmitter	<input type="checkbox"/> Hall Decoder	<input type="checkbox"/> Engine Position (CAM)
<input type="checkbox"/> Output Compare OC 384 Bytes	UART 564 Bytes	HD 568 Bytes	ENGINE_POSITION_CAM 372 Bytes
<input type="checkbox"/> Frequency and Period Measurement	<input type="checkbox"/> UART with Flow Control	<input type="checkbox"/> Quadrature Decoder	<input type="checkbox"/> Fuel Injection
	UART_FC 632 Bytes	QD 1060 Bytes	FUEL 996 Bytes
	<input type="checkbox"/> CEA709 MAC Layer -	<input type="checkbox"/> Quadrature Decoder - Home	<input type="checkbox"/> Spark Ignition
		ODHOME 112 Bytes	SPARK 824
		<input type="checkbox"/> Quadrature Decoder - Index	

Step 2: Provide us feedback

Please let us know how the created eTPU function set will be used. Describe your application, list its features, mention the eTPU tasks.

Step 3: Compile eTPU function set



Megasquirt Homepage

www.MSefi.com

Links to information, training, MegaManual and forums

The screenshot shows the Megasquirt website homepage. At the top left is the logo and the URL www.MSefi.com. Below this is a navigation menu with links for MegaSquirt EFI from Bowling and Grippo, MegaSquirt Forums (MSefi, MicroSquirt, MSgpio, MS Success Stories, MS User Groups, MSqorivva, MSextra), Board index, FAQ, Register, and Login. There are two search bars: one for the MegaManual and one for the forum. The forum index table is as follows:

MEGASQUIRT	TOPICS	POSTS	LAST POST
General Information This is the place to ask general MegaSquirt® questions if you are just getting started. Please read the FAQ and MegaManual before posting. Also see the Forum Rules . Click this link for Purchasing information.	325	1382	by Matt Cramer Mon May 21, 2012 4:07 am
MS-II and V2.2/V3 Main Board Assembly, Testing, and Troubleshooting The forum to discuss: - V2.2, V3 assembly, - V2.2, V3 troubleshooting, and - Connection troubleshooting	758	4620	by trakkies Fri May 25, 2012 12:12 am
Wiring and Sensors For discussing how to choose sensors and create a wiring harness for all Bowling and Grippo versions of the MegaSquirt® EFI controller.	974	4665	by trakkies Wed May 23, 2012 10:41 pm

Qorivva Forum Startup

<http://www.msgorivva.com/forum/index.php>



MSQorivva.com
QORIVVA based EFI Reference Design by Freescale
MegaSquirt Forums: MSeri, MicroSquirt, MSgpic, MS Success Stories, MS User Groups, MSqorivva.
[Also see Mike's Freescale Blog](#)

Search the MegaManual:

 only search the MegaManual, uncheck to search entire web.

Search this forum:

[Advanced search](#)

[Board index](#) v v v

[User Control Panel](#) (0 new messages) • [View your posts](#) [FAQ](#) [Members](#) [Logout](#) [Mike Garrard]

It is currently Fri May 25, 2012 1:21 pm Last visit was: Thu May 17, 2012 5:32 pm
[\[Moderator Control Panel \]](#)

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MSQORIVVA	TOPICS	POSTS	LAST POST
 <p>General Discussions General discussion of Mike Garrard's MPC5634 (called Qorivva) evaluation board for use as an engine controller.</p>	8	19	by Keevoippigh  Thu May 24, 2012 10:40 am
 <p>Hardware Discussions Forum to discuss hardware for the MPC5634 (called Qorivva) evaluation board for use as an engine controller.</p>	6	13	by mke  Fri May 11, 2012 2:09 pm
 <p>Code Discussions Forum to discuss code for the MPC5634 (called Qorivva) evaluation board for use as an engine controller.</p>	5	25	by jonr  Tue May 15, 2012 4:40 pm

FORUM	TOPICS	POSTS	LAST POST
 <p>Forum Support A forum to get help using the functions of this forum (NOT support for the MPC5634 engine controller)</p>	0	0	No posts



Tuner Studio

www.efianalytics.com

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Performance, Drivability & Efficiency. Simplified!

