

## 12 V Synchronous Boost Converter

The diagram illustrates a 12V Synchronous Boost Converter. The input is labeled +BATT, connected to a network of capacitors C1 (100uF), C2 (22uF), C3 (22uF), and C4 (100nF) to PGND. The input capacitor C<sub>in</sub> is specified as ~10uF with Low ESR. The input inductor L1 is 2uH. The switching MOSFETs are represented by SW and BST, with a 100nF gate capacitor C5. The IC, U1 (TPS61288RQQR), has pins SW, BST, VIN, EN, VCC, PGND, AGND, and COMP. The output filter consists of an inductor L2 (2uH) and a network of capacitors C6 (100nF), C7 (22uF), C8 (22uF), C9 (22uF), C10 (22uF), C11 (100uF), and C12 (22uF) to PGND. The output capacitor C<sub>out</sub> is specified as 10-1000uF with Low ESR. The feedback network includes resistors R1 (82k) and R2 (4k3) connected to the FB pin. The compensation network includes capacitors C13 (2uF), C14 (1nF), C15 (12pF), and resistors R3 (82k) connected to the COMP pin. The output is labeled +12V.

The diagram shows the SPARK MCU (STM32G071KBT6) with the following connections:

- VDD:** Pin 4 is connected to +3V3.
- VSS:** Pin 5 is connected to GND.
- NRST:** Pin 6 is connected to NRST.
- Peripheral Pins:**
  - Pin 15: DRV\_CS
  - Pin 16: PB0
  - Pin 17: PB1
  - Pin 18: PB2
  - Pin 27: LED1
  - Pin 28: PB3
  - Pin 29: LED2
  - Pin 30: PB4
  - Pin 31: FC\_MISO
  - Pin 32: PB6
  - Pin 33: FC\_MOSI
  - Pin 34: PB7
  - Pin 35: FC\_SCK
  - Pin 36: PB8
  - Pin 37: FC\_CS
  - Pin 38: PB9
  - Pin 20: DRV\_EN
  - Pin 21: PC6
  - Pin 22: SW1
  - Pin 23: PC14
  - Pin 24: SW2
  - Pin 25: PC15
- Other Pins:**
  - Pin 7: PA0
  - Pin 8: NTC1
  - Pin 9: PA1
  - Pin 10: NTC2
  - Pin 11: PA2
  - Pin 12: VD1
  - Pin 13: PA3
  - Pin 14: DRV\_FAULT
  - Pin 15: PA4
  - Pin 16: VREF
  - Pin 17: PA5
  - Pin 18: DRV\_SCK
  - Pin 19: PA6
  - Pin 20: DRV\_MISO
  - Pin 21: PA7
  - Pin 22: DRV\_MOSI
  - Pin 23: PA8
  - Pin 24: DRV\_STEP
  - Pin 25: PA9
  - Pin 26: DRV\_DIR
  - Pin 27: PA10
  - Pin 28: DRV\_SLEEP
  - Pin 29: PA9/PA11
  - Pin 30: ME\_SCL
  - Pin 31: PA10/PA12
  - Pin 32: ME\_SDA
  - Pin 33: PA13
  - Pin 34: SWDIO
  - Pin 35: PA14-BOOT0
  - Pin 36: SWCLK
  - Pin 37: PA15
  - Pin 38: RGB

Additional components shown include a 100nF capacitor (C16) connected to +3V3 and GND, and a 10uF capacitor (C17) connected to +3V3 and GND. A switch (SW1) is connected to NRST, with a 100nF capacitor (C18) connected to NRST and GND.

# SENSE

Three circuit diagrams for sense resistor connections:

- Diagram 1:** A 3V3 supply is connected to a sense resistor R4 (10k). The other end of R4 is connected to a thermistor TH1 (NTC1) and a 10k pull-up resistor to GND.
- Diagram 2:** A 3V3 supply is connected to a sense resistor R5 (10k). The other end of R5 is connected to a thermistor TH2 (NTC2) and a 10k pull-up resistor to GND.
- Diagram 3:** A 12V supply is connected to a sense resistor R6 (10k). The other end of R6 is connected to a thermistor VD1 (NTC1) and a 2k2 pull-up resistor to GND.

Backup If DAC ends up not working

Stepper Motor: 17HS24-2104S  
Phase Current: 2.1 A

ALL CAPS LOW ESR

# Peripherals

The diagram illustrates the pin connections for various peripherals on the SM02B-GHS-TB module. Each peripheral is connected to a specific header (J1 through J8) and its pins are configured as follows:

- 3V3 IN:** J1 pin 1 is connected to +3V3, and pin 2 is connected to GND.
- 12V OUT:** J2 pin 1 is connected to +12V, and pin 2 is connected to PGND.
- Stepper OUT:** J3 pins 1, 2, 3, and 4 are connected to AOUT1, AOUT2, BOUT2, and BOUT1, respectively.
- Power IN:** J4 pin 1 is connected to PGND, pin 2 is connected to PGND, pin 3 is connected to PGND, and pin 4 is connected to +BATT.
- SPI:** J5 pins 1, 2, 3, 4, 5, and 6 are connected to +3V3, FC\_CS, FC\_SCK, FC\_MISO, FC\_MOSI, and GND, respectively.
- SWD:** J6 pins 1, 2, 3, and 4 are connected to +3V3, GND, SWDIO, and SWCLK, respectively.
- I2C:** J7 pins 1, 2, 3, and 4 are connected to +3V3, ME\_SCL, ME\_SDA, and GND, respectively.
- Switch:** J8 pins 1, 2, 3, and 4 are connected to +3V3, SW1, SW2, and GND, respectively.

## Mounting Holes

The diagram illustrates four mounting holes, labeled H1, H2, H3, and H4, arranged horizontally. Each hole is represented by a black circle with a white center. Below each hole is a vertical line connecting to a common ground symbol, labeled PGND. The ground symbol consists of three horizontal lines of decreasing width, stacked vertically.