Drive your AC Brushless motor easily with RX111
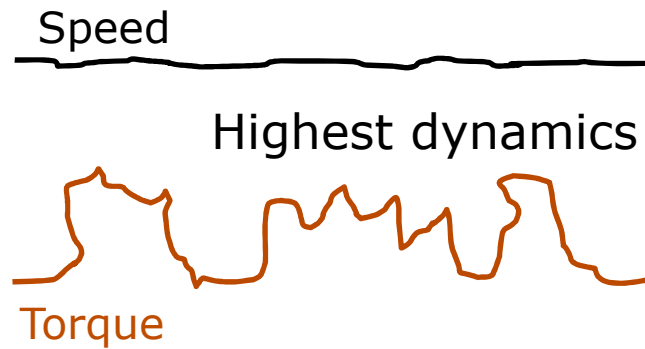
Experiment – Autocalibrate – Integrate.

Renesas Electronics Europe
ICBG
Vincent Mignard
October 2014   Rev. 1.00
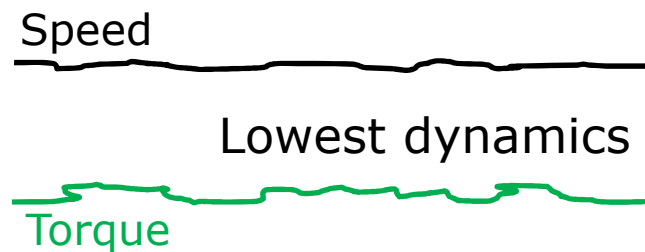
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Which target applications vs. requirements?

Speed

Highest dynamics

Torque

Highest MCU cost
Low CPU load →

Speed

Good dynamics

Torque

Medium MCU cost
Mid CPU load →

Speed

Lowest dynamics

Torque

Lowest MCU cost
High CPU load →

RENESAS

Set of Motor Control solutions for your inverters

RENESAS RX RX600

Highest dynamics

Highest MCU cost
Low CPU load →

RENESAS RX RX200

Good dynamics

RENESAS RX RX100

Medium MCU cost
Mid CPU load →

RENESAS RL78

Lowest dynamics
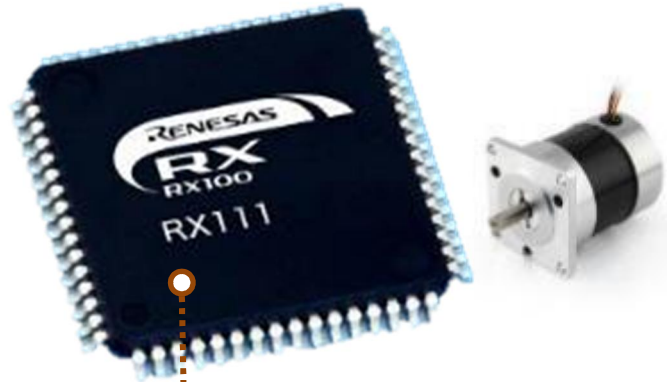
Lowest MCU cost
High CPU load →

RENESAS

Why RX111 is a suitable MCU for inverter?

32-Bit MCU
@ 32MHz
8K Data Flash
1.8 to 3.6 V

FLASH

| 16K | 64K | 128K | 256K | 384K | 512K |

RAM

| 8K | 32K | 64K |

A/D

| 7 ch. | 12 ch. | 14 ch. |

PACKAGE

| 36-pin | 48-pin | 64-pin |

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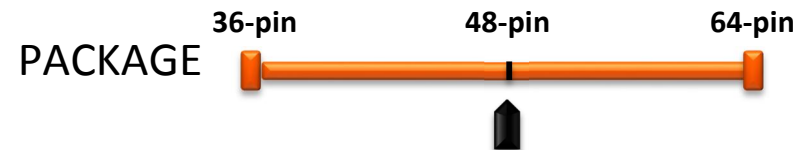
RX111 MCU Benefits ?