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In today's world the most important tools for tuning are no longer found in your toolbox. Just think, in the 1980's Top Fuel dragsters made 2500 hp using a 500 cubic inch (8.2 Liter) Aluminum Hemi headed engine, as amazing as this might sound, today this same displacement and very similar looking hemi headed engines are making over 8000 hp! Why? Technology and the best analytical tools have given an understanding of engines that simply was not available in the past. It is all about optimizing all aspects of the engine to improving efficiency. This demands the tools to gather data so you can understand what is happening inside the engine and identify opportunities to improve efficiency.

[Download TunerStudio MS now Free!](#)

TunerStudio!

TunerStudio brings a whole new level of refinement for tuning software. Far too long tuners have had to settle for what ever the controller manufacturer provided, this usually means a clunky user interface and minimal feature set. Top dollar EFI controllers are no different, the tuning software is typically lacking in feature and refinement, making configuration confusing and overly complex. TunerStudio brings a new flexible Tuning platform is designed to adapt to nearly any EFI Controller with functionality and features unavailable with any other Tuning Software period! There are several versions of TunerStudio available depending on your controller and support for more Controllers under way along with OBDII support. If you have a controller you would like to see supported by TunerStudio, let the manufacturer know!

Bringing you bling, a simplified interface and computer analytics to make you a master tuner whether a car, truck, motorcycle or airplane. Some of TunerStudio's features:

- TunerStudio
 - TunerStudio MS
 - Registered TunerStudio Advantages
- MegaLogViewer
- Shadow logger MS (Android)
- Cables and Bluetooth

Support

- Downloads
- FAQs
- Manuals
- MegaSquirt Forums
- How To Videos
- FAQ

Operating System cocoOS

<http://www.cocoos.net/>

www.cocoos.net

cocoOS

Home

Introduction

Getting Started

Tasks

Events

Messages

Semaphores

cocoOS news

2012-03-07: cocoOS support forum is now online! Please make a visit and submit your questions!

2012-01-04: Release cocoOS 3.0.0 !
From now on, cocoOS will be under the BSD license.

Release note:

- Moving to BSD license.
- Flash saving macros.
- Added os_cbk where sleep function can be implemented.
- Support for sub clocks with settable tick size.

P&E Debugger

www.pemicro.com -> Products -> USB Multilink Universal (\$119)

The screenshot shows the P&E Micro website interface. At the top, there is a navigation bar with the P&E Micro logo, a shopping cart icon, a 'New Account' button, a 'Login' button, and a search icon. Below this is a secondary navigation bar with buttons for 'Home', 'About us', 'Products' (which is highlighted), 'Support', 'Forums', 'P&E Blog', and 'Customer Service'. The breadcrumb trail reads 'Home > P&E Products > USB Multilink Universal'. The main content area features a 'RoHS Compliant' badge, the product name 'USB Multilink Universal', and a price tag 'Starting at \$119.00' with a 'See pricing and order' link. Below this are tabs for 'Product Details', 'FAQs, Manuals & Downloads', and 'Version Info'. The 'Product Details' tab is active, showing the text: 'This product covers the following Part Numbers: USB-ML-UNIVERSAL'. There is a 'Click image for details' link above a grid of product images. To the right of the images is a 'Freescale Enabled' logo. The main text describes the product as an all-in-one development interface for Freescale microcontrollers, listing supported models: HCS08, HC(S)12(X), S12Z, RS08, ColdFire V1/+V1, ColdFire V2-4*, Qorivva 55xx/56xx, and Kinetis ARM microcontrollers. It explains that the device connects to a PC via USB and to the target via a standard debug connector. The text also notes that product photos show how headers can be accessed by flipping the plastic case. Below the main text is a 'Supported Freescale Devices:' section with a bulleted list of supported microcontrollers.

Product Details | **FAQs, Manuals & Downloads** | **Version Info**

This product covers the following Part Numbers: USB-ML-UNIVERSAL

Click image for details

P&E's **USB Multilink Universal** is an all-in-one development interface which allows a PC access to the Background Debug Mode (BDM) or JTAG interface on **Freescale HCS08, HC(S)12(X), S12Z, RS08, ColdFire V1/+V1, ColdFire V2-4*, Qorivva 55xx/56xx, and Kinetis ARM microcontrollers**. It connects between a USB port on a Windows machine and the standard debug connector on the target. The Freescale microcontrollers are supported via the multiple headers located on the USB Multilink Universal. The product photos to the left of this page show how the headers can be accessed by simply flipping open the plastic case. Ribbon cables suitable for a variety of architectures are included.

