



**INDUSTRIAL
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SHENZHEN, CHINA | 28 SEPTEMBER



Reference designs based X-CUBE-MCSDK

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Reference design of
dPFC+dual motors control

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Success stories for water
pump, fan motor, refrigerator

2

Reference design of iPFC +
tri motors control

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Tips for using X-CUBE-
MCSDK6

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Reference design of single
motor control

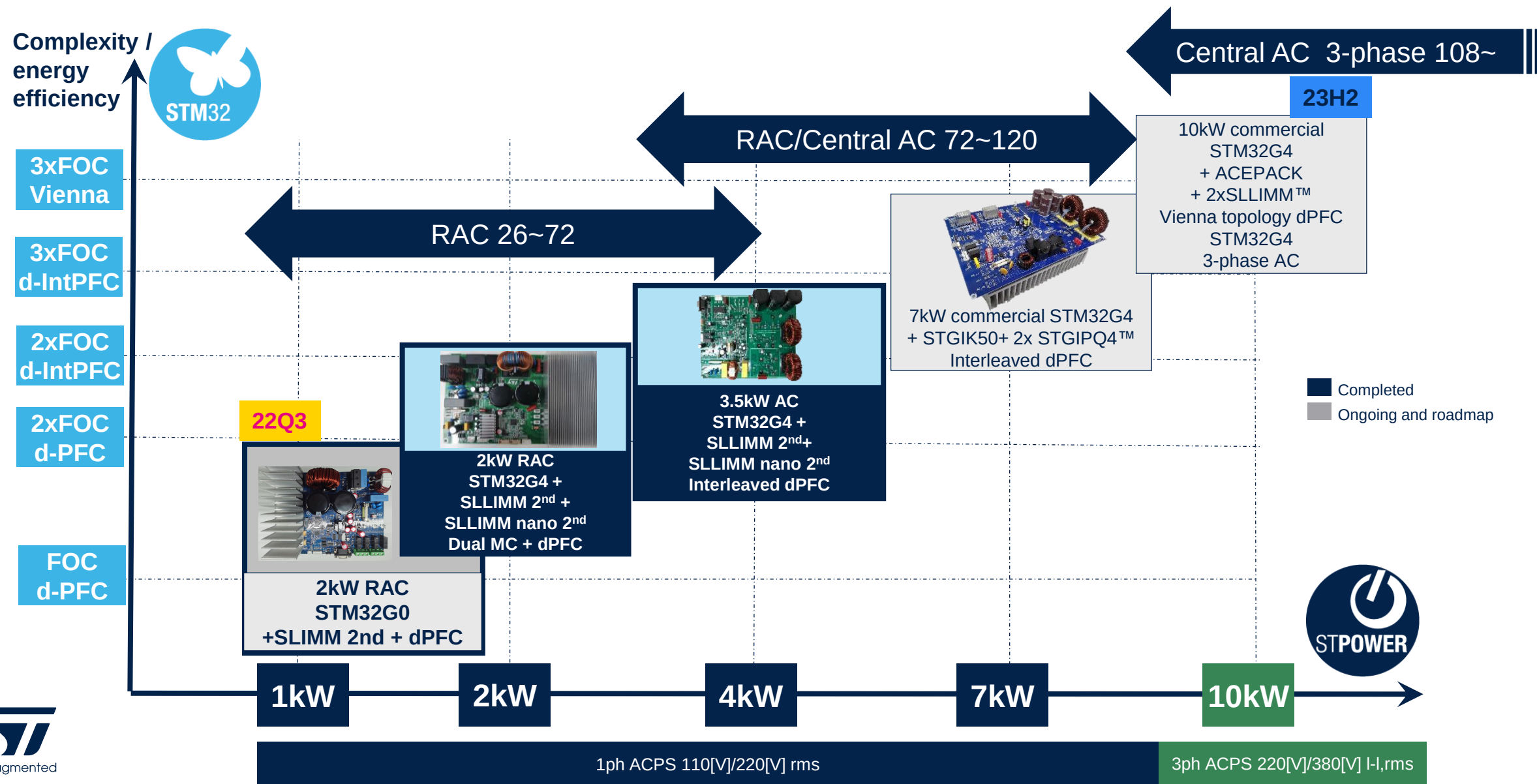
4

STM32 advanced reference
design

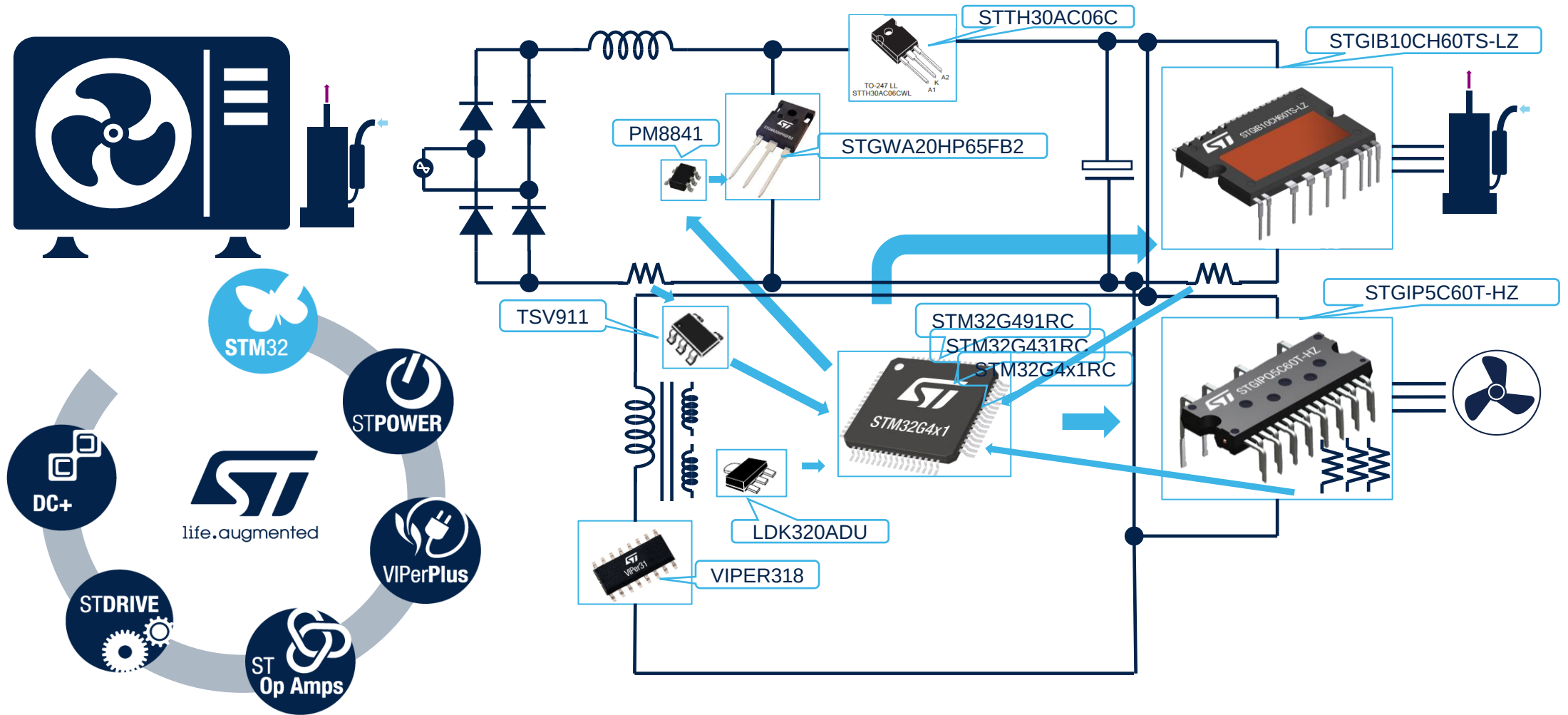
Reference designs for air-con ODU



Solutions for AC ODU



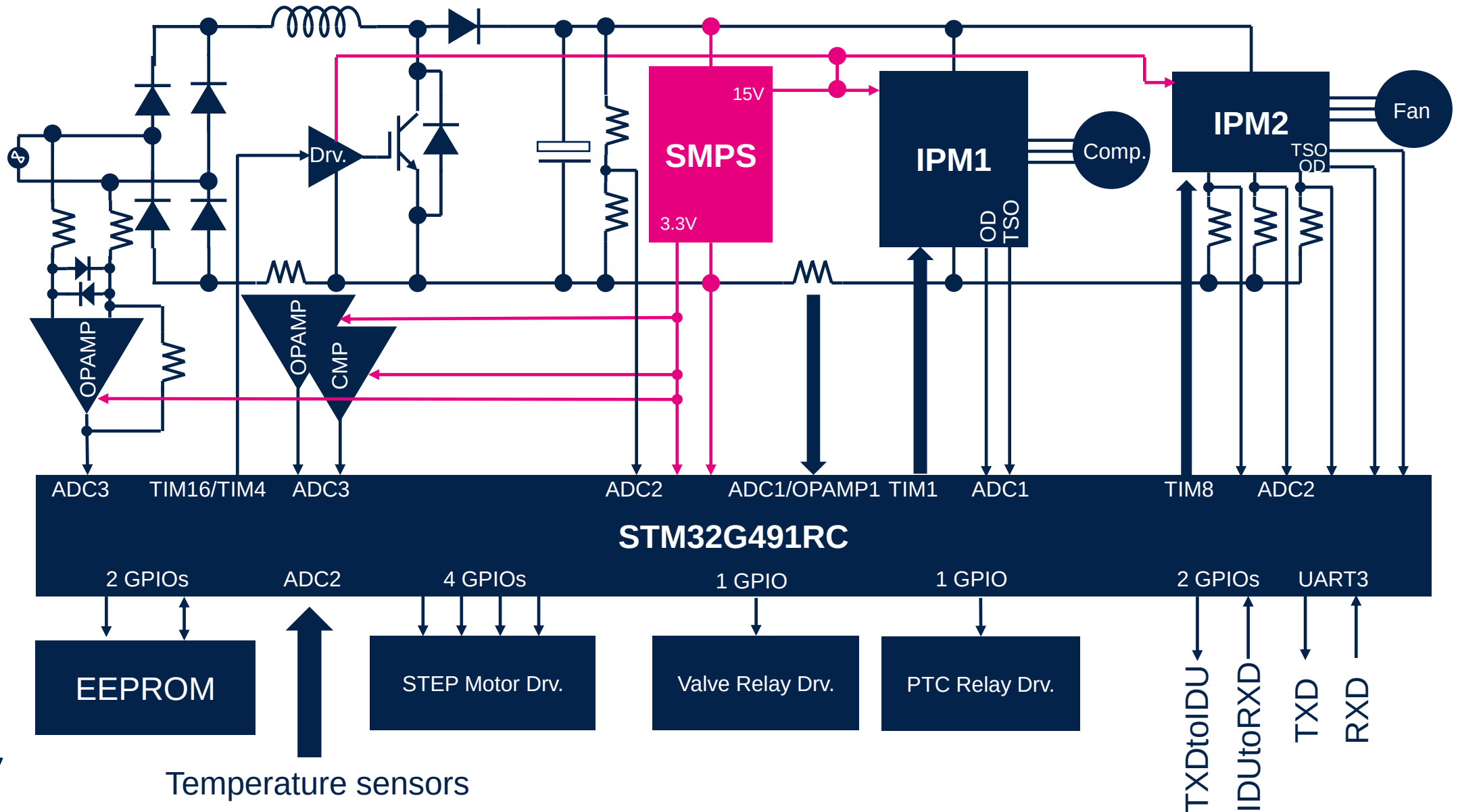
Outdoor unit controller



ST BOM adopted in turn-key solution

Modules	Product	Part No.	Features
Controller	MCU	STM32G491RC	Mainstream Arm Cortex-M4 MCU 170 MHz with 256 Kbytes of Flash memory, Math Accelerator, High Analog level integration
Booster	IGBT	STGWA30HP65FB2	$I_c=30[A]$ @ $T_c=100[^\circ C]$ / $V_{CES}=650[V]$
	FRD	STTH30AC06CPF	$I_{F(rms)}=2 \times 15[A]$ / $V_{RPM}=600[V]$ / $t_{rr}=40[ns]$
	IGBT driver IC	PM8841D	$I_{snk}=1.1[A]$ / $I_{src}=0.94[A]$ / $t_R=t_F=20[ns]$
	OP-AMP(for single shunt current detection)	TSV911ILT	Wide-bandwidth (8MHz) rail to rail input/output 5V CMOS Op-Amp, single
	OP-AMP(for AC input voltage detection)	TSV611ILT	Rail to rail input/output 5V CMOS Op-Amp, micro-power (10uA), GBP = 120kHz, single
	Comparator(for zero crossing point detection, optional)	TS391RILT	Low power, single voltage comparator
Compressor Motor drive	IPM	STGIB10CH60TS-L	$I_c=15[A]$ @ $T_c=25[^\circ C]$, $I_c=10[A]$ @ $T_c=80[^\circ C]$ / $V_{CES}=600[V]$
	Comparator(Demag protect)(optional)	TS391RILT	Low power, single voltage comparator
Fan motor drive	IPM(OP-AMP embedded)	STGIPQ5H60T_HZ	SLLIMM nano 2nd series IPM, 3-phase inverter, 5A, 600 V short-circuit rugged IGBTs
SMPS	Hi-voltage converter	VIPER318HDTR	Energy Saving Off-line High Voltage Converter
	LDO	LDK320ADU33R	200 mA low quiescent current and high PSRR voltage regulator
	Power Schottky diode	STPS2200U	200 V, 2 A High Voltage Power Schottky diode
	Power Schottky Rectifier	STPS1L30A	30 V, 1 A Low Drop Power Schottky Rectifier
EEPROM	EEPROM	M24C16-RMN6TP	16 Kbit serial I2C bus EEPROM
RELAY driver	Darlington Arrays	ULN2003D1013TR	Seven Darlington Arrays

