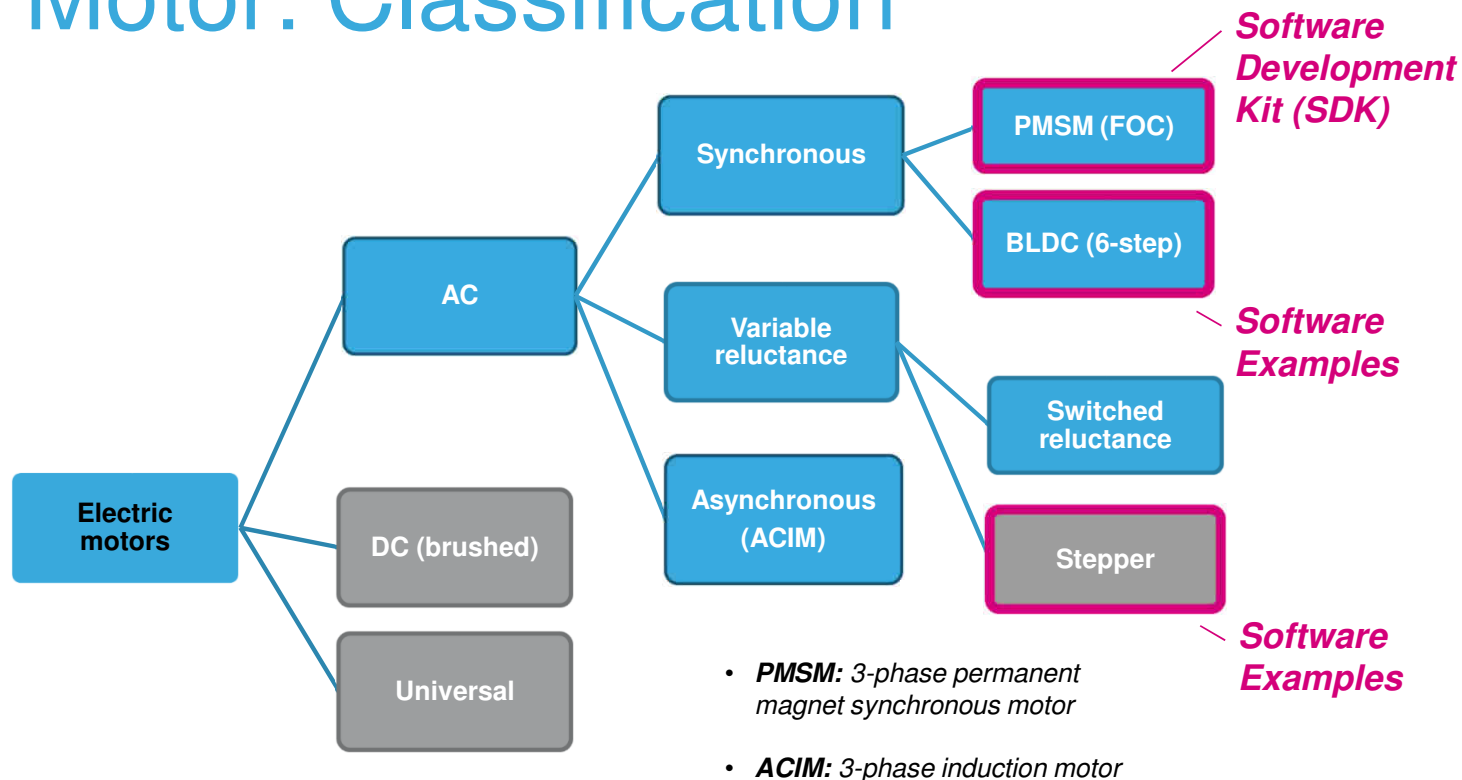




Technology Tour 2019

Schaumburg, IL | April 25

Electric Motor: Classification



Wide Ranging Applications



INDUSTRIAL DRIVES

Pumps, HVAC, Pumps, Fans

HOME

Appliances, Shades, Security Cameras, Vacuum

TOOLS

Drill, Saw, Grinder, Weed Wacker, Mower

MEDICAL

CPAP, Oxygen Concentrator, Hospital Bed, Wheelchair

TRANSPORTATION

Scooter, e-Bike, Fork-lift, Golf Cart, Elevator

DRONES & TOYS

Inspection/Delivery Drone, RC Cars/Planes/Boats

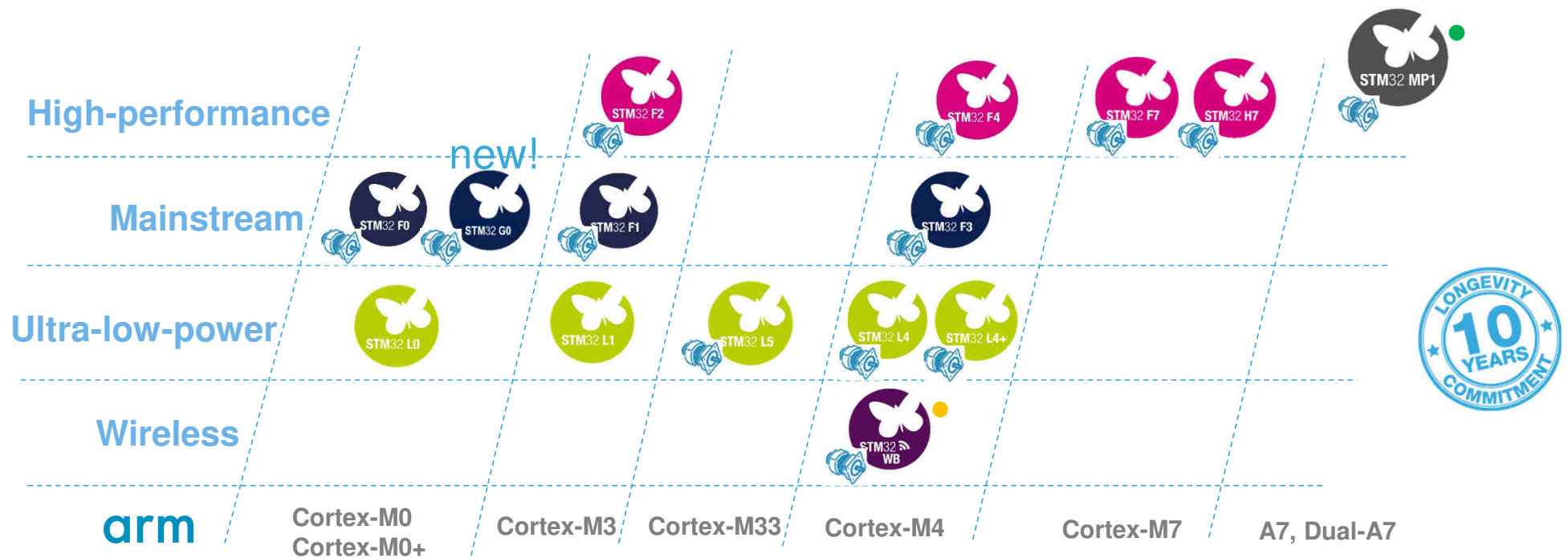
STM32 Microcontroller Products for Motor Control



