ANET A8 PLUS

× BTT SKR MINI E3 V2.0

Wiring & Interconnect Package

Complete connector-by-connector breakdown of the BigTreeTech SKR Mini E3 V2.0 controller as installed in the Anet A8 Plus, including the BTT TFT35 E3 V3.0.1 display, endstop rewiring, fan architecture, drive configuration, commissioning checklist, and the official BigTreeTech electrical schematic (appendix).

PREPARED FOR

Spark — A8 Plus conversions, both machines

MACHINE POWER

24 V DC single rail (12 V module feeds LEDs & any 12 V fans)

FIRMWARE

Marlin 2.1.2.8 custom build (this package's firmware.bin)

SOURCES

Official BTT schematic, pin map & manual + Marlin 2.1.2.8 source

CONTENTS

HOW TO READ THIS PACKAGE

Pin orders are given exactly as silkscreened on the board. Colour code in every diagram and table: RED = supply positive (PSU voltage), BLACK/INK = ground or return, BLUE = 3.3 V logic signal, GREEN = serial communications. All rewiring is done with the printer switched OFF and unplugged.

REFERENCES

R1 BIGTREETECH SKR Mini E3 V2.0 electrical schematic 2020-03-31, App. A
R2 BIGTREETECH SKR Mini E3 V2.0 official pin diagram (PIN.pdf)
R3 BIGTREETECH SKR Mini E3 V2.0 instruction manual
R4 Marlin 2.1.2.8 source & BOARD_BTT_SKR_MINI_E3_V2_0 pins definition
R5 Marlin official example configs: Anet A8plus / Ender-3 SKR Mini E3 V2.0
R6 BIGTREETECH TFT35 E3 V3.0 documentation (bttwiki.com)