Topology



Specification

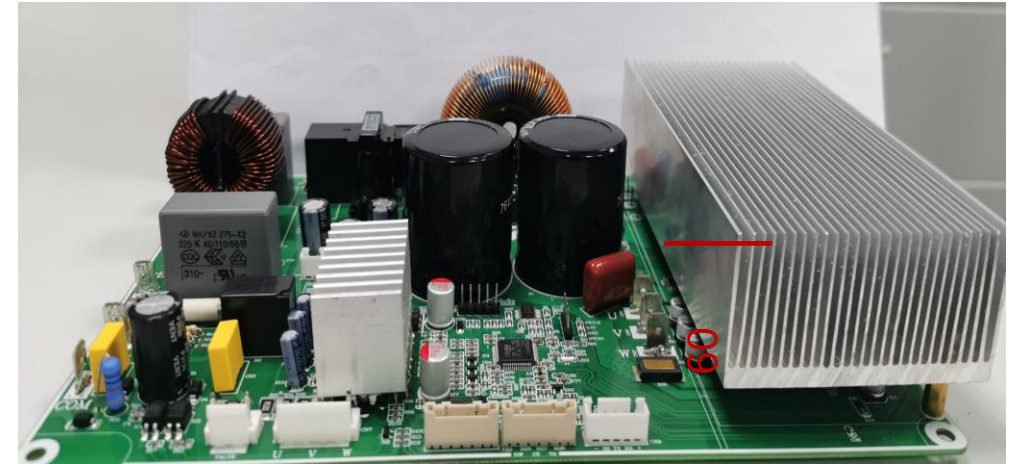
1. Input power: ~2200[kW]
2. Input voltage: single phase, 150[V]_{rms}~265[V]_{rms} @50[Hz] or 60[Hz]
3. Cooling capacity: ~3500[W]
4. Maximum DC bus voltage: 350[V](input voltage ≤240[V]_{rms})
5. Maximum rotor speed of compressor: 9000[rpm]
6. Maximum discharge pressure of compressor: 4.1[MPa]
7. Maximum rotor speed of fan motor: 1200[rpm]@0.57[A]_{rms}
8. On-the-fly maximum rotor speed of fan motor: -600[rpm]~600[rpm]

Reference design materials are available

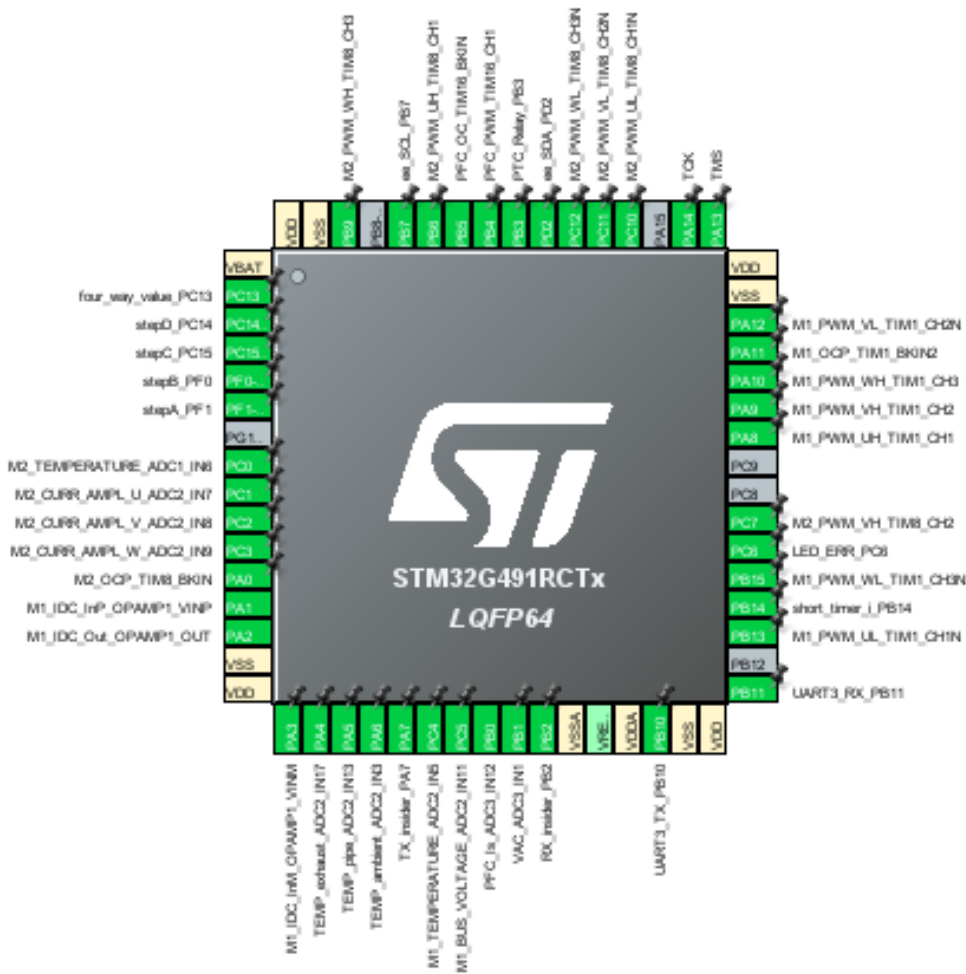
HW design support is available

Consulting on PCB layout is available

Ready for mandatory validation(PCBA is placed
in room temperature condition)



STM32G491RC Peripheral allocation



Peri.	Compressor	Fan motor	PFC	Others
TIMER	TIM1/Systick	TIM8/Systick	TIM16/TIM4/Systick	
ADC	ADC1 OPAMP1	ADC2	ADC3	
DMA1			CH2 sync. TIM16nTim4	

Interruption(4 bits for pre-emption priority, 0 bit for subpriority)	Group Priority	Sub priority	Description
TIM1_UP_TIM16_IRQn	0	0	PFC over current protection
TIM4_IRQn	1	0	PFC high frequency tasks
TIM8_UP_IRQn	2	0	ADC configuration for current sampling
TIM3_UP_IRQn	3	0	M1 FOC high frequency tasks
ADC1_2_IRQn	3	0	M2 FOC high frequency tasks
SysTick_IRQn	4	0	Medium Frequency and safety tasks
TIM8_BRK_IRQn	5	0	M2 over current protection
TIM1_BRK_TIM15_IRQn	5	0	M1 over current protection

Features

Wide available speed range

Minimized loss

Minimized noise/vibration

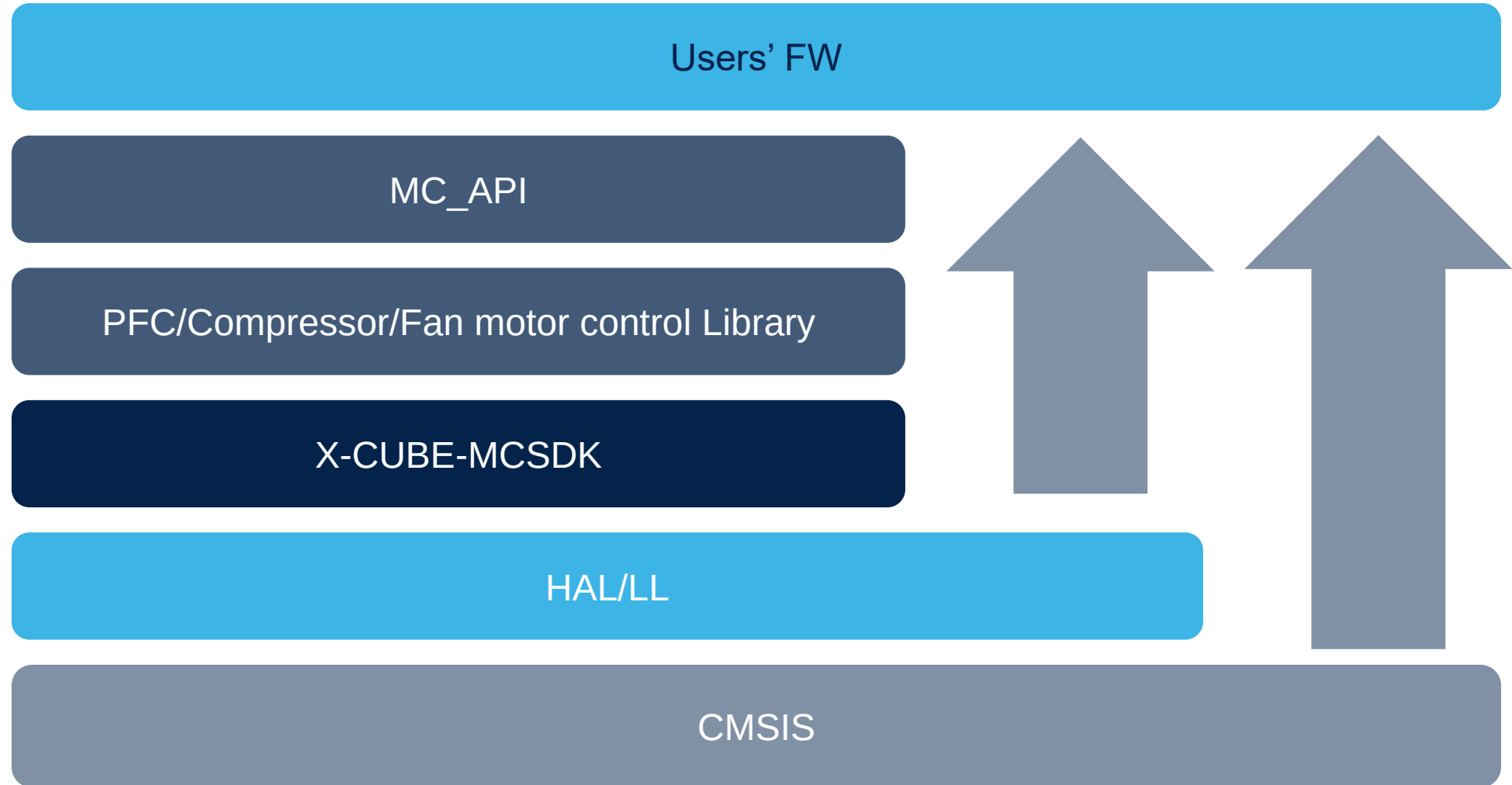
Accurate estimation

Robust observer

Scalable controller

- PFC
 - Variable DC bus voltage control
 - DC bus voltage ripple compensation
- Compressor control
 - Torque load ripple compensation at low/middle rotor speed
 - Model decoupling at high rotor speed
 - Adjustable flux weaken control
- Fan motor control
 - On-the-fly startup
 - Rotor stall judgement(Machine Learning)
 - Low acoustic noise using 3-shunt
- Common
 - Optimized back-emf observer for rotor speed/position estimation
 - Available to start rotor with full load from standstill and very low rotor speed(1[rpm])
 - Available to run motor at very low rotor speed(1[rpm])

FW architecture



PCTools (SW)

EEPROM Data Generation

STM32F3038B

Motor 0 Part No: Motor 1 Part No: Person in Charge: shawn chen

PFC Type: Single phase booster

Motor 0 Vendor: Motor 1 Vendor: EEPROM Data Rev. (xx.yy.zzzz): 01.00.0000

Single Motor ☐ Dual Motors ☒

Items	Name	Value	Unit
1	MCU power supplier	3.3	[V]
2	Reference value of DC bus voltage	350.00	[V]
3	MAX Applicable Voltage	380.00	[V]
4	MAX Measurable Current	20.00	[A]
5	PFC Turn ON Voltage	330.00	[V]
6	Shunt resistor for input current detection	0.020	[Ohm]
7	OP-AMP gain for current signal detection of input current	10.000	n/a
8	Expected OC threshold(PFC)	30.000	[A]
9	KP(PFC Current regulation)	700	n/a

Save Data File Import

Communicating with MCU

STM32F3038B

Language: Help

COM Setting: COM3 Sending Baud Rate: 1200 Parity Bit: None Data Bit: 8 Stop Bit: 2

