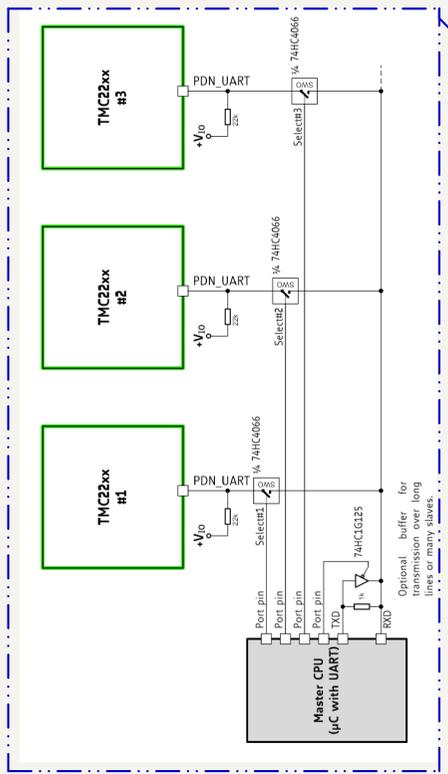


OPTIONS FOR TMC220X DEVICES, ONLY:

MS2	MS1	Microstep Setting
GND	GND	8 microsteps
GND	VCC_IO	2 microsteps (half step)
VCC_IO	GND	4 microsteps (quarter step)
VCC_IO	VCC_IO	16 microsteps

PDN_UART: CONFIGURATION OF STANDSTILL POWER DOWN

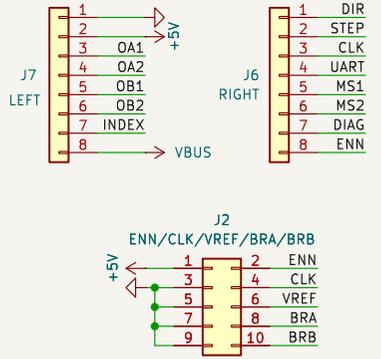
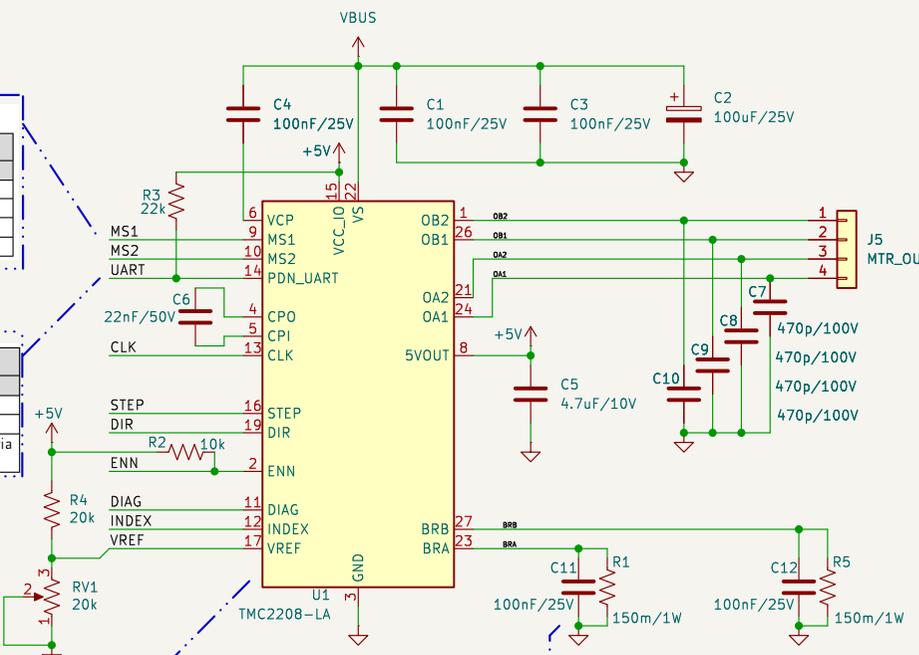
PDN_UART	Current Setting
GND	Enable automatic power down in standstill periods
VCC_IO	Disable
UART interface	When using the UART interface, the configuration pin should be disabled via <code>GCONF.pdn_disable = 1</code> . Program <code>IHOLD</code> as desired for standstill periods.



CHOICE OF R_{SENSE} AND RESULTING MAX. MOTOR CURRENT

R _{SENSE} [Ω]	RMS current [A] VREF=2.5V (or open), IRUN=31, vsense=0 (standard)	Fitting motor type (examples)
1.00	0.22	
0.82	0.27	
0.75	0.29	300mA motor
0.68	0.32	400mA motor
0.50	0.43	
470m	0.46	500mA motor
390m	0.55	600mA motor
330m	0.64	700mA motor
270m	0.77	800mA motor
220m	0.92	1A motor
180m	1.09	1.2A motor
150m	1.28	
120m	1.53*)	
100m	1.77*)	1.5A motor

*) Value exceeds upper current rating, scaling down required, e.g. by reduced VREF.



3.6 Driver Protection and EME Circuitry

Some applications have to cope with ESD events caused by motor operation or external influence. Despite ESD circuitry within the driver chips, ESD events occurring during operation can cause a reset or even a destruction of the motor driver, depending on their energy. Especially plastic housings and belt drive systems tend to cause ESD events of several kV. It is best practice to avoid ESD events by attaching all conductive parts, especially the motors themselves to PCB ground, or to apply electrically conductive plastic parts. In addition, the driver can be protected up to a certain degree against ESD events or live plugging / pulling the motor, which also causes high voltages and high currents into the motor connector terminals. A simple scheme uses capacitors at the driver outputs to reduce the dV/dt caused by ESD events. Larger capacitors will bring more benefit concerning ESD suppression, but cause additional current flow in each chopper cycle, and thus increase driver power dissipation, especially at high supply voltages. The values shown are example values - they may be varied between 100pF and 1nF. The capacitors also dampen high frequency noise injected from digital parts of the application PCB circuitry and thus reduce electromagnetic emission. A more elaborate scheme uses LC filters to de-couple the driver outputs from the motor connector. Varistors in between of the coil terminals eliminate coil overvoltage caused by live plugging. Optionally protect all outputs by a varistor to GND against ESD voltage.

AHAH_TERROR
 Sheet: /
 File: crumbs-tmc2208.kicad_sch
Title: CRUMBS - TMC2208 Breakout Board
 Size: A4 Date: 2024-06-30
 KiCad E.D.A. 9.0.0 Rev: 0.1
 Id: 1/1