50DMIPs with MAC enable complex vector control algorithm implementation

MC timer to drive one 3-phase motor, full h/w support of hall sensors, encoder

12-bit A/D with S/H on-chip for single/three shunts sensorless algorithm

Temperature sensor on-chip enabling accurate monitoring

h/w safety: CAC, POE, CRC, WDT, self-test A/D to comply IEC60730-1

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Which Ref. design did we build for you?

Vector control Algo.

3-phase AC Brushless motors

Auto-tuning Procedure of any PMAC motor
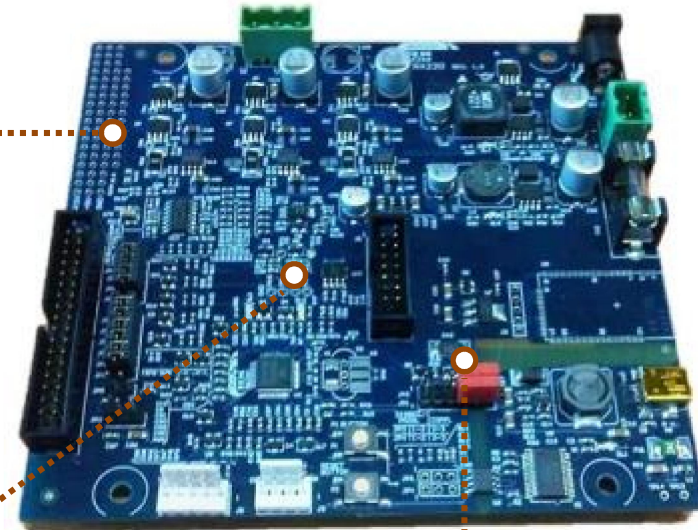
Sensorless control 1 or 3 shunts

MOSFETs inverter

150W @ 24V

USB powered

Prog/debug connector

Ext. stage 1.5KW @ 230V$_{AC}$

Fully isolated

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What's inside the kit?

PC GUI s/w

Schematics, Gerber, BOM
Datasheets, User's Manual
HEW Source code

Quick Start Guide

USB powered

Single PCB inverter
based on RX111 +
AC Brushless motor

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What is doing the embedded software?

Small footprint

Good Dynamics

CPU load below 45% at 8KHz control loop

Max. Control loop: 16KHz

30K 3K

Flash usage | RAM usage

8 | 8

0 —→ 16 | 0 ↑ 16

KHz | KHz

PWM | Control loop

Sensorless Field Oriented Control Algorithm

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Advanced PC GUI to speed-up evaluation

Custom motor calibration
in a few mouse clicks

Alarms status
displayed

Tuning of key parameters:
PI coefficients, start-up, etc.

Real-time torques displayed

Dynamically change PWM frequency
and the control loop frequency

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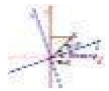# Which benefits do you get from such kit?

Below €200

p/n: YROTATE-IT-RX111

Calibrate & drive any 3-phase Brushless AC/DC motors thanks to the Auto-tuning procedure

Use royalty-free vector control s/w using small flash footprint and minimum CPU resources
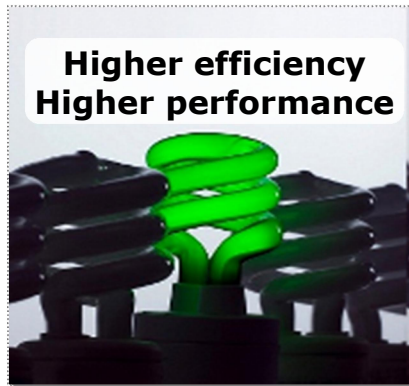
MCU & MOSFETs on-board, 1.5KW / 230V$_{AC}$ external power stage ready to be connected

For less than €200, it contains: Schematics, Gerber, BOM list, datasheets, User's Manual, list of motors tuned using the reference platform

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Feel free to evaluate the RX111 MC kit to reach:

Higher efficiency
Higher performance

Lower cost

Lower dissipation

Low acoustic noise
Low Electrical noise

More safety
More reliability

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