Open COM Close COM

E2PROM R/W: E2PROM Data Setting E2PROM Read/Write/Erase E2PROM Data Version Read Ver: F/W Version Read Ver: User Version Read Ver:

Motor Debug: Motor 0 Target Speed: 0.0 rps Acceleration: 1.0 rps/s Measured Speed: Phase Current (rms): A IPM temperature: °C TRC Enable: Disable Bus Voltage: V

Motor 1 Target Speed: 0.0 rps Acceleration: 1.0 rps/s Measured Speed: Phase Current (rms): A IPM temperature: °C

Motor 2 Target Speed: 0.0 rps Acceleration: 1.0 rps/s Measured Speed: Phase Current (rms): A IPM temperature: °C

PFC Status: PFC Enable: Enable Total Current: A IGBT1 temp: °C IGBT2 temp: °C

Motor Status Fault Status

STO Gains Calculation

G1G2 generator (V01.00.02 20210622)

Lq: 0.0145 H KE: 53.6 V(L-L)/rms/krpm Rs: 1.108 ohm Pole Pair: 3 Max. Application Mechanical Speed: 120 rps FOC loop execute frequency: 5000 Hz

OPA_gain: 3.4 MCU_VCC: 3.3 V Rshunt: 0.02 ohm point_num: 100 threshold_low: 0.8 threshold_high: 0.9 k1/k2_range_factor: 1.0

Generate

K1: -8620 K2: 186742 F1: 16384.0 F2: 8192.0 G1: -28246 G2: 19634

Graph: 350000 325000 300000 275000 250000 225000 200000 -10000 -9750 -9500 -9250 -9000 -8750 -8500 -8250

Toolchains



CPU load

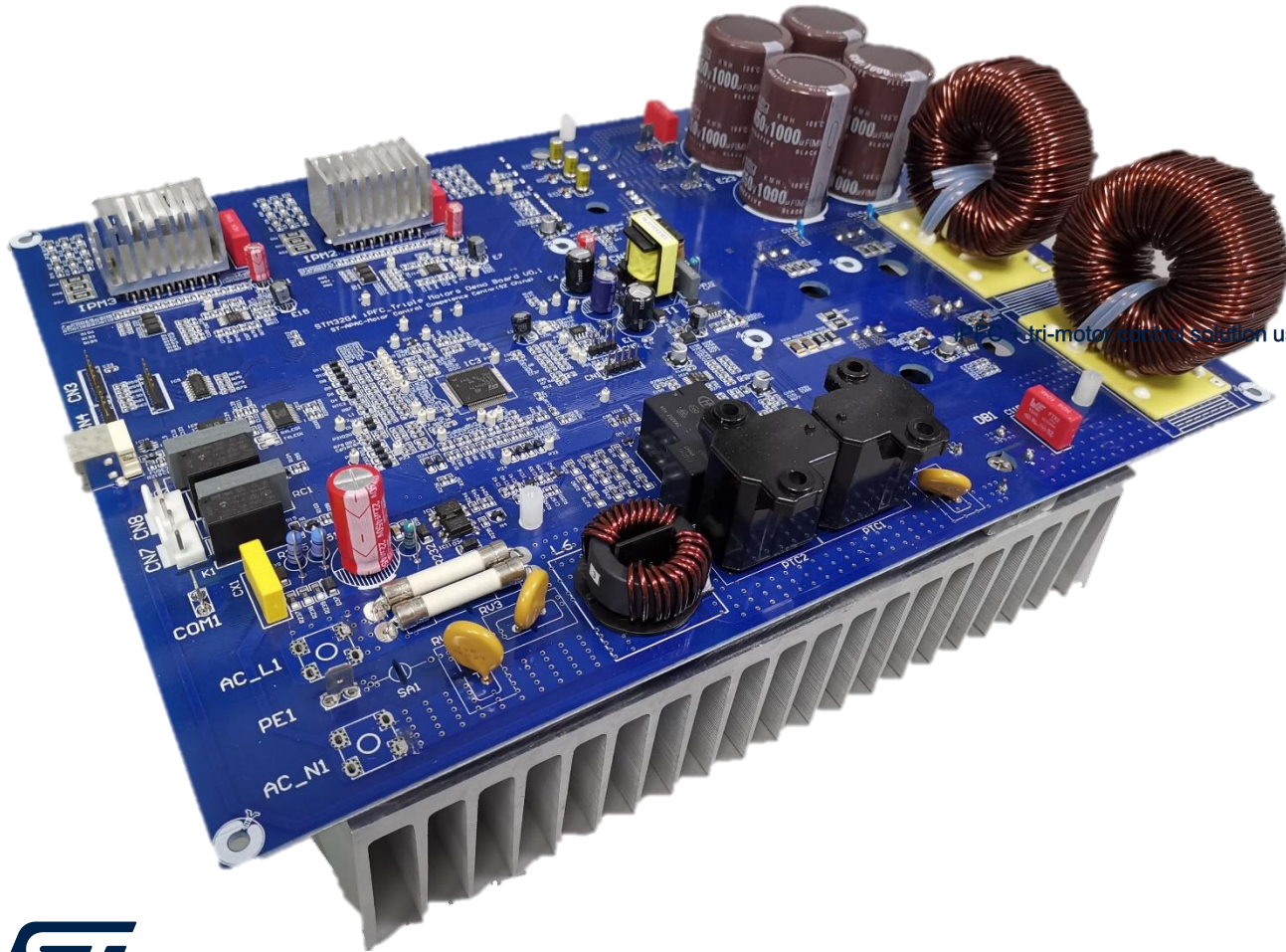
Optimize for speed(-Ofast)

module	Interrupt	Execution frequency	duration	CPU Load
PFC	TIM4_IRQHandler	40K	4.0us	16%
	MediumFrequencyTask	2K	10us	2%
Compressor	TIM1_IRQHandler (task1)	5K	24.5us	12.7%
	TIM1_IRQHandler (task2)	5K	0.8us	
	MediumFrequencyTaskM1	500	56us	2.8%
dual Fan(M2)	ADC1_2_IRQHandler	15K	13.5us	20.2%
	MediumFrequencyTaskM2	500	18us	0.9%
			Total:	54.6%

ROM, RAM size

Memory Regions	Size	Used	Free	Usage(%)
CCMRAM	16KB	11.68KB	4.32KB	73%
RAM	112KB	11.81KB	100.19KB	10.54%
Flash	256KB	87.85KB	168.15KB	34.32%

iPFC + tri-motor control solution using STM32G474



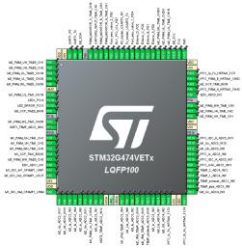
MAIN FEATURES:

- One STM32G4 MCU only to drive all functions
 - Reduced number of components
 - No need sync between controllers
 - 1 firmware workspace only
 - MC SDK v5.Y
- New ST HP SLLIMM 50A
 - High energy efficiency
- High frequency d-i-PFC
 - SJ MOSFET / IGBT
 - SiC diodes

ST products

- STM32G474VE
- STG1K50CH65T
- 2x STGIPQ4C60T-HZ
- 2x STGWA50HP65FB2
- 2x STFW40N60M2
- 2x STTH30M06S
- 2x TSV914IPT
- ULN2003D1013TR
- VIPER318HDT
- PM8834
- LMV339IDT
- TS391RILT
- LD1117S33TR
- LD1117S50TR

All functions inside 100-pin STM32G4 MCU + 3 IPMs

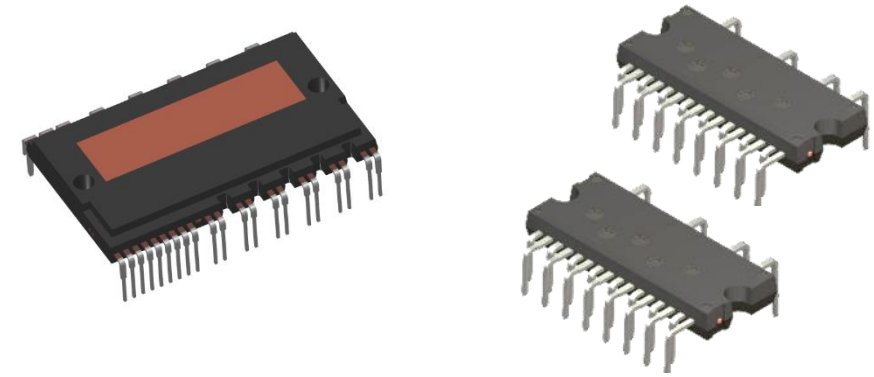


Function	Digital I/O	Analog I/O	Total
Compressor	9	5	14
Fan1	7	7	14
Fan2	7	7	14
Interleaved PFC	6	5	11
USART comm	4		4
SWD debug	2		2
I ² C EEPROM	2		2
Stepper valves	6		6
Other analogs		8	8
Other digitals	3		3
MCU functional			14
unused	4	4	8
GRAND TOTAL			100

OCF shutdown by IPM & temperature sensing by MCU

OCF shutdown by IPM & temperature sensing by MCU

OCF shutdown by IPM & temperature sensing by MCU

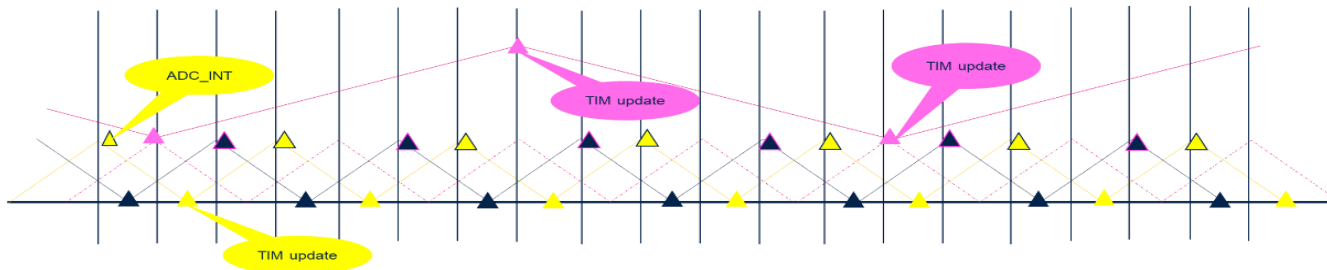


Vdd, Vss, Boot, Vdda, Vssa, NRST

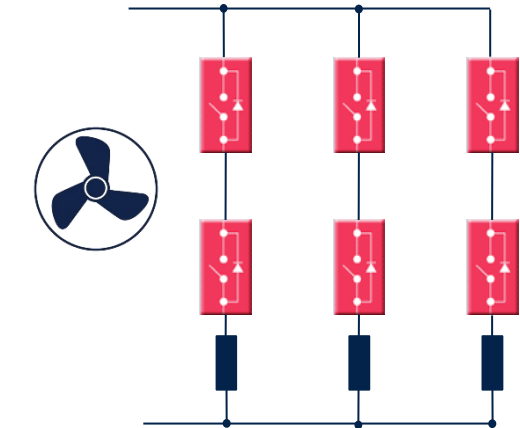
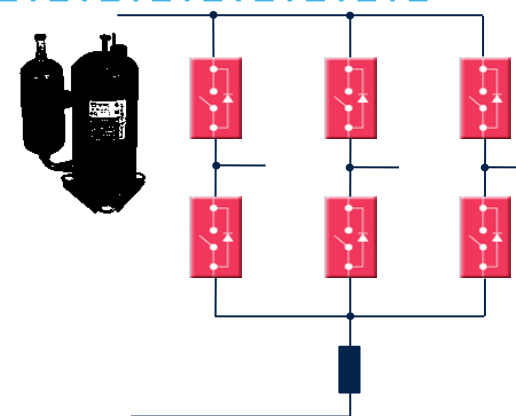
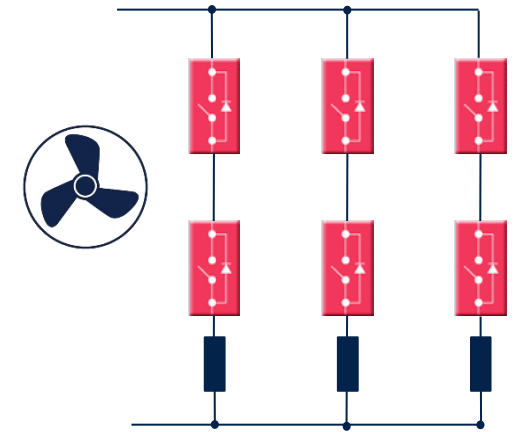
Triple FOC and current sensing topology

STM32G474 has up to 3 x 16-bit 8-channel advanced motor control timers

- FOC library arranges to share CPU time between the three drives, compressor, and two fans
- Two fans have same PWM frequency proportional to compressor PWM frequency