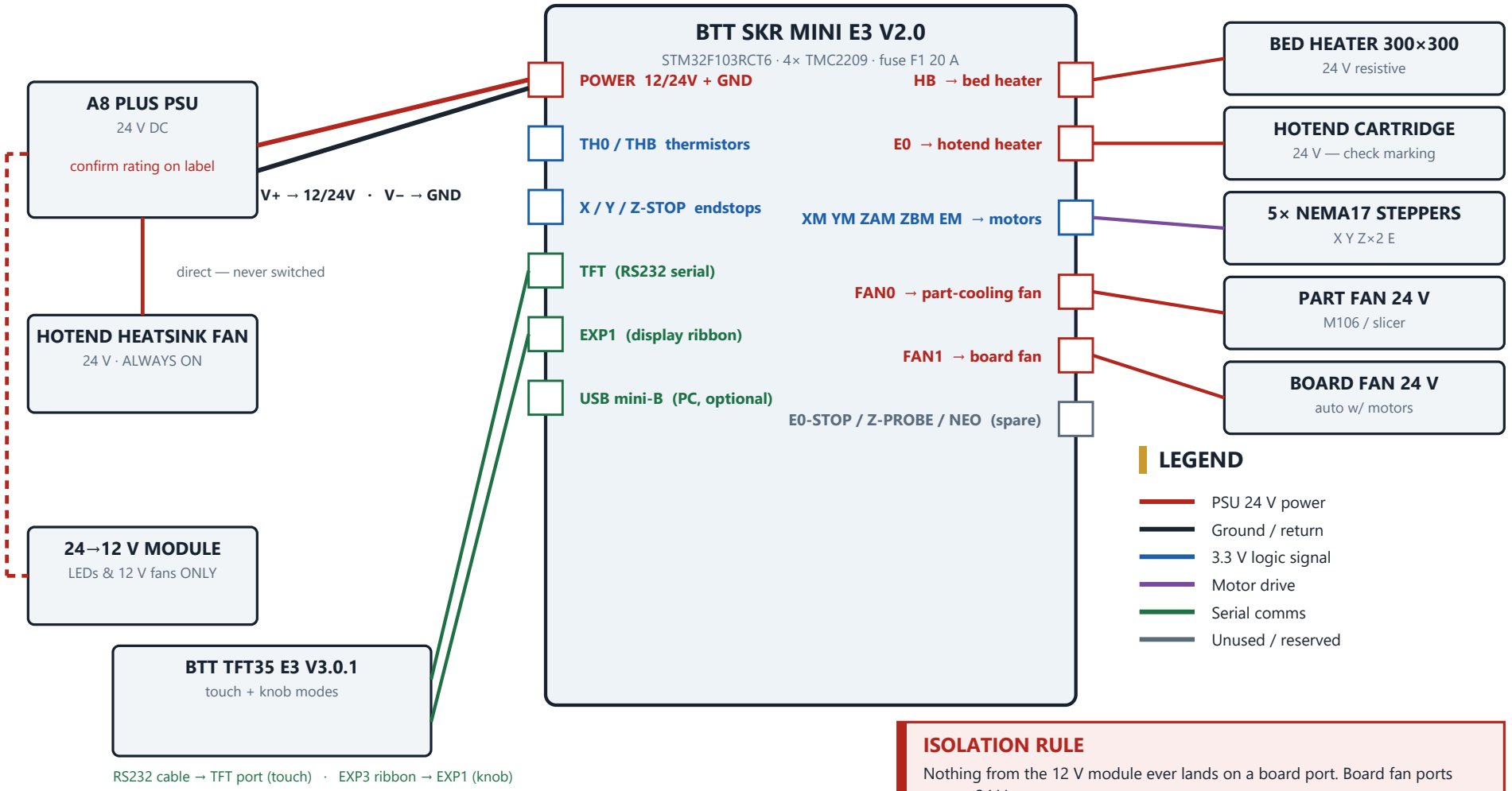
REVISION RECORD

REV	DATE	DESCRIPTION
A	2026-07-09	Initial issue — machine 1 & 2 conversion

SAFETY — READ FIRST

This document covers the DC side only (24 V). Mains wiring into the PSU is not part of this package. Never work on connectors with the printer powered. The endstop and thermistor inputs are 3.3 V logic — applying 5 V or PSU voltage to them damages the MCU.

SYSTEM OVERVIEW — POWER & SIGNAL ARCHITECTURE



ISOLATION RULE

Nothing from the 12 V module ever lands on a board port. Board fan ports output 24 V.

PREPARED BY	TITLE	DOC NO.	REV	DATE	SHEET
HONEYBADGER SOFTWARE	ANET A8 PLUS × BTT SKR MINI E3 V2.0 — WIRING & INTERCONNECT PACKAGE	HB-A8P-SKR-001	A	2026-07-09	3/10

POWER INPUT

POWER (screw terminal)

A8 Plus PSU DC output lands here: V+ to 12/24V, V− to GND. The board accepts 12 or 24 V; this machine is 24 V. Use ferrules or tinned ends, 14–16 AWG, and strain-relief the run. Onboard protection: fuse F1 = 20 A / 32 V on VBB; F2 = 2.5 A on the 5 V rail.

ITEM	RATING	NOTES
Input voltage	12 or 24 V DC	single rail (VBB) — 24 V here*
Main fuse F1	20 A / 32 V	on board, replaceable
Logic fuse F2	2.5 A	5 V DC-DC rail
5 V regulator	MP1584EN	buck converter
3.3 V regulator	AS1117-3.3	MCU + logic

* 24 V per machine owner — confirm on the PSU label before first power-up.

HEATER OUTPUTS

HB — heated bed

E0 — hotend

Both heaters are LOW-SIDE switched: the + terminal sits at PSU voltage whenever the printer is on; the MOSFET switches the − leg. Resistive heaters have no polarity — either wire in either terminal is fine. Bed wiring is high-current: 14–16 AWG, screwed tight, ferrules strongly recommended (loose bed terminals are the #1 melted-connector cause).