STM32 portfolio positioning

5

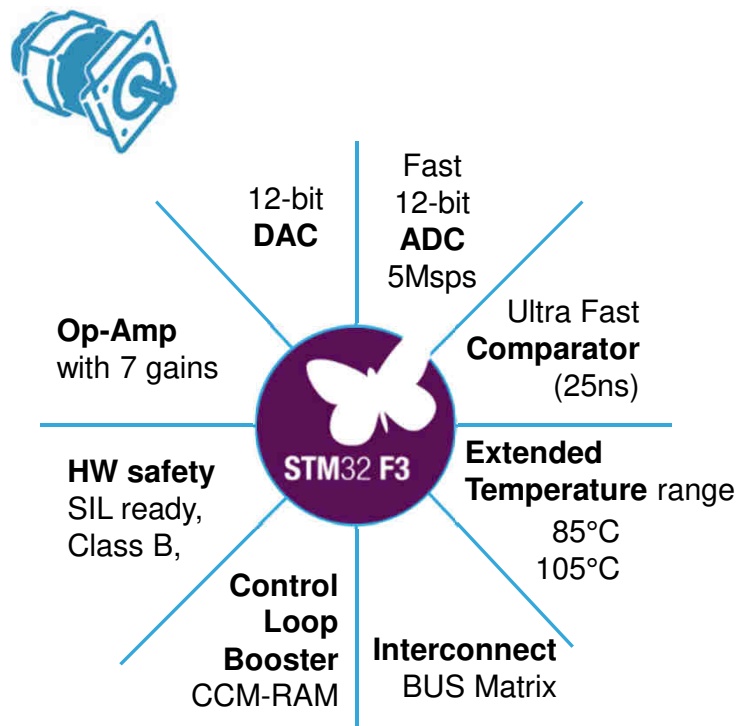
15 product series / More than 50 product lines



Notes: ●: Cortex-M0+ Radio Co-processor, ●: Cortex-M4 Co-processor, ⚙️: Advanced motor control timer included

STM32F3: Shaped for Motor Control

6



High performance 72MHz ARM Cortex-M4 with FPU

Equipped with advanced Motor Control timer(s)

Rich advanced analog integration and optimized for the control loop

From 32 KB to 512KB flash memory in a wide range of packages

STM32 G0 MCU series

Efficiency at its best





STM32G0 Series Overview 8

Efficient, robust and simple, the STM32G0 series is able to support a wide variety of applications including three phase FOC sensor-less motor control

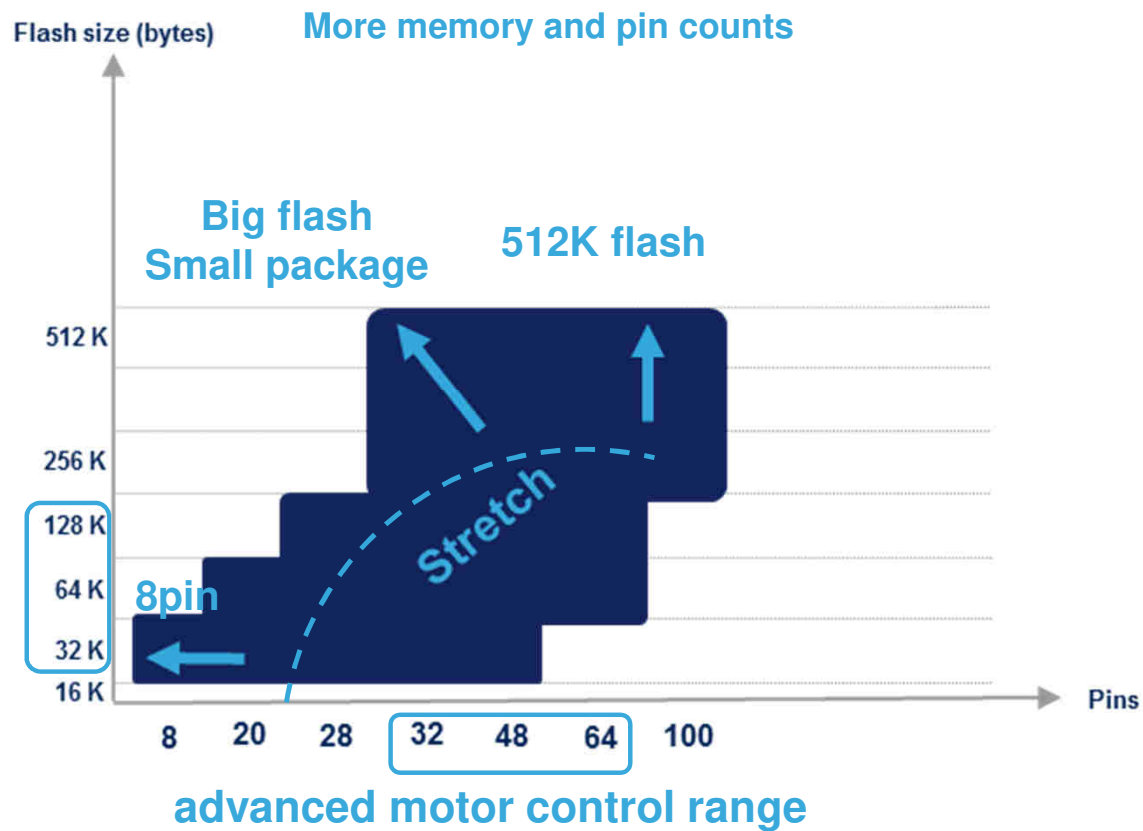
- 64MHz Arm® Cortex® M0+
- 16 to 512 Kbytes of Flash memory with the best RAM/Flash ratio
- Internal high speed clock with 1% accuracy
- Upgraded analog features, timer resolution up to 2xcpu (7.8ns) and IoT ready with enhanced security features
- STM32CubeMX configuration and code generator tool
- STM32Cube Hardware Abstraction Layer library (HAL) and Low Layer library (LL) for maximum re-use and faster time to market
- X-CUBE-MCSDK motor control software development kit with graphical user interface and firmware library