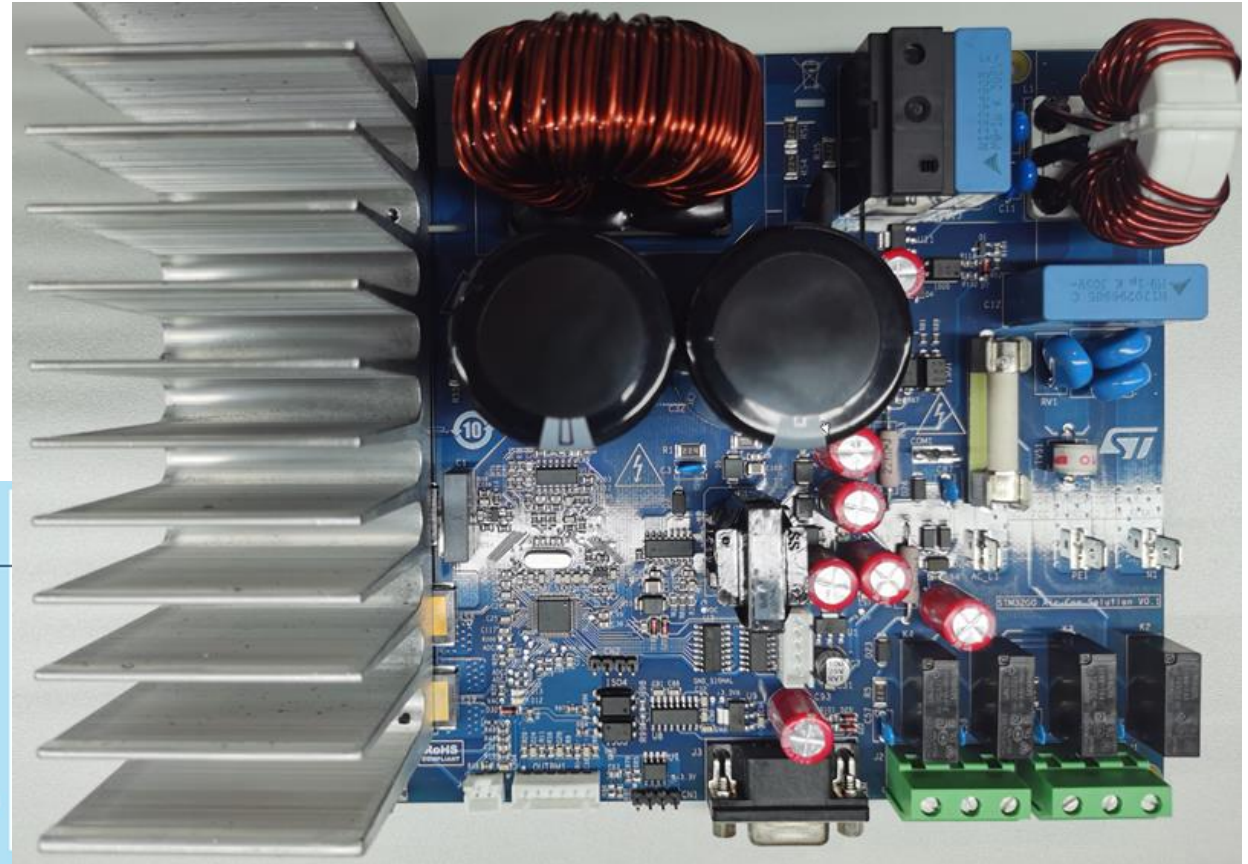
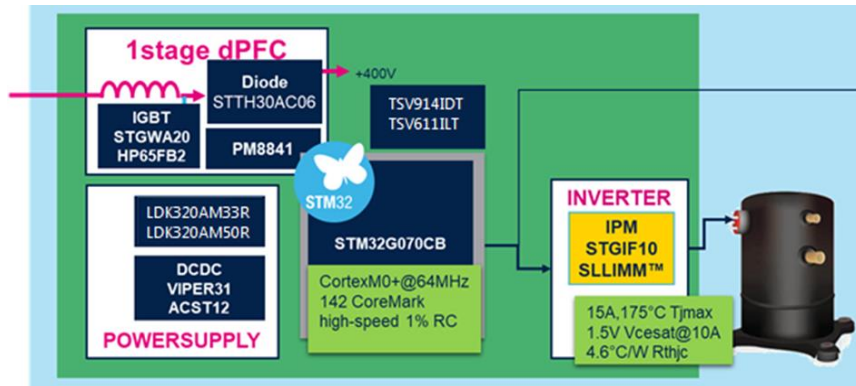
- 1 shunt for compressor to reduce BOM cost
- 2/3 shunts for fans to enhance OTF performance and startup success rate
- BEMF sensing network included to extend extreme conditions



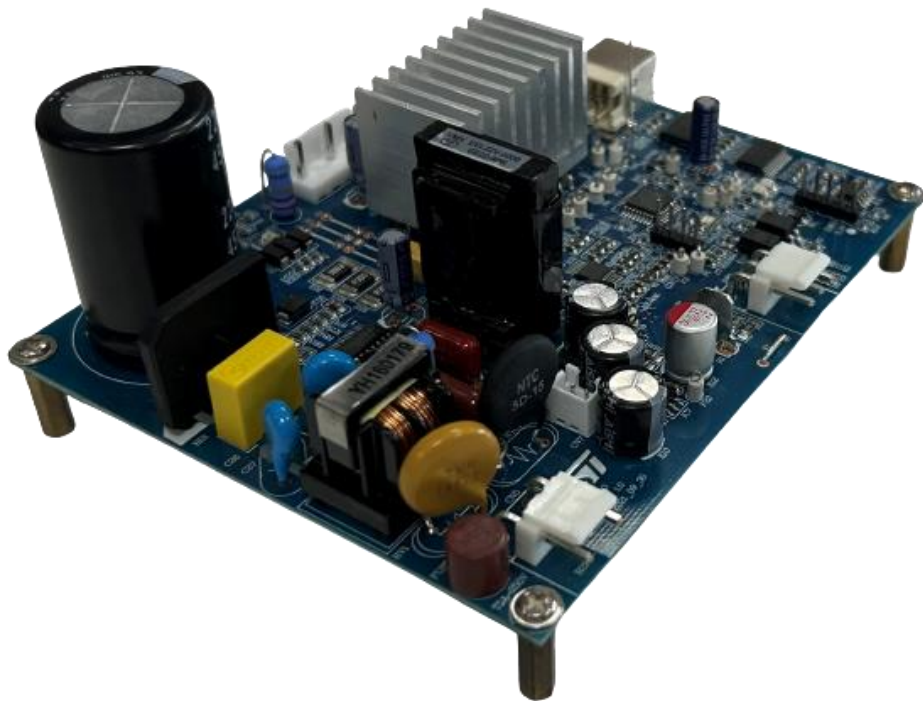
dPFC+single motor control solution using STM32G0

First STM32G0 Compressor & dPFC

Motor Control
Competence
Center



Reference design using STM32G0



Input Power: $\sim 1[\text{kW}]$
Rotor speed range: 7200[rpm]
Winding Current range: $\sim 5[\text{A}]$

ST BOM

Nb.	Part Nb.	pc(s)	Description
1	LDK320ADU33R	1	LDO
2	STM32G030KxT6	1	Mainstream Value-Line Arm Cortex-M0+ MCU with 64 Kbytes of Flash memory, 8 Kbytes RAM, 64 MHz CPU, 2x USART, timers, ADC, comm. I/F, 2-3.6V
3	M24C16-RMN6TP	1	EEPROM
4	STGIPQ5C60T-HZ	1	SLLIMM nano 2nd series IPM, 3-phase inverter, 5 A, 600 V, short-circuit rugged IGBT
5	VIPER318HDTR	1	800 V avalanche-rugged power MOSFET to cover ultra-wide VAC input range
6	TSV914IPT	1	quad rail-to-rail input/output 8 MHz operational amplifiers