OUTPUT	MOSFET	FIRMWARE CONTROL
HB (bed)	WSK220N04	PID, M140/M190
E0 (hotend)	WSF3085	PID, M104/M109

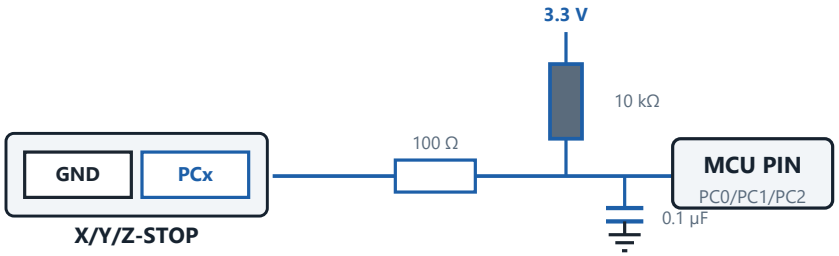
THERMAL SAFETY

Thermal runaway protection is enabled for both heaters in the shipped firmware and must stay on. After wiring, verify both temperatures read ~20–30 °C at room temp BEFORE first heating. A sensor reading 0 °C, a huge number, or ERR means a wrong or open connection — do not heat until fixed.

WHY THE REWIRE

Anet endstop modules carry three wires, but only two belong to the switch. The middle 5 V wire only feeds the module's indicator LED. The SKR endstop ports are two-pin. Land the two SWITCH wires on the port; insulate the 5 V wire — it connects to nothing.

BOARD INPUT CIRCUIT (PER AXIS) — FROM OFFICIAL SCHEMATIC



The board pulls the signal to 3.3 V through 10 kΩ. The Anet switch (normally open) closes SIGNAL to GND when hit — the shipped firmware expects exactly that (ENDSTOP_INVERTING = true). Result at M119: open when idle, TRIGGERED when pressed.

PORT	PIN 1	PIN 2	A8 PLUS WIRE PAIR
X-STOP (J1)	GND	PC0	X switch pair
Y-STOP (J2)	GND	PC1	Y switch pair
Z-STOP (J3)	GND	PC2	Z switch pair

ANET MODULE → SKR PORT

ANET MODULE PIN	FUNCTION	GOES TO
Pin 1 (outer)	GND — switch	X/Y/Z-STOP
Pin 2 (middle)	5 V — LED only	NOWHERE — insulate
Pin 3 (outer)	SIGNAL — switch	X/Y/Z-STOP

Wire order inside the 2-pin plug does not matter — the pair is just a switch. Identify the pair with a continuity beep test while clicking the switch; never trust cable colours. Verify with M119 from the TFT terminal before the first homing move.

THERMISTOR INPUTS

TH0 — hotend

THB — bed

Two-pin, no polarity. Board pullup is 4.7 kΩ to 3.3 V; the shipped firmware uses Marlin sensor type 5 on both, matching the Anet 100 k NTC sensors per the official Marlin A8plus configuration. Thermistor leads are fragile — no tension on the run.

3.3 V LOGIC

Never land the Anet 5 V LED wire on a STOP port and never feed 5 V into a signal pin — the STM32 inputs here are 3.3 V.

MOTOR CONNECTORS (ALL FIVE IDENTICAL)

XM / YM / ZAM / ZBM / EM

Coil A on pins 1A/2A, coil B on pins 1B/2B, exactly as the Anet's 4-wire motor cables expect. ZAM and ZBM are wired in PARALLEL on the board — one Z driver drives both A8 Plus Z motors, one motor per socket. No wiring change needed on any motor.

AXIS	EN	STEP	DIR	SOCKET
X	PB14	PB13	PB12	XM
Y	PB11	PB10	PB2	YM
Z	PB1	PB0	PC5	ZAM + ZBM
E0	PD2	PB3	PB4	EM

DIRECTION CORRECTIONS

A board swap can reverse an axis. Two valid fixes: (1) power OFF, rotate that motor's plug 180°; or (2) a one-line INVERT_*_DIR firmware change — a rebuilt firmware.bin takes minutes, no re-crimping. Prefer the firmware fix if a plug swap means cutting crimps.