Supported Freescale Devices:

- Kinetis
- Qorivva MPC55xx/56xx
- ColdFire +V1/ColdFire V1
- ColdFire V2/3/4
- Power Architecture PX Series
- HC(S)12(X)
- S12Z

TRK-MPC5634M Board

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TRK-MPC5634M: MPC563xM StarterTRAK (Development Kit) ☆

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Application Notes Buy

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Power

The Qorivva MPC5634M family of 32-bit microcontrollers (MCUs) are feature-rich devices suitable for powertrain applications such as motorcycles, automotive 4 cylinder engine control and hybrid electric motors. These scalable Power Architecture® devices are supported by an enablement ecosystem that includes software drivers, operating systems and configuration code to help you quickly implement your designs.

Features

- MPC5634M Microcontroller in a 144LQFP package
- On-board JTAG connection via open source OSBDM circuit using the MPC9S08JM microcontroller
- MCZ3390S5EK system basis chip with advanced power management and integrated CAN transceiver
- CAN & LIN Interface

TRK-MPC5634M Board



Supported Devices

See what other engineers are interested in:

Products MPC563xM: Qorivva 32-bit MCU f... MPC564xA: Qorivva 32-bit MCU f... MPC560xB: Qorivva 32-bit MCU f...	Documentation TRK-MPC5634M User Manual TRK-MPC5634M Quick Start Guide MPC5634M Microcontroller - Dat...	Software and Tools XPC563MKIT: Evaluation system ... TRK-MPC5634MSCH Schematic TRK-MPC5604B: MPC5604B Starter...	Applications Gasoline Engine Managemen... Motorcycle Engine Control... Integrated Small Engine C...
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Featured Training & Events

On-Demand Training
Microcontroller Products for Automotive Applications

Live Training
MPC563xM Family of Powertrain Microcontrollers Course

Connect With Us

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Become a member of our newest community site

Automobility Blog
by Freescale's automotive experts

Featured Video

What's This? 

MegaSquirt retailer

www.diyautotune.com

Supplier hub: MS ECUs, spares, accessories, events and more

DIYAutoTune.com

Tune it Yourself. Tune it for less. Tune it Right.

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FAQ

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Tech Articles/Videos

Install Articles

The Cars

MegaSquirt Electronic Fuel Injection Systems

Wideband O2 Sensor Systems, Wiring Harnesses and more...

We are Your One-Stop DIY EFI Shop!

This site is optimized for 1024x768 or higher resolution

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Featured Products!



MegaSquirt PNP Gen 2 is here! We've just released one for '93-'95 Mazda MX6 and Ford Probe models with the V6. Other MSPNPs available include:

- '90-'97 Mazda Miata
- '87-'92 BMW 325i
- '85-'90 Toyota 4AGE





Agenda

- Background and motivation
- Freescale in powertrain
- Megasquirt overview and products
- MSQorivva hardware description
- Software structure
- Calibration tool
- Online resources
- **Work products and timelines**
- Summary and Q&A



Work products and timelines

Available now

Hardware:

- Reference ECUs - \$500, five in the FTF Store
- Sensors, Actuators, Megasquirt ECUs, repairs, accessories, loads board etc
- Debuggers from P&E

Software:

- Codewarrior, demo and full
- Tuner Studio Lite and Full
- eTPU code, engine functions
- cocoOS Operating System
- ETAS CAN XCP stack with INCA

Probably posted by now

Hardware:

- Schematics in Altium and pdf format
- PCB layout in Altium and Gerber format

Software:

- Most LLD, device and peripheral specific files eg: SPI and SIU

Available by October:

Hardware:

- next build of Reference ECUs

Software:

- Engine Application
- Integrated TS interface

Resources:

- Freescale MegaSquirt Qorivva web page and links



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Objectives review

- We covered:
 - The origin, purpose and capability of a Megasquirt Qorivva ECU
 - Where to access existing material
 - What tools make up the development environment and how to obtain them
 - The plans for Open Source code and further ECU release



Question time ??

Qorivva EFI for the masses

or

How to have fun with 12V, an engine,
and 20,000,000 transistors

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Tag yourself in photos
and upload your own!



Tweeting?

Please use hashtag
#FTF2012



Session materials will be posted @ www.freescale.com/FTF

Look for announcements in the FTF Group on LinkedIn or follow Freescale on Twitter