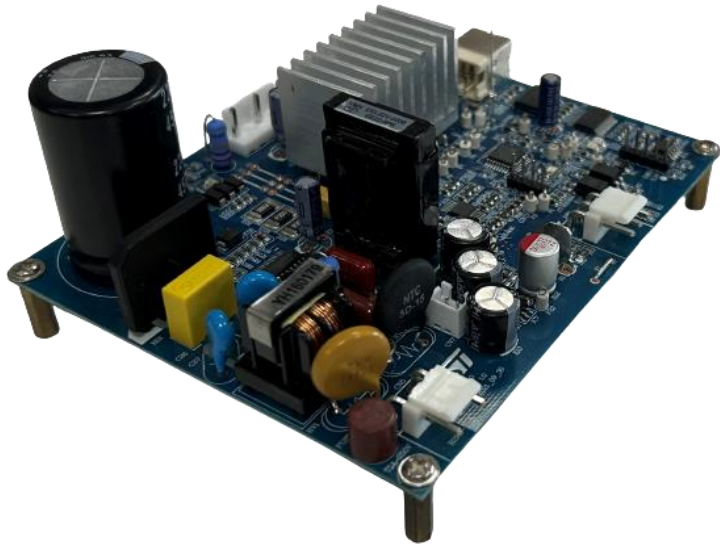
Deliverable

- SCH/PCB/BOM design materials
- X-CUBE-MCSDK

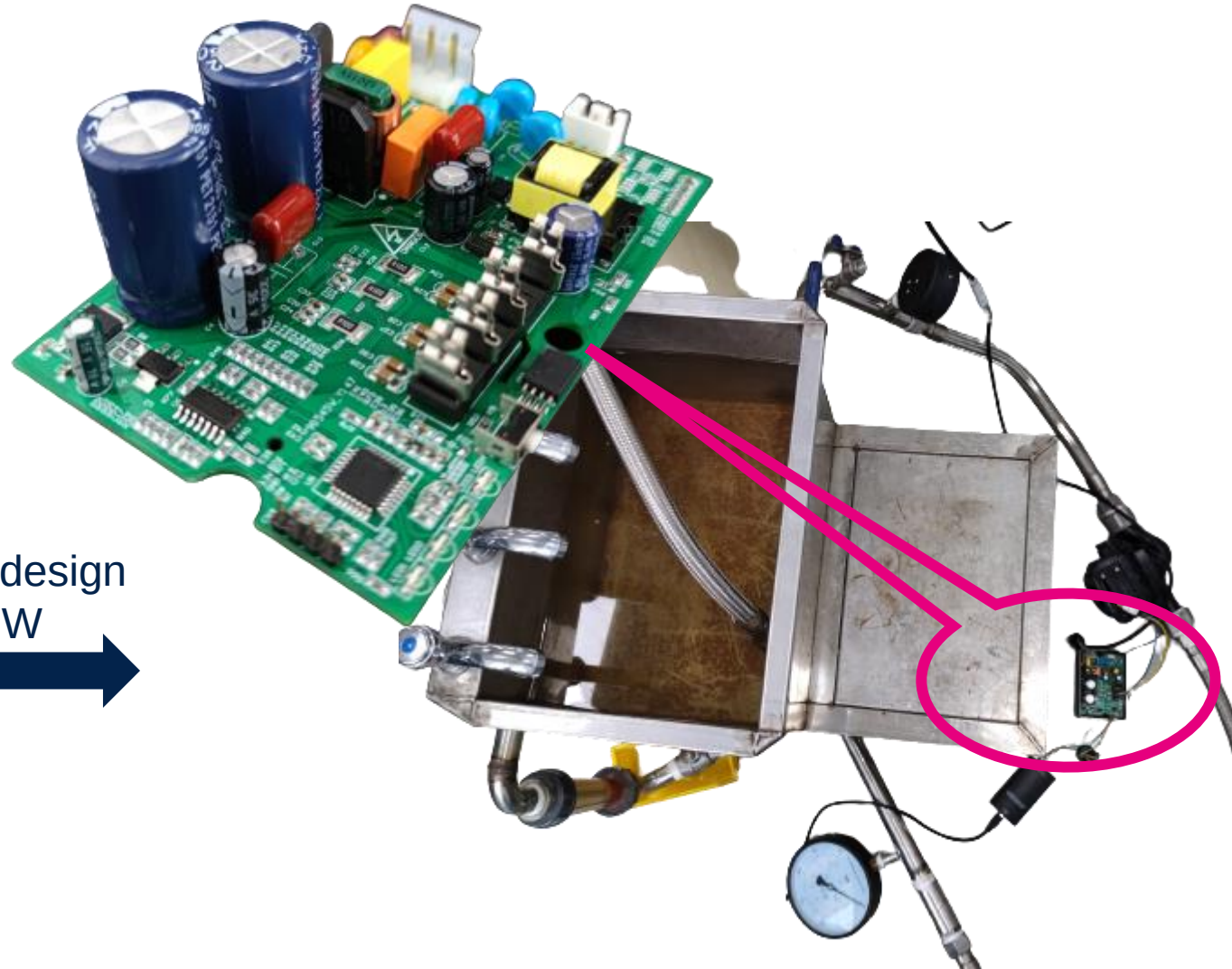
Reference design for water pump



Water pump controller



From reference design
to customized HW

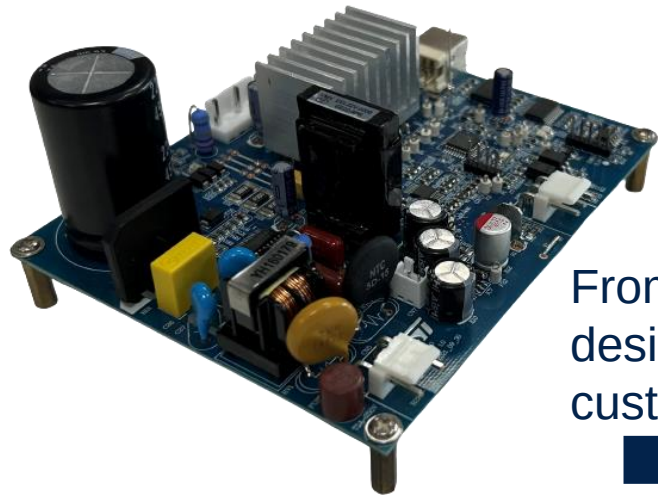


Reference design for fan motor



life.augmented

Fan motor controller



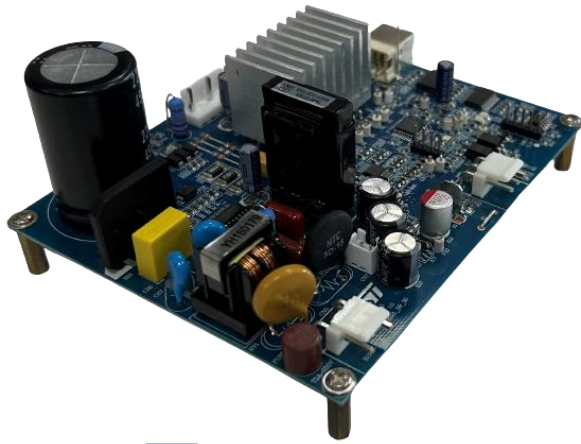
From reference
design to
customized HW



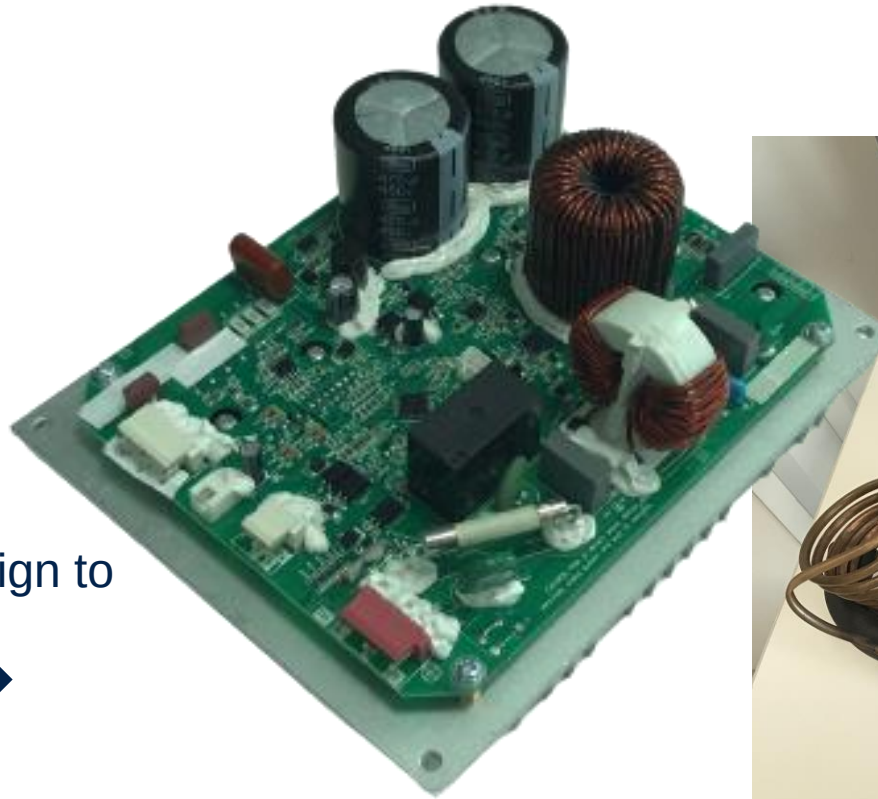
Reference design of refrigerator compressor control



Refrigerator compressor controller



From reference design to
customized HW

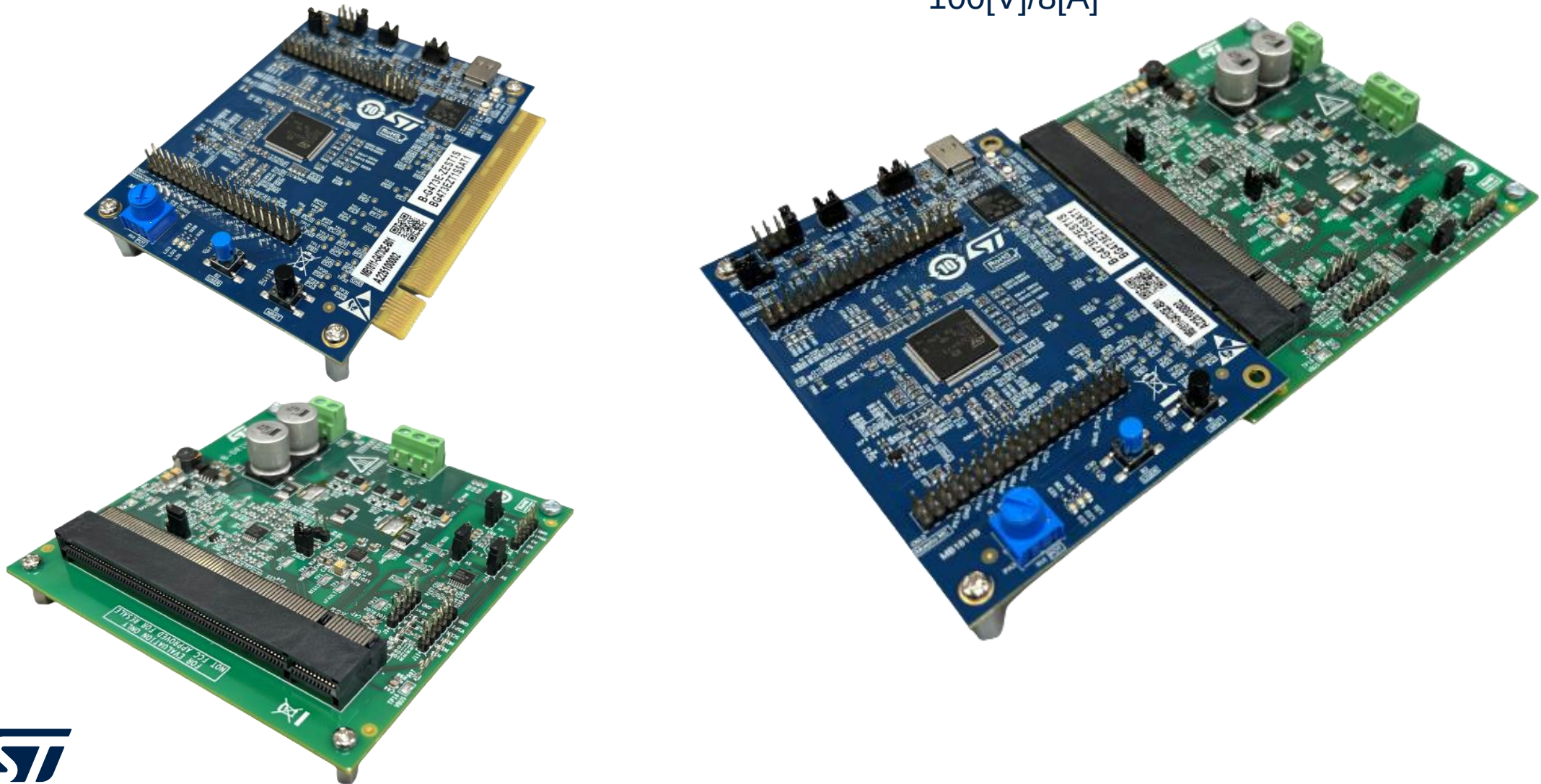


STM32 advanced reference design



Low Power Low Voltage reference design

100[V]/8[A]

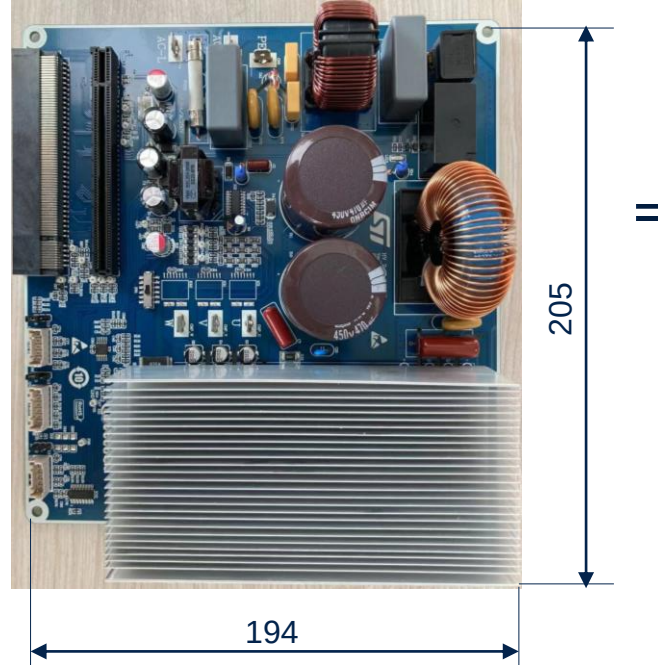


HV board to support one motor control using STM32 ZeST



MCU Board

+

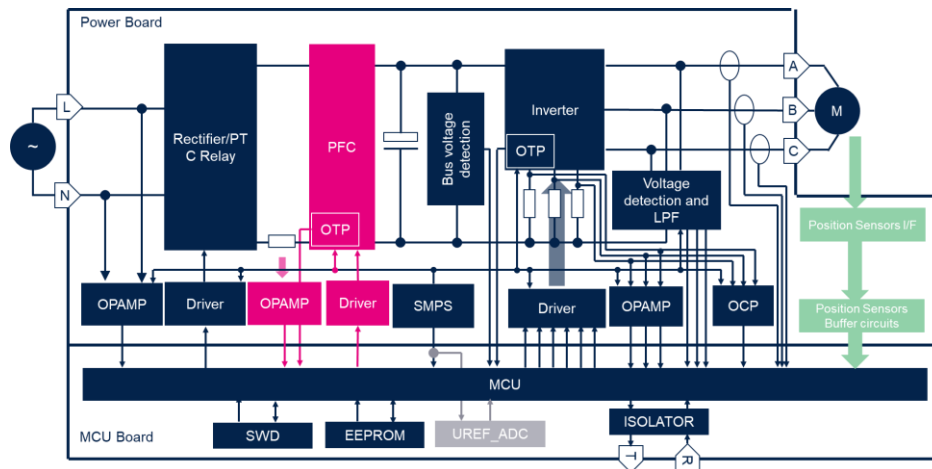


Power Board

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- Input voltage: 110[V]/220[V]
- Input frequency: 50[Hz]/60[Hz]
- Input power: ~2[kW]
- Target motor: single
- PFC(optional)
- Options: Digital Inrush Current Limitation / PTC + Relay
- Motor current detection: DCCT(3)/3-shunt
- HW = Power board(Power) + MCU board(+ SCI->USB TypeC)
- Include position sensors I/F on Power board
- Non isolated power supply
- MCU: STM32G491RC



Tips for using X-CUBE-MCSDK6



An Example to port MCSDK into an STM32 not in the support list

- Target:
 - Porting MCSDK into an STM32 not in the support list
- Steps:
 - Modify power board json file and add a customized power board into power board list
 - Modify motor parameters json file(it can also be done in WB) and add it into motor list
 - Select customer's motor
 - Select customized power board
 - Select control board (MCU on the board should be in the same serials as target MCU)

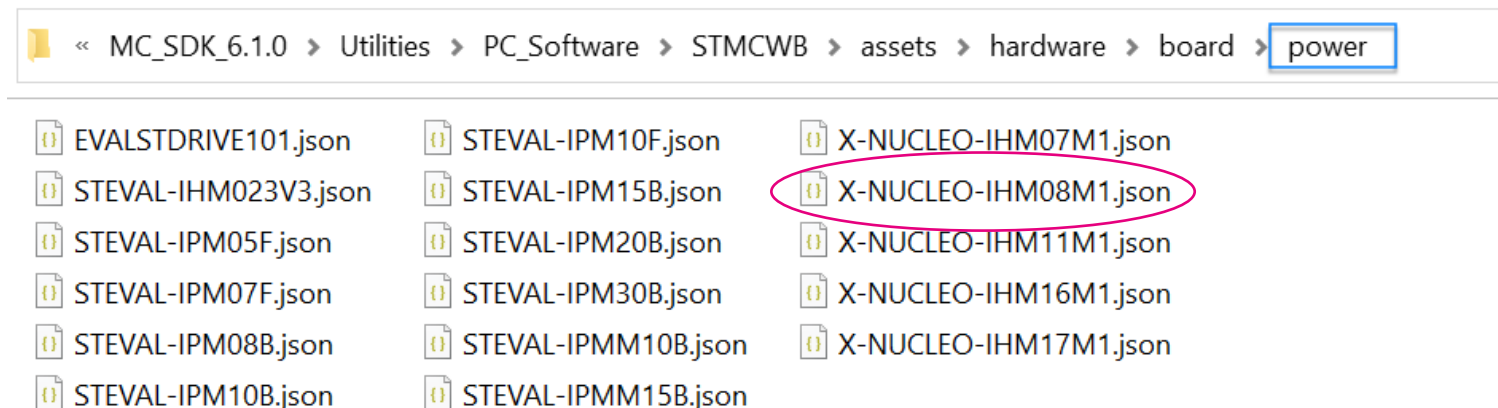
Step1 MCU board selection

- Background:
 - MC Workbench does not support all part numbers of STM32
 - HW options in WB:
 - Modular: the following 3 parts are separated
 - Motor
 - Control
 - Power
 - Pack:
 - P-NUCLEO-IHM... (Including motor, control board and power board)
 - Inverter:
 - Motor
 - Inverter (Including MCU and power electronics components in a PCBA)

Hardware: ☒ Modular
☐ Pack
☐ Inverter

Step 1: Modify power board json file and add a customized power board into power board list

- Open ...\\MC_SDK_6.x.x\\Utilities\\PC_Software\\STMCWB\\assets\\hardware\\board\\power\\X-NUCLEO-IHM08M1.json, save it as “new_power_board.json”.
- Modify pin allocation and peripheral circuits parameters according customer's board.
- Modify “name” to “new_power_board”.
- Save the file.