Wider platform

9

Portfolio streeeeeeeetched for efficient budget applications



More packages

SO / TSSOP

WLCSP

BGA

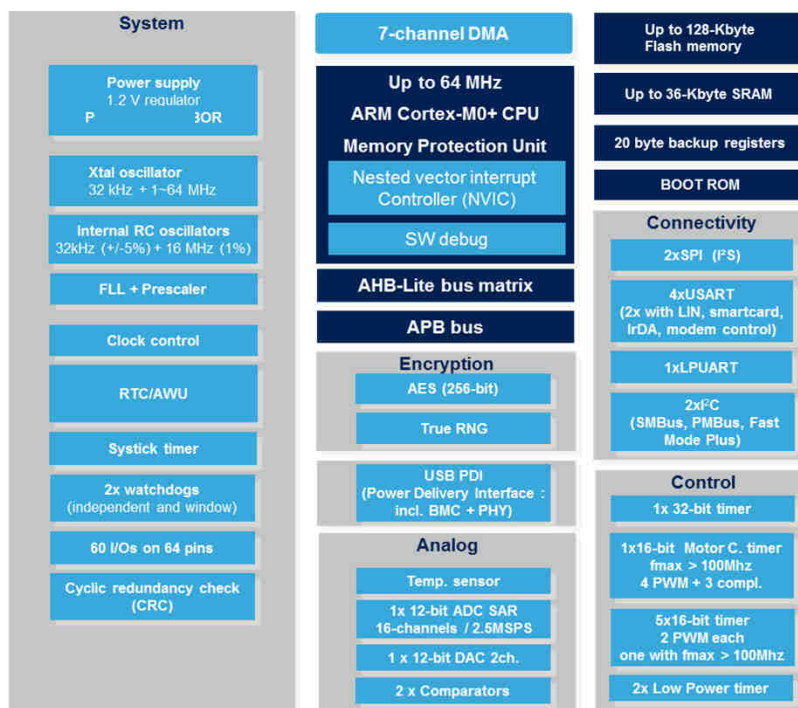
QFN

LQFP



Advanced features and solutions

- Arm 32-bit Cortex-M0+ core
- 1.7 to 3.6V power supply
- RAM maximization
- 1% internal clock
- Direct Memory Access (DMA)
- Communication peripherals
- USB-C Power Delivery



- Timers up to 2xfcpu resolution
- Real Time Clock
- I/O ports maximization
- ADC 12-bit Ultra-fast
- DAC 12-bit
- Comparators
- Safety features
- Advanced Security features



Common peripherals and architecture:

ARM Cortex-M0+
64MHz
0.93 DMIPS/MHz

MPU

Communication Peripheral:
USART, SPI, I²C

Multiple general-purpose
16-bit timers

Integrated reset and brown-
out warning

DMA channels

2x watchdogs
Real-time clock (RTC)

Integrated regulator
PLL and clock circuit

Main oscillator and
32 kHz oscillator

Internal RC oscillators
32kHz , 16 MHz

-40 to +85 °C

Low voltage 1.65 to 3.6 V
(Value Line: 2.0 to 3.6V)

Temperature sensor

Up to +125°C

STM32 G0 product lines

motor control key features

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STM32G0x0 – Value Line (ex: STM32G070)

Up to 512KB Flash	Up to 80KB SRAM	12-bit ADC 2.5MSPS
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STM32G0x1 – Access Line (ex: STM32G071)

