NXP Mobile Robotics

Proof of concept MCX ESC using AM32 opensource software.

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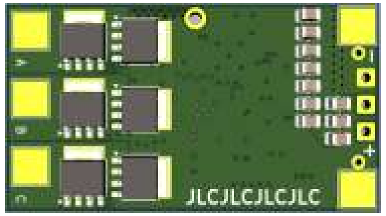
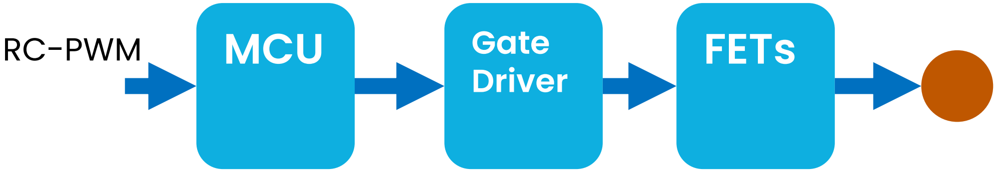
MR-ESC-AM32 *Proof of Concept only*

4X+ per
Drone

Approx BOM
$1.68 MCU
$0.75 Gate Drv
$0.13 opAmp
$**6.40 FETs** 8x$0.80*
$0.18 regulator
$0.18 regulator
$1-2 PCB, passives, connectors
-=-=-
$11.42
**FET selection is cost driver.*

42mmx24mm





Simple
Trapezoidal

MCXA MCU: NXP MCXA153

- Simple **trapezoidal** ESC motor controller with RC-PWM input.
- Form factor for Drones and small devices.
- Copy of AM32 reference hardware to establish NXP Baseline
- Low cost ~$10 target

Justification:
- AM32 is popular opensource ESC software.
- Engage with community
- Include NXP Solution in NXP HoverGames drone EVK
    - Future MR-HGK-RT
- Hooks in place for QDEC where odometry is needed such as ground applications. MR-B3RB-M, MELM.

Specs –approx.:
- 5.5V up to 24V, 6 Cell/6S LiPo battery input voltage
- Onboard PSMN1R4-40 FETs rated 240A
  – note this is not the board rating
- 50A peak drain seems likely
- In-situ current rating TBD, required validation testing, dependent on heatsinking added.

Future potential options:
- Enable QDEC input
- Enable NXP software
- Revise design to use MCXA16x
  (Analog integration lower bom cost)
- Enable NXP FOC as alternative software.
- Add CAN interface
- *Consider advanced version using MCXN with FOC, NPU enable motor analysis, T1 Ethernet interface*

Wiring (DRAFT – for debugging purposes)

Wire the **+ and - input** to the power supply (6V to 24V max). The board **does not have** polarity protection so make sure you have wired the + and - correctly.

Wire **signal pin** (indicated with "S" on board) to the function generator which should generate a PWM signal with Low voltage at 0V and High voltage at 3.3V. PWM signal must have a period of 2.2ms. Motor starts spinning from 50% duty cycle up to 99%.

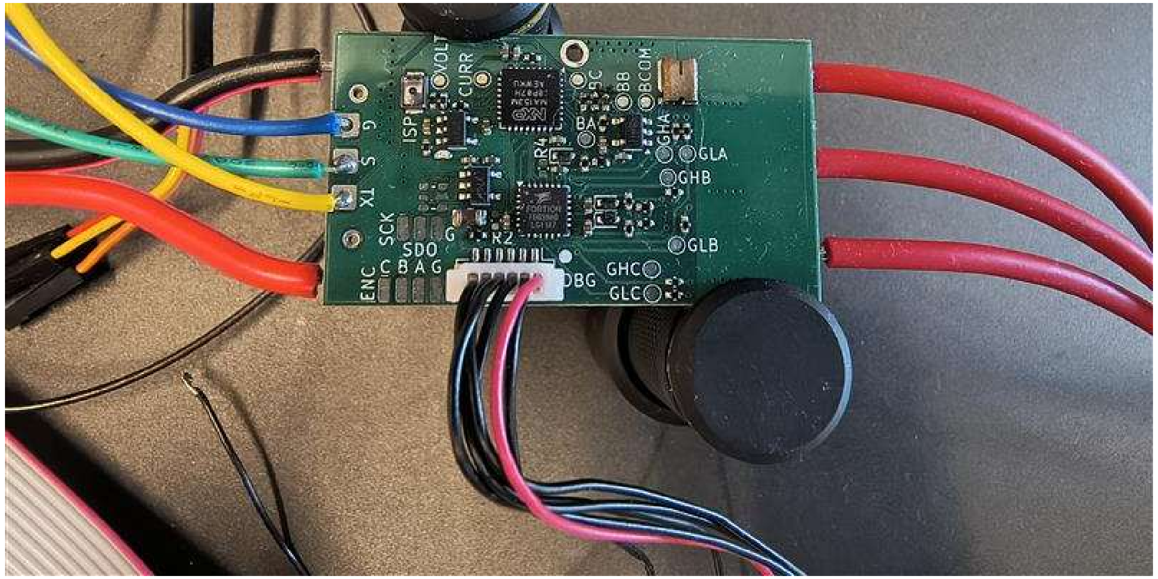
Wire **ground pin** (indicated with "G" on board) to the ground of the function generator.

TX pin may connect to a serial data converter (e.g. FTDI cable). This is not mandatory for the board to work.

Wire **motor phase** outputs (A, B and C) to each motor phase.

Test pads:

- Test pad GHA, GHB and GHC are the high MOSFET gate signals of each corresponding phase.
- Test pad GLA, GLB and GLC are the low MOSFET gate signals of each corresponding phase.
- Test pad BA, BB and BC are the BEMF signals of each corresponding phase.
- Test pad BCOM is the BEMF common signal.
- Test pad VOLT is tied to the voltage sense input of the MCU.
- Test pad CURR is tied to the current sense input of the MCU.



For debug purposes you can optionally use the pads "ENC A" and "ENC C" as GPIO. The "G" pad near the ENC pads is a ground.