Add new power board json into power board list

- Open WB, select “Board manager” ->import board

MC Workbench

 life.augmented

Motor Control WorkBench

English

New project

Load Project

Tools

About

Recent Projects:

PNUCLEOIH03_FOC

STM32G431RB

Type: FOC / Three Shunt Resistors

Control: NUCLEO-G431RB

Powers: X-NUCLEO-IHM16M1

Motors: Gimbal GBM2804H-100T

testICL

STM32G431RB

Type: FOC / Three Shunt Resistors

Control: NUCLEO-G431RB

Powers: STEVAL-IHM023V3

Motors: SM-PMSM 320V motor

Motor Profiler

Motor Pilot

Boards Manager

6STEP-P-NUCLEO-IHM03_Senso

STM32G431RB

Type: 6-Step / Voltage Mode

Control: NUCLEO-G431RB

Powers: X-NUCLEO-IHM16M1

Motors: Gimbal GBM2804H-100T

PNUCLEO_IHM02

STM32F302RB

Type: FOC / Three Shunt Resistors

Control: NUCLEO-F302RB

Powers: X-NUCLEO-IHM07M1

Motors: Bull Running BR2804-1700kv

Example Projects:

Project name	MCU	Type	Control	Powers	Motors	Description
ACIM FOC	STM32G431RB	ACIM / FOC	NUCLEO-G431RB	STEVAL-IHM023V3	ACIM SELNI AHV 242 N06	Sensorless Field Oriented Contro...
ACIM V/F Open Loop	STM32G431RB	ACIM / V/F	NUCLEO-G431RB	STEVAL-IHM023V3	ACIM SELNI AHV 242 N06	Open Loop Control of an AC Ind...
FOC STM32H745ZI with IHM08 example	STM32H745ZI	FOC / 3Sh	NUCLEO-H745ZI	X-NUCLEO-IHM08M1	SHINANO	FOC example with control board ...
Electronic speed control on B-G431B-ESC1 kit	STM32G431CB	FOC / 3Sh	B-G431B-ESC1	B-G431B-ESC1	SHINANO	Electronic speed control on B-G4...

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STMC Board Manager

English

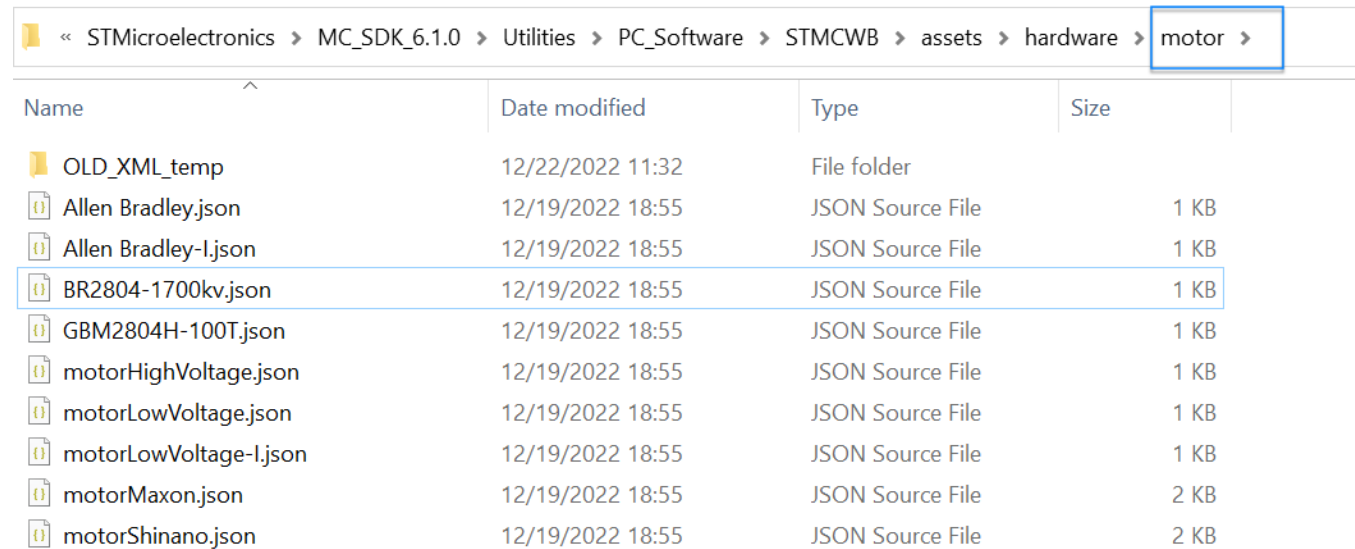
	Min Rated (V)	Max Rated (V)	Rated Current (A)	Rated Power (W)
AL-IPM05F	10	400	3	500
AL-IPM07F	10	400	4.2	700
AL-IPM08B	10	400	4.8	800
AL-IPM10B	10	400	7	1200
AL-IPM10F	10	400	7	1000
AL-IPM15B	10	400	9	1500
AL-IPM20B	10	400	12	2000
☐ STEVAL-IPM30B	10	400	18	2500
☐ STEVAL-IPMM10B	10	400	4.2	1200
☐ STEVAL-IPMM15B	10	400	6	1500
☐ X-NUCLEO-IHM07M1	8	48	2.8	N.A.
☐ X-NUCLEO-IHM08M1	10	48	30	N.A.

Selected: 0 / 19

+

Step 2: Setup motor parameters

- Motor parameters files in:
 - ..\STMicroelectronics\MC_SDK_6.x.x\Utilities\PC_Software\STMCWB\assets\hardware\motor\motor.json



Name	Date modified	Type	Size
 OLD_XML_temp	12/22/2022 11:32	File folder	
 Allen Bradley.json	12/19/2022 18:55	JSON Source File	1 KB
 Allen Bradley-l.json	12/19/2022 18:55	JSON Source File	1 KB
 BR2804-1700kv.json	12/19/2022 18:55	JSON Source File	1 KB
 GBM2804H-100T.json	12/19/2022 18:55	JSON Source File	1 KB
 motorHighVoltage.json	12/19/2022 18:55	JSON Source File	1 KB
 motorLowVoltage.json	12/19/2022 18:55	JSON Source File	1 KB
 motorLowVoltage-l.json	12/19/2022 18:55	JSON Source File	1 KB
 motorMaxon.json	12/19/2022 18:55	JSON Source File	2 KB
 motorShinano.json	12/19/2022 18:55	JSON Source File	2 KB

- Motor parameters can be modified directly from WB either.

Modify motor parameters in json file

- Open an existed motor parameters json file;
- Modify motor parameters;
- Modify **label** to new_motor;
- Save json file to new_motor.json;

« STMicroelectronics » MC_SDK_6.1.0 » Utilities » PC_Software » STMCWB » assets » hardware » motor »				
Name	Date modified	Type	Size	
OLD_XML_temp	12/22/2022 11:32	File folder		
Allen Bradley.json	12/19/2022 18:55	JSON Source File	1 KB	
Allen Bradley-l.json	12/19/2022 18:55	JSON Source File	1 KB	
BR2804-1700kv.json	12/19/2022 18:55	JSON Source File	1 KB	
GBM2804H-100T.json	12/19/2022 18:55	JSON Source File	1 KB	
motorHighVoltage.json	12/19/2022 18:55	JSON Source File	1 KB	
motorLowVoltage.json	12/19/2022 18:55	JSON Source File	1 KB	
motorLowVoltage-l.json	12/19/2022 18:55	JSON Source File	1 KB	
motorMaxon.json	12/19/2022 18:55	JSON Source File	2 KB	
motorShinano.json	12/19/2022 18:55	JSON Source File	2 KB	

```
3      "label": "new_motor",
4      "hardwareFamily": "MOTOR",
5      "description": "Motor low voltage ",
6
7      "compatibility": ["FOC", "sixStep"],
8
9      "polePairs": 2,
10
11      "nominalCurrent": 1.8,
12      "nominalDCVoltage": 24.0,
13      "rs": 0.35,
14      "ls": 0.6,
15      "magneticStructure": {
16          "type": "I-PMSM",
17          "ld_lq_ratio": 0.7
18      },
19
20      "BEmfConstant": 4.0,
```

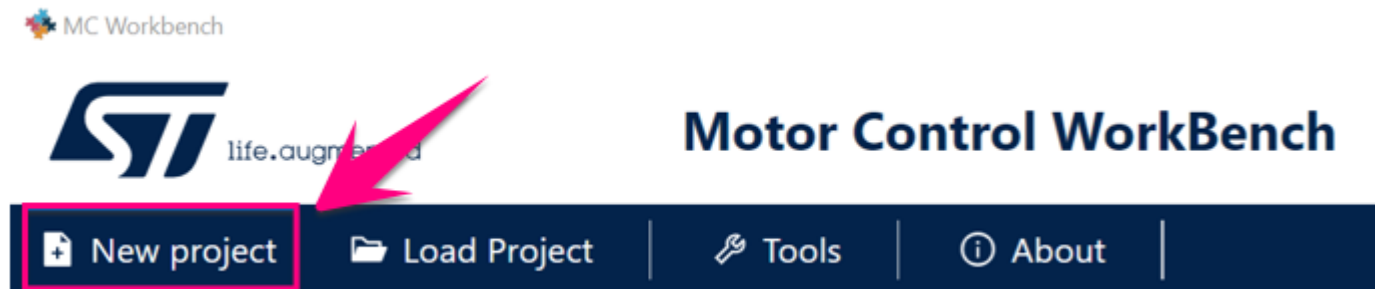
Step 3: Supported MCU by MCSDK6.1.x

- Target MCU: STM32G030Kx **but not in the list**
- Select Nucleo-G071RB as control board

 NUCLEO-F030R8.json	 STM32G474E-EVAL.json
 NUCLEO-F072RB.json	 STM32303E-EVAL.json
 NUCLEO-F302R8.json	
 NUCLEO-F303RE.json	
 NUCLEO-F401RE.json	
 NUCLEO-F446RE.json	
 NUCLEO-F746ZG.json	
 NUCLEO-G071RB.json	
 NUCLEO-G431RB.json	
 NUCLEO-G474RE.json	
 NUCLEO-H745ZI.json	
 NUCLEO-L452RE.json	
 NUCLEO-L476RG.json	
 STM32G081B-EVAL.json	

Step 4: Generate FW

- Create a new project from WB



Select Modular

- Select “Modular” -> Next;

New Project

General Info

Motors

Power

Control

Project Name & Description

Project name:

Description:

Select Motor Control Algorithm & Hardware

Num. Motors:

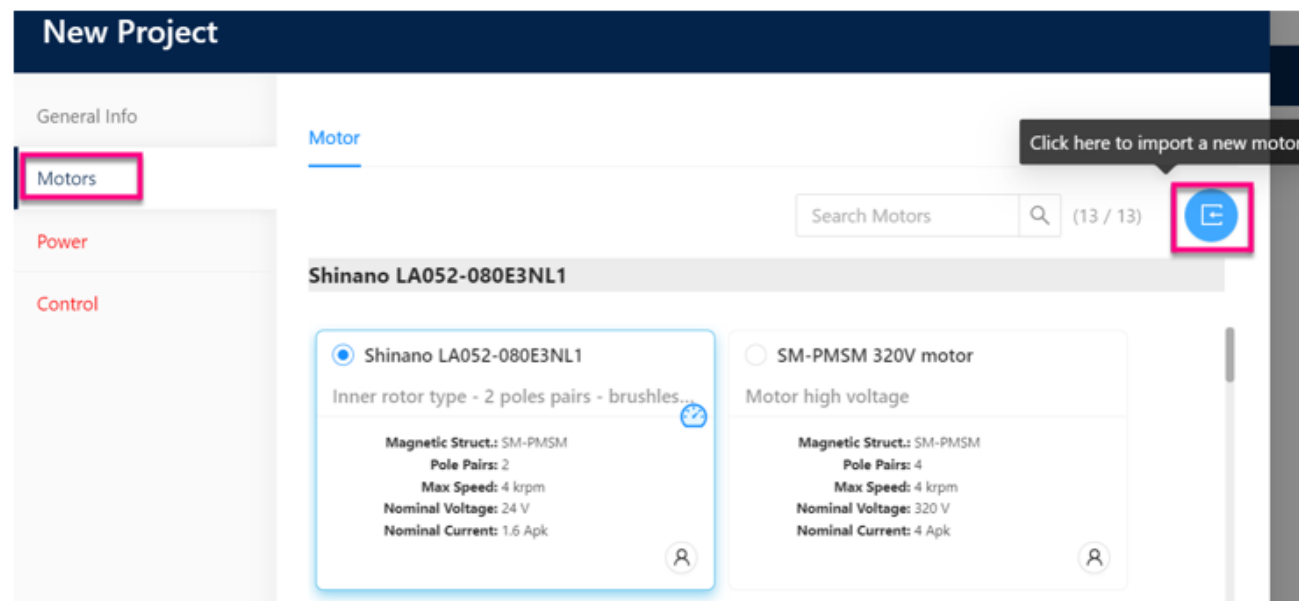
Algorithm: ☒ FOC ☐ 6-Step

Hardware: ☒ Modular ☐ Pack ☐ Inverter

< Prev **Next >** >> OK X Cancel

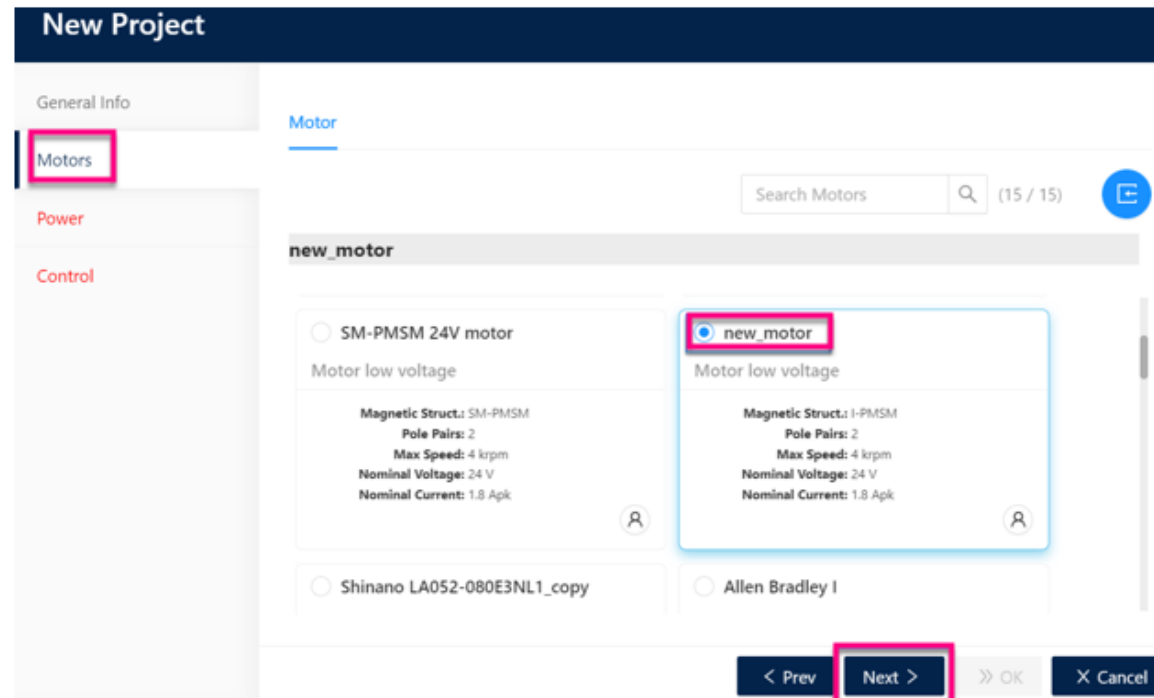
Select modified motor

- 在Motors页面，点击右上角导入图标，导入新修改的用户电机new_motor.json文件，选择new_motor.json文件，点击Next;



Select modified motor

- Select “new_motor” ->Next;



Select new power board

New Project

General Info

Motors

Power

Control

Power

Search Powers

(20 / 20)

new_power_board

☒ new_power_board

Low-Voltage BLDC motor driver expansio...



☐ X-NUCLEO-IHM08M1_change-v7

Low-Voltage BLDC motor driver expansio...



< Prev

Next >

>> OK

✕ Cancel

Select control board

New Project

General Info

Motors

Power

Control

Search Controls

(16 / 16)

NUCLEO-G071RB

☐ NUCLEO-F746ZG
STM32 Nucleo-144 development board ...

MCU: STM32F746ZGTx
Clock Frequency: 216 MHz

☒ NUCLEO-G071RB
STM32 Nucleo-64 development board wi...

MCU: STM32G071RBTx
Clock Frequency: 64 MHz

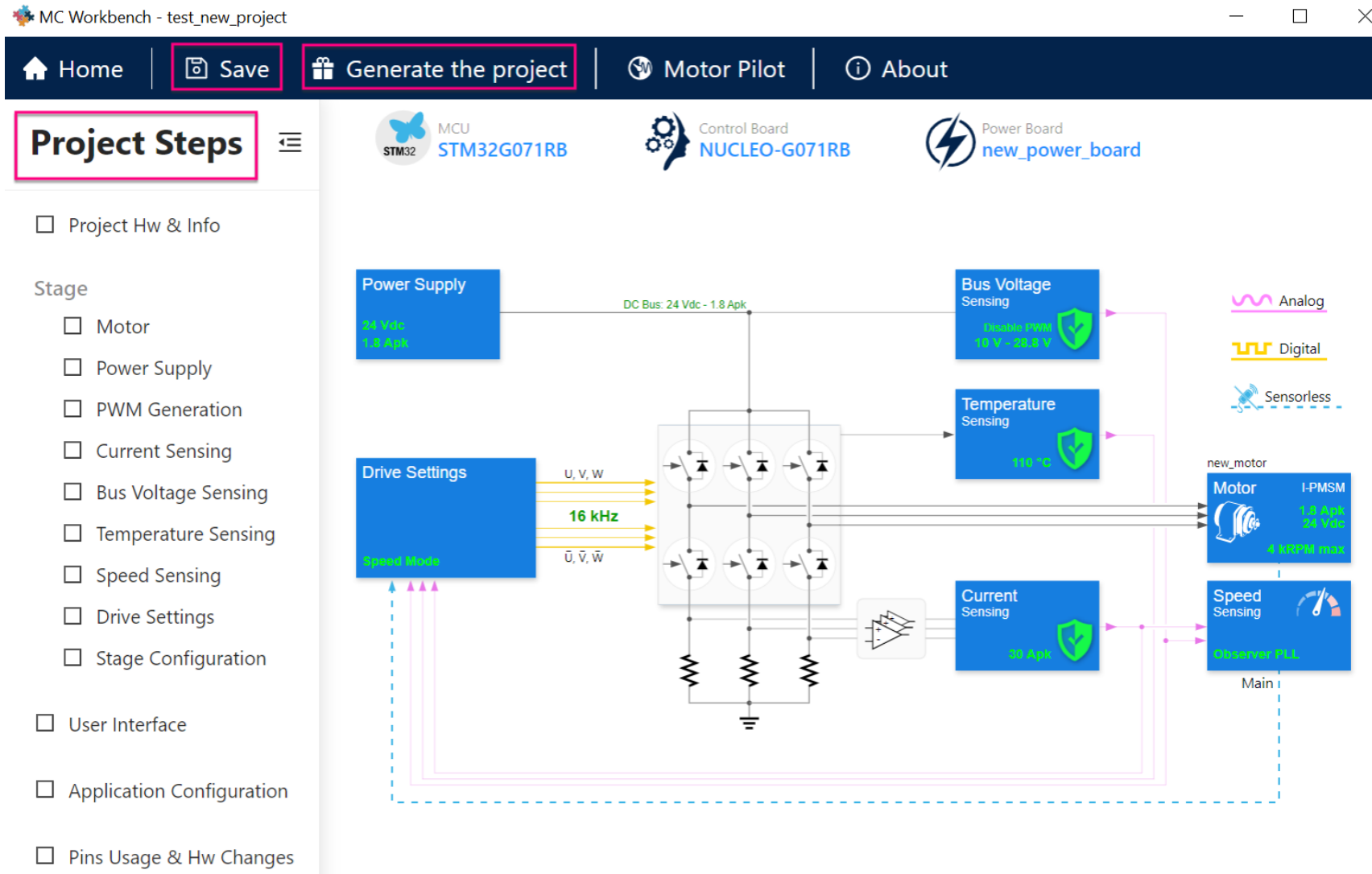
< Prev

Next >

>> OK

✕ Cancel

Save and generate the project



Generate FW project

- Click Continue

Generate Project

 Warning! Hardware changes must be applied to the following signals.
Please, refer to the board diagram for details.

Pin	Signal name
PC4	TEMPERATURE_NTC
PA8	PWM_CHU_H
PA9	PWM_CHV_H
PA10	PWM_CHW_H
PA7	PWM_CHU_L
...	...

Cancel

Continue

Generate FW project

MX

Project generation

SETTINGS

STM32CubeMX

6.7.0

Target Toolchain

ST STM32CubeIDE

Firmware Package Version

STM32 FW V1.6.1 (Recommended)

Selecting "not installed" firmware or "Latest" will require internet connection

Drive Type

☒ HAL - Hardware Abstraction Layer

☐ LL - Low Level

GENERATION

RUN STM32CubeMX

GENERATE


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Open the fold of FW project

MX Project generation



SETTINGS

STM32CubeMX

6.7.0

Target Toolchain

ST STM32CubeIDE

Firmware Package Version

STM32 FW V1.6.1 (Recommended)

Selecting "not installed" firmware or "Latest" will require internet connection

Drive Type



HAL - Hardware Abstraction Layer



LL - Low Level



GENERATION

```
...\\Inc\\pmsm_motor_parameters.h
...\\Inc\\power_stage_parameters.h
...\\Src\\stm32g0xx_mc_it.c
...\\Inc\\mc_parameters.h
...\\Src\\mc_parameters.c
...\\Src\\register_interface.c
...\\Inc\\register_interface.h
...\\Src\\usart_aspep_driver.c
...\\Src\\mc_configuration_registers.c
...\\Inc\\mc_configuration_registers.h
...\\Inc\\aspep.h
...\\Src\\aspep.c
...\\Inc\\mc_app_hooks.h
...\\Src\\mc_app_hooks.c
...\\Src\\stm32g0xx_it.c
...\\Inc\\stm32g0xx_it.h
...\\Src\\stm32g0xx_hal_msp.c
...\\Inc\\stm32g0xx_hal_conf.h
...\\Inc\\main.h
...\\Src\\main.c
```