Up to 512KB Flash	Up to 80KB SRAM	12-bit ADC 2.5MSPS	2x Comp 2x 12-bit DAC	1x 16-bit MC Timer >100MHz	1x 32-bit Timer	1x16-bit Timer >100MHz	USB-PD	USB OTG 2.0 FS	CAN-FD	Securable Memory Area
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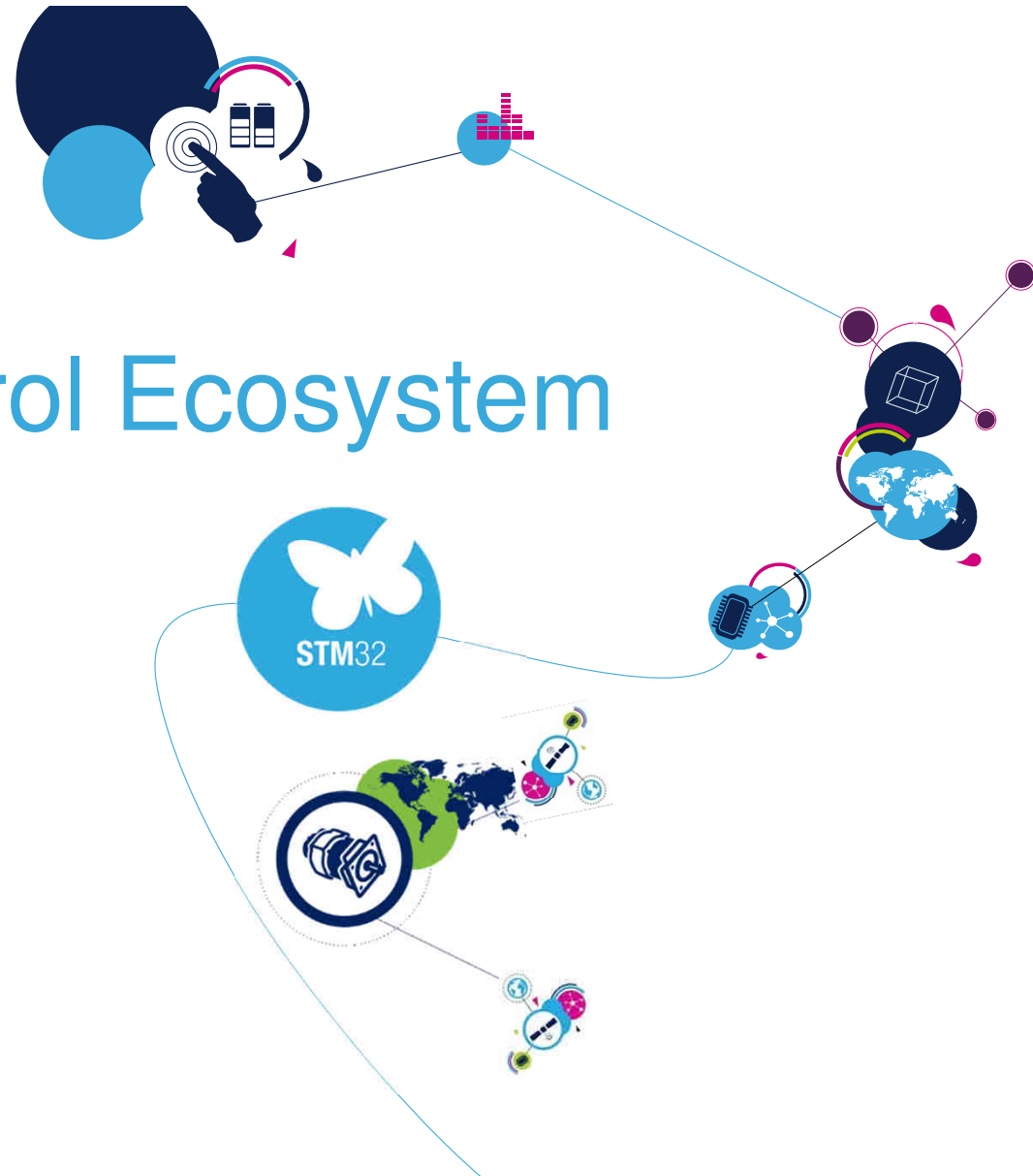
STM32G0+11 – Access Line & Encryption (ex: STM32G081)

Up to 512KB Flash	Up to 80KB SRAM	12-bit ADC 2.5MSPS	2x Comp 2x 12-bit DAC	1x 16-bit MC Timer >100MHz	1x 32-bit Timer	1x16-bit Timer >100MHz	USB-PD	USB OTG 2.0 FS	CAN-FD	Securable Memory Area	AES TRNG
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On some part-numbers

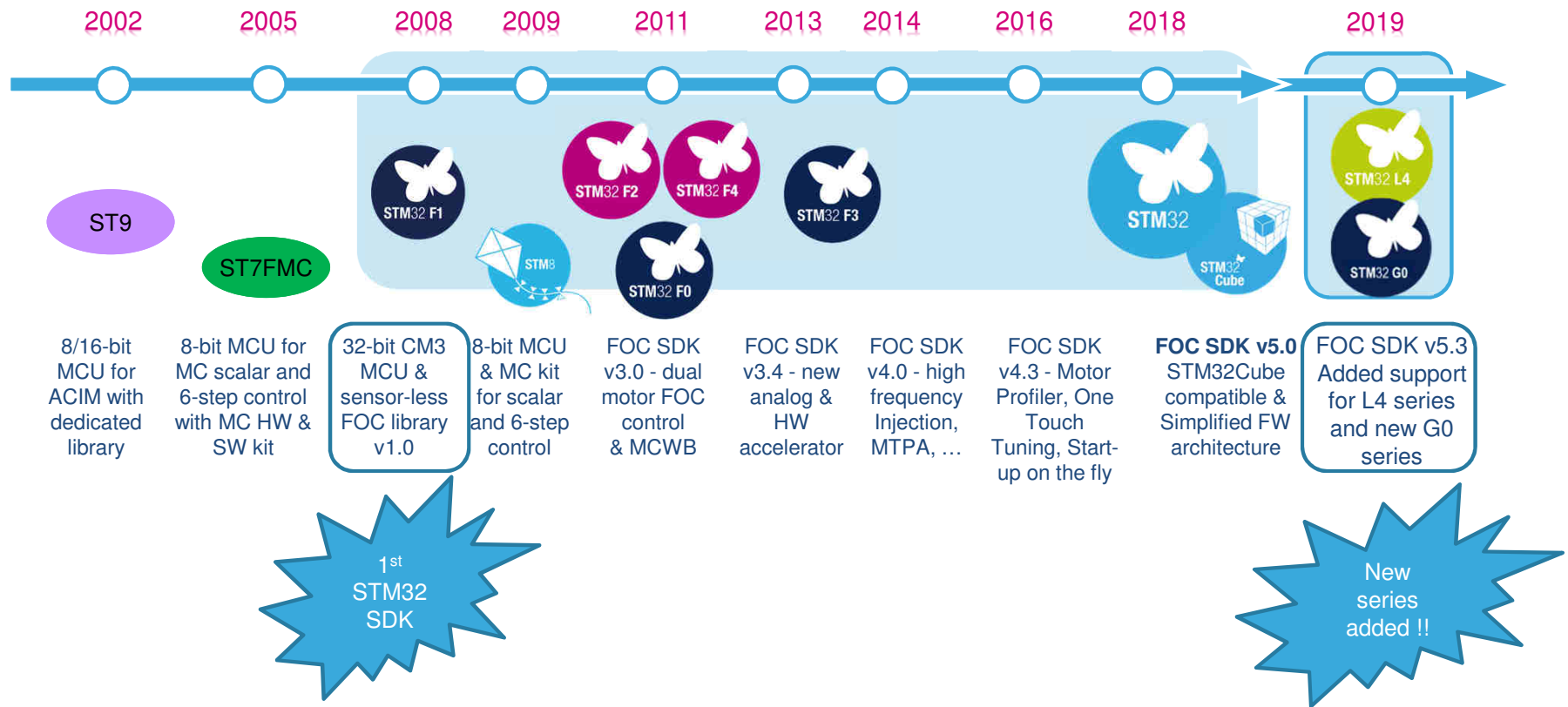
STM32 Motor Control Ecosystem



17 years of 3-phase motor drives

11 years of STM32 motor control SDK

13



ST Motor Control Ecosystem

3-Phase Motors ST PMSM FOC – **v5.x**

3

new
tool

Motor Control Suite

Online tool to select and bundle collateral

Tools



STM32CubeMX



Workbench
PC SW GUI

Full customization and
real time communication

GUI

Library



STM32Cube

Wide range of algorithms
for specific applications



FW lib

Motor
Control
SDK

new
series

HW boards



High and Low Voltage
Power ICs



8bit and 32bit MCUs



...