Completed

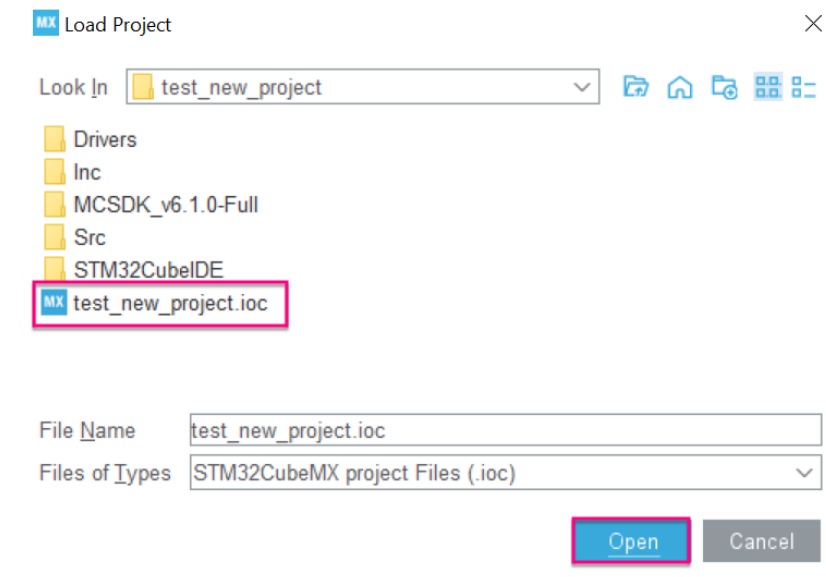
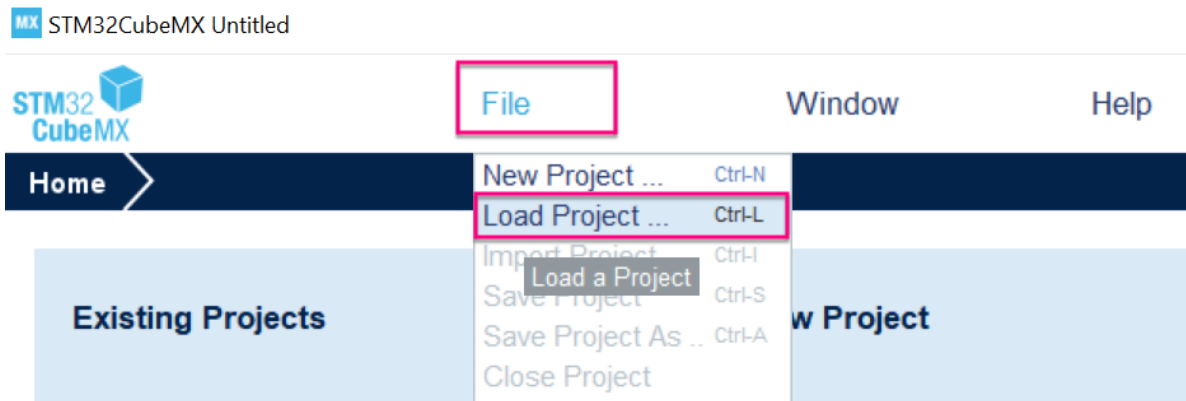
OPEN FOLDER

RUN STM32CubeMX

CLOSE

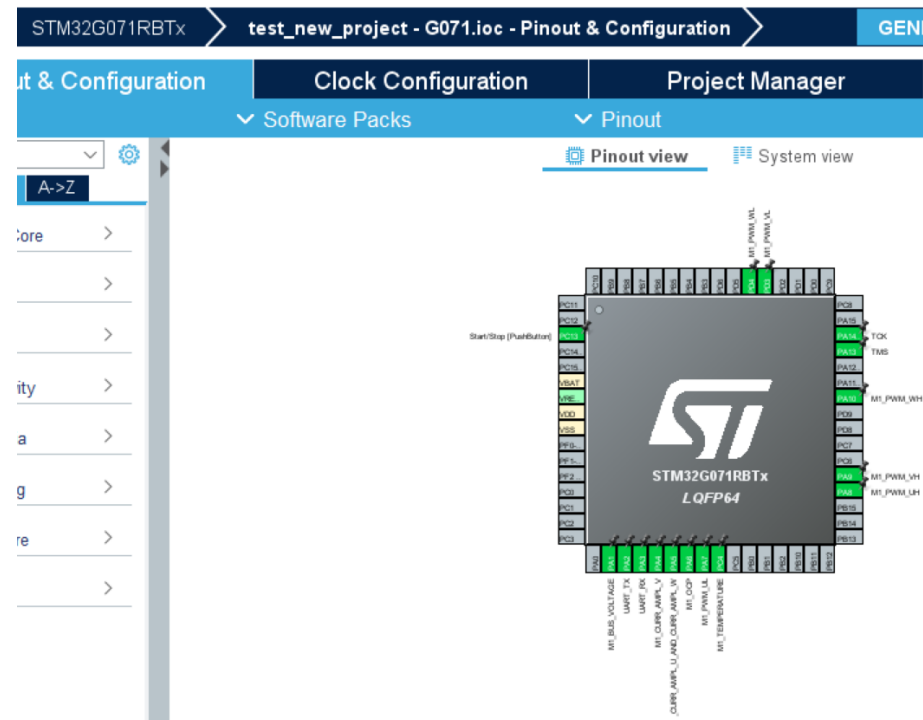
Select target MCU from CubeMX

- Load *.ioc file from CubeMX



Modify MCU part number

- Now MCU is G071

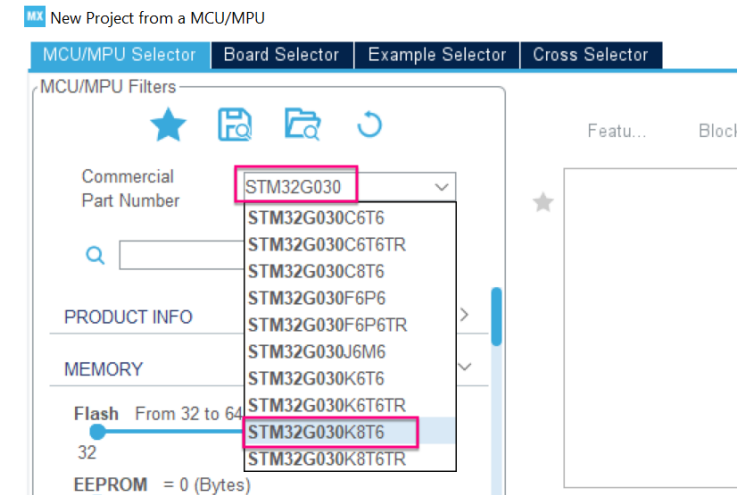
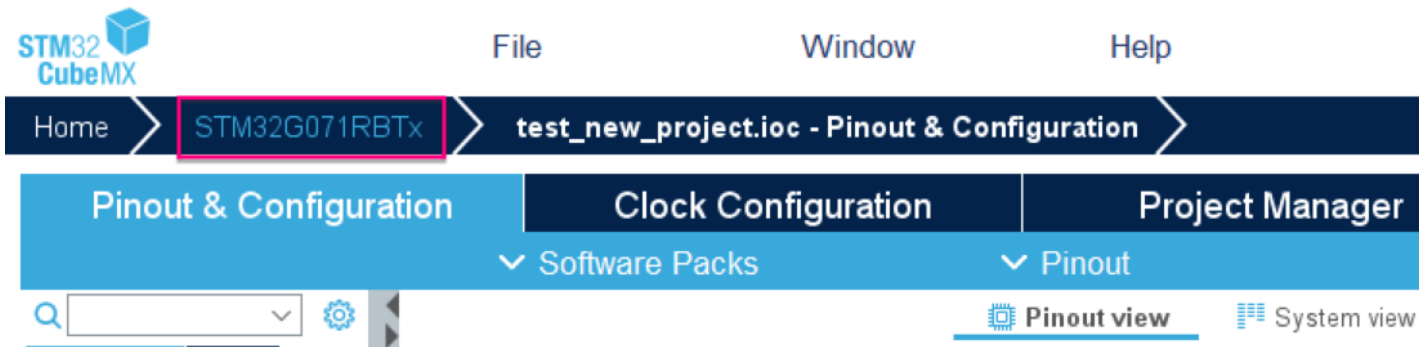


Select MCU

Modify part no. to G030

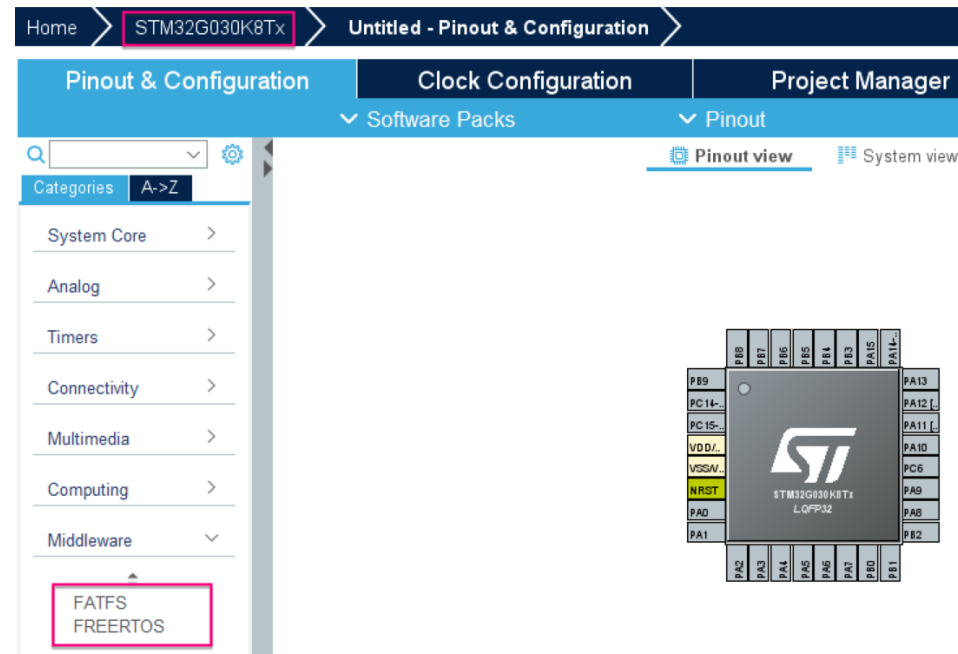
- Modify MCU part number to STM32G030K8T6

STM32CubeMX test_new_project.ioc: STM32G071RBTx



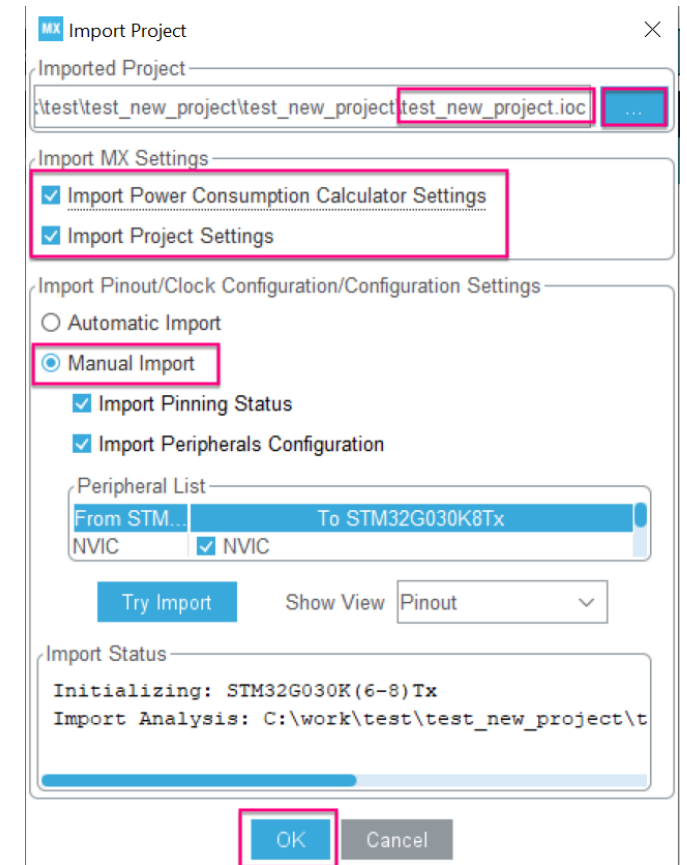
Select MCU

- Then MCU is switched to STM32G030K8T6, but lacking of IO allocation and motor control middleware.



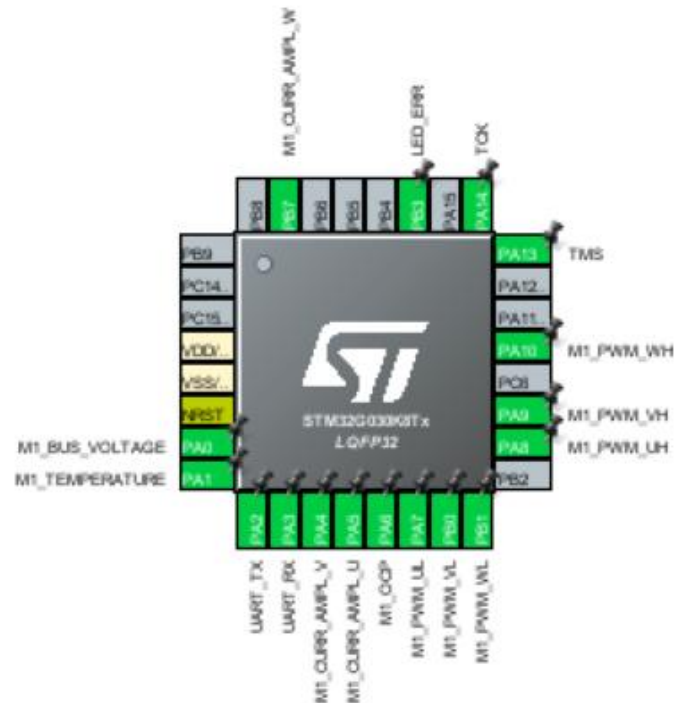
Import an IOC file

- File – Import Project , select test_new_project.ioc



Done to port SDK into a new MCU

- Please check if IO allocation is aligned with schematics



The last step

- Save the ioc (File-Save Project), exit and re-open CubeMX, motor control middleware is loaded. Click GENERATE CODE to generate FW project and codes.





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