Silicon

Motor Control Suite Overview

15

- ST-MC-SUITE is an online tool that provides easy access to motor-control resources in the STMicroelectronics MCU ecosystem, including STM32 and STM8
- Today the focus is on PMSM (Permanent Magnet Synchronous Motors) controlled in FOC (Filed Oriented Control) mode, others coming soon!
- Main features
 - Browse both STM32 and STM8 STMicroelectronics MCU motor-control resources such as hardware tools, software packages, documentation, and videos
 - Select motor-control materials such as documentation and links to hardware tools, software packages, and videos and then download them as a bundle (zip file)
 - Save motor-control setups as combinations of software packages and hardware tools most relevant for the development of the target motor-control applications

Motor Control X-CUBE-MCSDK v5

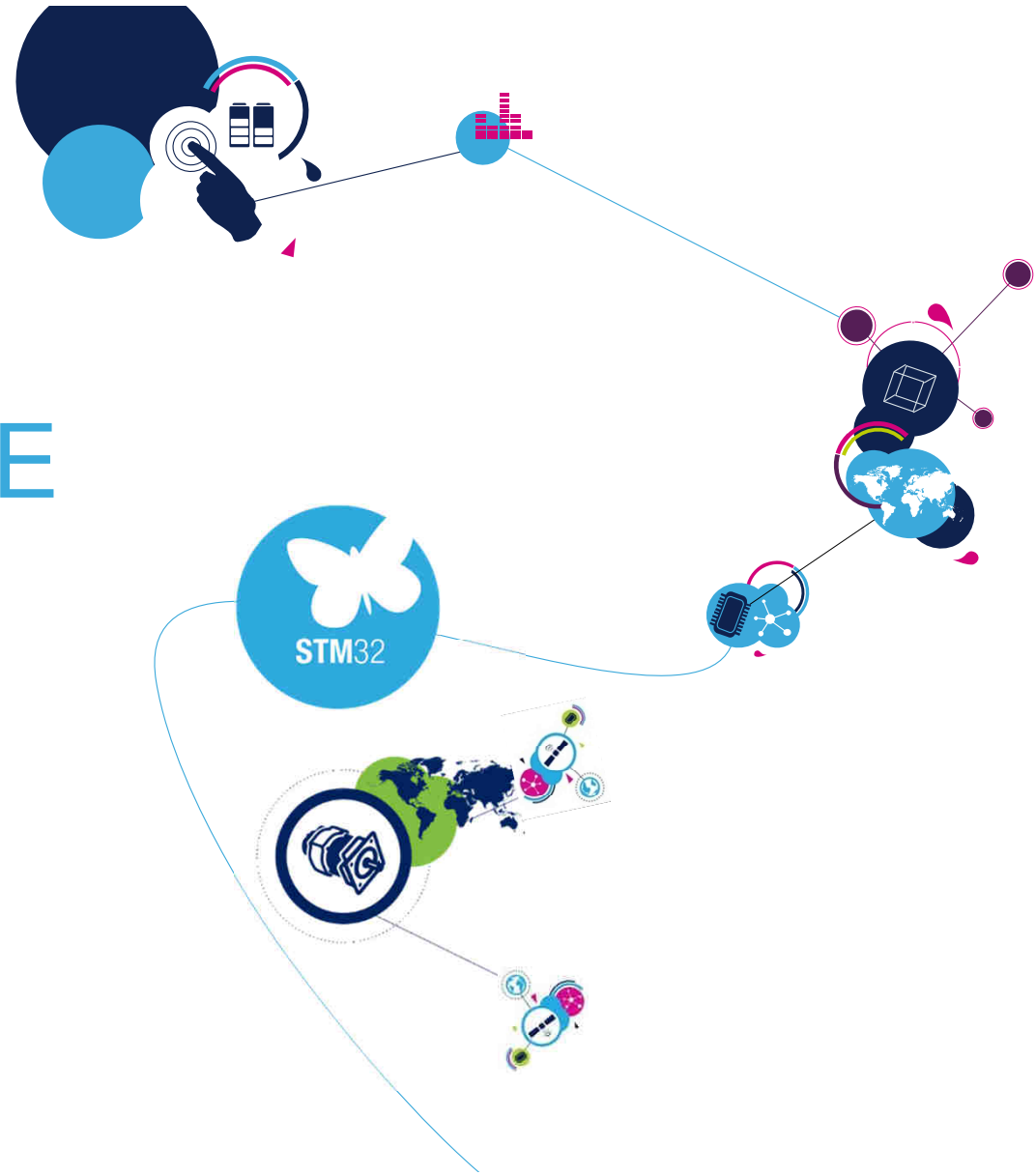
16

New STM32 series added

- STM32 L4 and F7 series (v5.2)
- STM32 G0 series (v5.3)

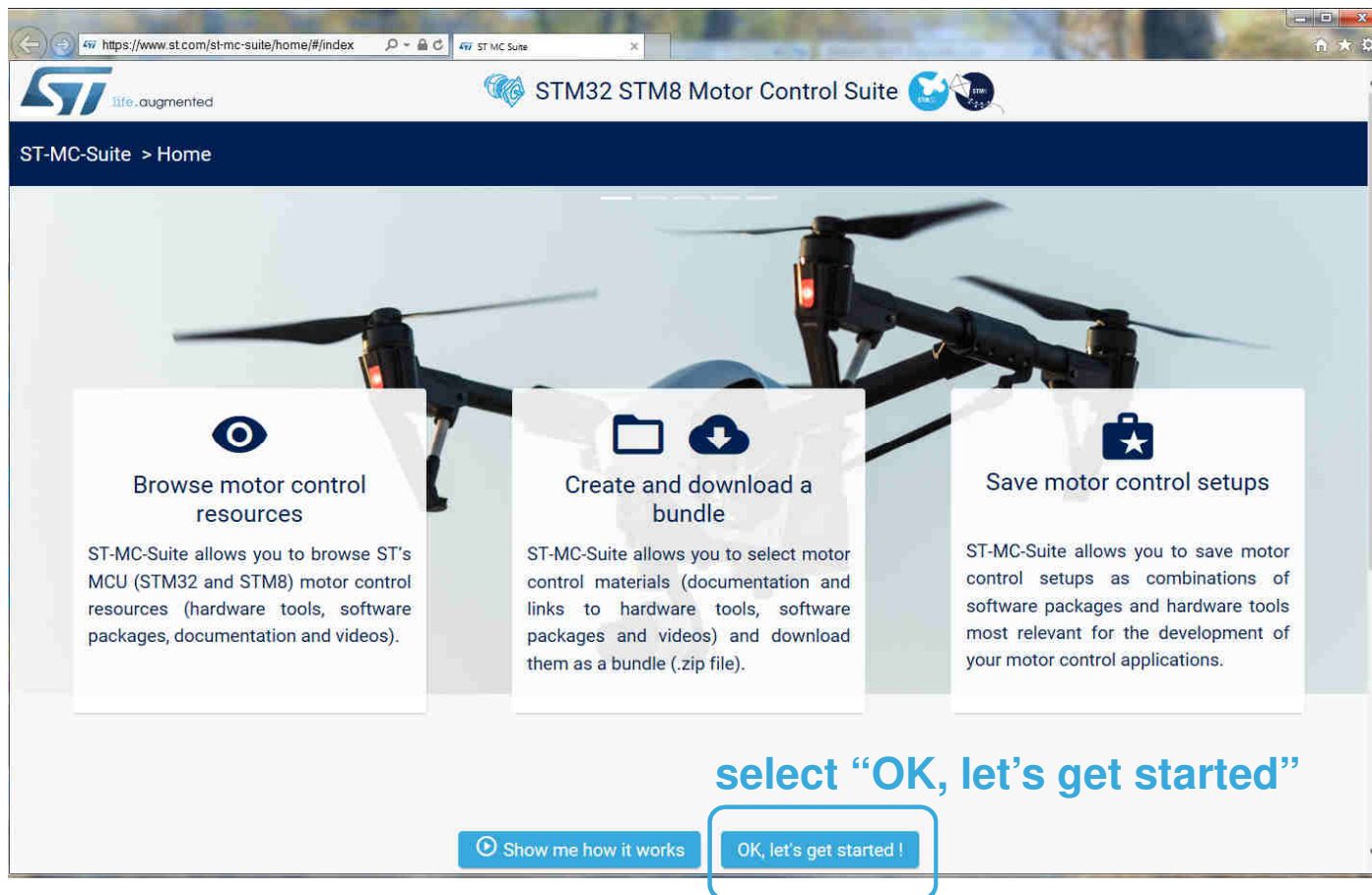


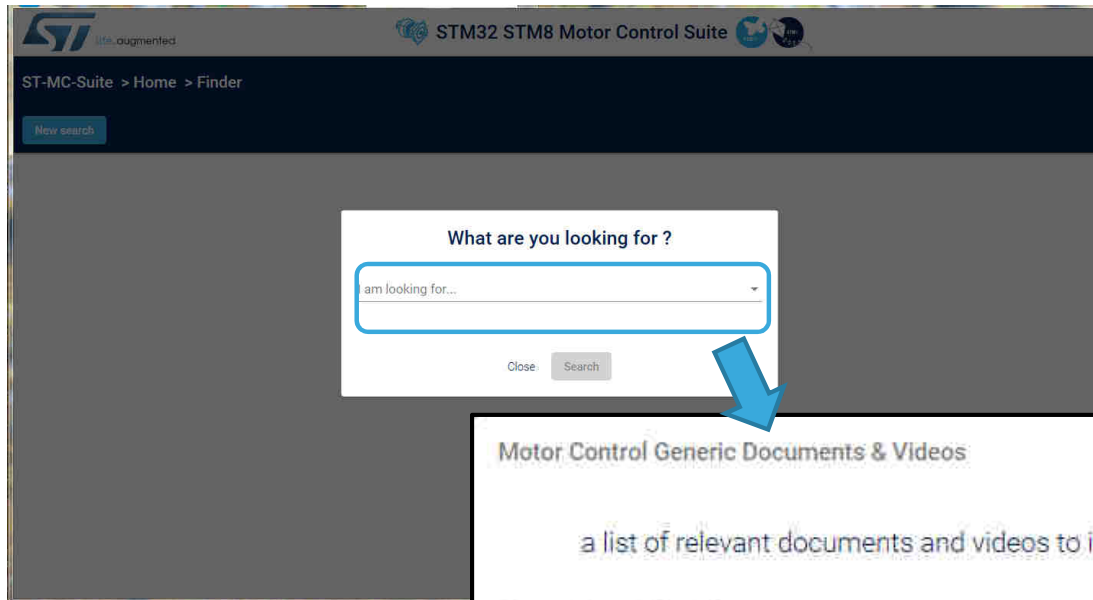
STM32 / STM8 Motor Control SUITE Introduction



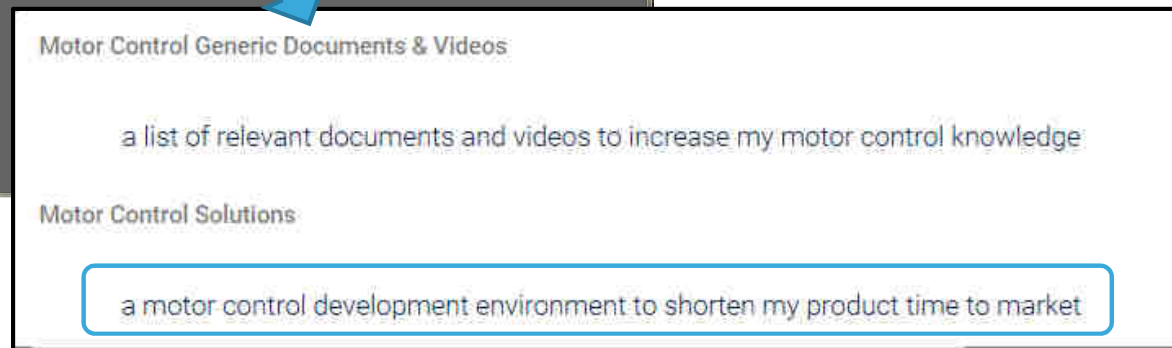
Open your web browser and go to:
<https://www.st.com/st-mc-suite/home>

18





click on the pulldown



select “a motor control development ...”

The screenshot shows the STM32 STM8 Motor Control Suite Finder interface. At the top, there is a navigation bar with the ST logo and 'life.augmented' on the left, and 'STM32 STM8 Motor Control Suite' with a globe icon on the right. Below this is a dark blue header with the text 'ST-MC-Suite > Home > Finder' and a 'New search' button. The main content area is a light gray rectangle. In the center, there is a white modal box titled 'What are you looking for ?'. Inside this box, there is a text input field with the placeholder 'I am looking for...' and the text 'a motor control development environment to shorten my product ti...' followed by a dropdown arrow. Below this is a section titled 'Which Criteria ?' containing two dropdown menus: 'Motor Type' with 'BLDC / PMSM' selected, and 'Motor Control Algorithm' with 'Vector Control (FOC)' selected. Each dropdown has a question mark icon to its right. At the bottom of the modal box are 'Close' and 'Search' buttons.

ST life.augmented STM32 STM8 Motor Control Suite

ST-MC-Suite > Home > Finder

New search

What are you looking for ?

I am looking for...

a motor control development environment to shorten my product ti...

Which Criteria ?

Motor Type

BLDC / PMSM

Motor Control Algorithm

Vector Control (FOC)

Close Search

select
“BLDC/PMSM”
and
“Vector Control”
then click
“Search”

other options
coming soon !

ST life.augmented STM32 STM8 Motor Control Suite

ST-MC-Suite > Home > Finder

Results for : Motor Control Solutions for BLDC / PMSM - Vector Control (FOC) [New search](#) [My Bundle](#)

- Choose a development setup option to browse the corresponding hardware and software resources.
- Use Filters to narrow your search.
- Click [Add to setup](#) to create a setup as a combination of hardware and software resources.
- Click to show associated documentation. Make a selection ☒ to add to your bundle.
- Click [My Setups](#) to visualize, edit or download your setups.
- Click [My Bundle](#) to visualize, edit or download your bundle.

[Software + Power & Control](#) [Software + MC Kits](#) [Software + Inverters](#) [My Setups \(0 \)](#)

STM32/STM8 Control boards + Power boards.

[Save setup](#)

Embedded Software Packages				
Reset filters	Actions	Name	Description	Ecosystem

select
“Software + Power &
Control”

other options are
“Software + Kits”
“Software + Inverters”

Results for : Motor Control Solutions for BLDC / PMSM - Vector Control (FOC) New search My Bundle (3)

Embedded Software Packages

Reset filters

Search

Ecosystem
Any

Close

Actions	Name	Description	Ecosystem
In setup	X-CUBE-MCSDK	PMSM FOC library to drive one or two motors	STM32

Associated Document(s) (3 / 13 selected)

<input type="checkbox"/>	Description	category	version	size
<input checked="" type="checkbox"/>	DB3548 STM32 MC SDK software expansion for STM32Cube	Product Specifications	1.0	159 KB
<input type="checkbox"/>	AN5143 How to migrate motor control application software from SDK v4.3 to SDK v5.x	Application Notes	3.0	660 KB
<input type="checkbox"/>	AN5166 Guidelines for control and customization of power boards with STM32 MC SDK v5.0	Application Notes	1.0	322 KB
<input checked="" type="checkbox"/>	UM2392 STM32 motor control SDK	User Manuals	1.0	1 MB
<input checked="" type="checkbox"/>	UM2380 STM32 motor control SDK v5.2 tools	User Manuals	3.0	4 MB

Items per page: 5 1 - 5 of 13

Items per page: 10 1 - 1 of 1

1/3 selected for current setup

select desired
software collateral

select “Add to setup”

Results for : Motor Control Solutions for BLDC / PMSM - Vector Control (FOC) [New search](#) [My Bundle](#) (5)

Control Boards

Reset filters [Reset filters](#)

Search [Search](#)

Connections: Any

Family: STM32G0

Close

Actions: [Add to setup](#)

Name	Connections	Family	Components
STM32G081B-EVAL	MC	STM32G0	STM32G081RBT6

Associated Document(s) (2 / 28 selected)

Description	category	version	size
<input checked="" type="checkbox"/> DB3597 Evaluation board with STM32G081RB MCU	Product Specifications	1.0	9 MB
<input type="checkbox"/> TN1235 Overview of ST-LINK derivatives	Technical Notes & Articles	2.0	670 KB
<input checked="" type="checkbox"/> UM2403 Evaluation board with STM32G081RB MCU	User Manuals	1.0	2 MB
<input type="checkbox"/> STM32G0 MCU Series - Efficiency at its Best	Presentations	1.0	2 MB
<input type="checkbox"/> STM32 Development Boards Portfolio	Presentations	1.0	3 MB

Items per page: 5 1 - 5 of 28 |< < > >|

Items per page: 10 1 - 1 of 1 |< < > >|

Power Boards

Reset filters [Reset filters](#)

Name	Connector	Power	Output voltage range	Irms	Ipeak	Components

select control board
by choosing the
Family:
“STM32G0”

select desired
collateral

select “Add to setup”

Results for : Motor Control Solutions for BLDC / PMSM - Vector Control (FOC) [New search](#) [My Bundle](#) (10)

Power Boards

Actions	Name	Connector	Power	Output voltage range	Irms	Ipeak	Components
Add to setup	STEVAL-IHM023V3	MC	1000	DC:125-400	0	13.3	L6390D STGP10H60DF
Add to setup	STEVAL-IHM028V2	MC	2000	DC:125-400	0	20	STGIPS20C60
Add to setup	STEVAL-IHM045V1	MC	100	DC:20-190	0.35	1	STGIPN3H60A
Add to setup	STEVAL-IPM05F	MC	500	DC:125-400	3	5	STGIF5CH60TS-L

Associated Document(s) (5 / 9 selected)

	Description	category	version	size
<input type="checkbox"/>	DB2717 500 W motor control power board based on STGIF5CH60TS-L SLLIMM™ 2nd series IPM	Product Specifications	4.0	1 MB
<input checked="" type="checkbox"/>	UM1971 500 W motor control power board based on STGIF5CH60TS-L SLLIMM™ 2nd series IPM	User Manuals	3.0	15 MB
<input checked="" type="checkbox"/>	STEVAL-IPM05F gerber files	Board Manufacturing Specifications	1.1	225 KB
<input checked="" type="checkbox"/>	STEVAL-IPM05F BOM	Bill of Materials	2.0	170 KB
<input checked="" type="checkbox"/>	STEVAL-IPM05F schematic	Schematic Pack	2.0	466 KB

Reset filters

Search

Connector
Any

power (watt(s)) :

minimum voltage (volt(s)) :

maximum voltage (volt(s)) :

Close

select power board
“STEVAL-IPM05F”

select desired
collateral

select “Add to setup”

Portfolio

Items per page: 5 1 - 5 of 28

Items per page: 10 1 - 1 of 1

Power Boards

Reset filters

Search

Connector: Any

power (watt(s)) :

minimum voltage (volt(s)) :

maximum voltage (volt(s)) :

Actions	Name	Connector	Power	Output voltage range	Irms	Ipeak	Components
Disabled	STEVAL-IHM023V3	MC	1000	DC:125-400	0	13.3	L6890D STGP10H60DF
Disabled	STEVAL-IHM028V2	MC	2000	DC:125-400	0	20	STGIPS20C60
Disabled	STEVAL-IHM045V1	MC	100	DC:20-190	0.35	1	STGIPN3H60A
In setup	STEVAL-IPM05F	MC	500	DC:125-400	3	5	STGIF5CH60TS-L

Associated Document(s) (5 / 9 selected)

	Description	category	version	size
<input checked="" type="checkbox"/>				1 MB
<input checked="" type="checkbox"/>				15 MB
<input checked="" type="checkbox"/>				225 KB
<input checked="" type="checkbox"/>				170 KB

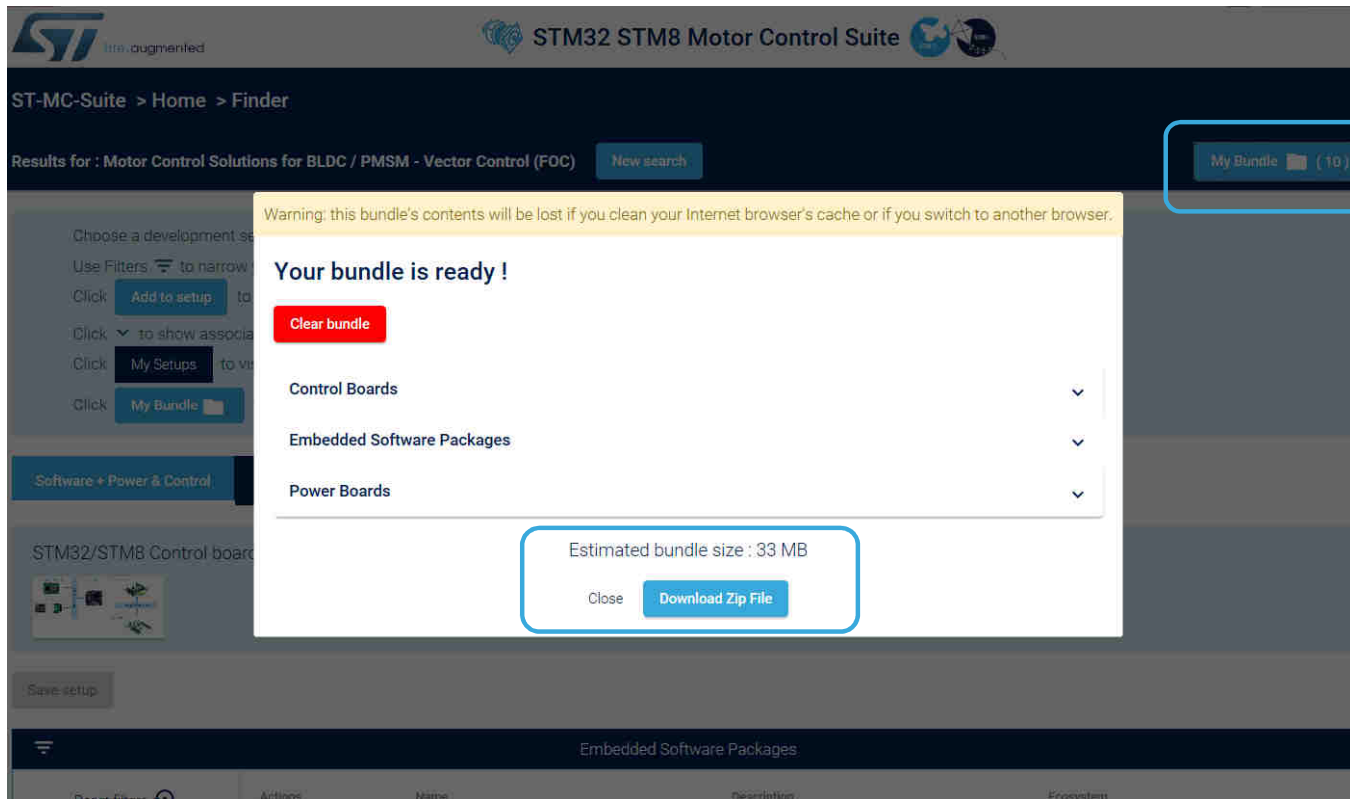
Your setup is complete, would you like to save it ?

Setup name
Optional : Home Appliance

Setup description
Optional : Efficient and Robust

Not now **Save setup**

Give your setup a name and description
select "Save setup"



select
“My Bundle”

Select “Download
ZIP file”

Enjoy the bundle!

Releasing your creativity with the STM32

27



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 community.st.com



www.st.com/stm32