TMC2209 DRIVERS — NO VREF POTS

All four drivers are onboard TMC2209s controlled over UART. Motor current is set by FIRMWARE, not by trimpot — there is nothing to adjust with a screwdriver on this board. The shipped build uses StealthChop: motion is near-silent compared to the Anet board. A quiet 'grind' during a missed homing is therefore easy to miss — test endstops first.

AXIS	RMS CURRENT	NOTES
X / Y	580 mA	home at half (290 mA)
Z	580 mA	homes at full current
E0	650 mA	extruder
Mode	StealthChop	UART, firmware-set

SENSORLESS HOMING — NOT USED

The board exposes DIAG jumpers (X/Y/Z/E0-DIAG) for sensorless homing. This conversion keeps the physical Anet endstop switches — leave the DIAG jumper headers EMPTY.

NEVER HOT-PLUG MOTORS

Connecting or disconnecting a stepper with the board powered can destroy its driver instantly. Motors move only with power OFF.

FAN ARCHITECTURE

FAN0 — part cooling

FAN1 — board fan

FAN	BEHAVIOUR (SHIPPED FIRMWARE)
FAN0	Off until commanded: M106 S255 / S0. Slicer-run in prints.
FAN1	100% while any stepper enabled; off 60 s after idle.
Hotend fan	**Not on board — PSU direct, ALWAYS ON, never switched.**

Both ports switch the negative leg; the + pin is live at 24 V whenever the printer is on. Fans DO have polarity — red to the + mark. A fan plugged backwards simply never spins.

24 V PORTS

Fan ports output PSU voltage: 24 V on this machine. A 12 V fan here burns out. 12 V fans/LEDs belong on the separate 12 V module only.

TFT PORT — TOUCH MODE (RS232 CABLE)

TFT (5-pin)

USART2 (PA2/PA3) at 115200 baud — matches the shipped firmware (SERIAL_PORT 2). Use the BTT-supplied cable. If the TFT reports 'no printer attached', set its baud to 115200 in the TFT's own settings menu.

EXP1 — MARLIN (KNOB) MODE RIBBON

ROW	A	B	SIGNALS
1 (top)	PB5	PA15	beeper / encoder
2	TX1	RST	PA9 / reset
3	RX1	PB9	PA10 / LCD
4	PB8	PB15	LCD data
5 (bottom)	GND	+5V	power

Single ribbon from the TFT35's EXP3 header to EXP1. With both cables fitted, press and hold the encoder about 2 s to switch touch mode ↔ Marlin mode (per BTT TFT35 E3 docs). The shipped firmware drives this as a CR10-style 12864 display — both modes work.

DOCUMENTED FOR FUTURE UPGRADES — ALL UNUSED IN THIS BUILD

PORT	PINS (SILKSCREEN ORDER)	PURPOSE	UPGRADE NOTES
E0-STOP (J4)	`PC15 · GND · +5V`	Filament runout sensor input	Any simple switch sensor; enable in firmware
Z-PROBE (J5)	`PC14 · GND · PA1 · +5V · GND`	BLTouch / probe port	PC14 = probe, PA1 = servo; firmware rebuild
PS-ON (J6)	`GND · PC13`	ATX PSU on/off control	For auto power-off setups
PWR-DET (J7)	`PC12 · GND · NC`	Power-loss detection	Pairs with resume-after-outage
NEOPIXEL	`GND · PA8 · +5V`	Addressable RGB output	5 V strips only, short runs
SPI1 / SWD	—	Debug / programming headers	Not needed in normal use
USB mini-B	`PA11 / PA12 (native USB)`	PC link (Pronterface, OctoPrint)	USB-A → MINI-B cable (not USB-C), 115200
microSD	—	Firmware flashing + print files	firmware.bin → FIRMWARE.CUR when flashed

Leave unused ports empty. The DIAG jumper block next to the drivers stays empty too (sheet 6). If a future upgrade lands here (BLTouch, runout sensor, RGB), the firmware needs a matching one-line change and rebuild — the full build environment for this machine is archived with this package.

5 V BUDGET

The 5 V rail is fused at 2.5 A and also feeds the TFT. Keep added 5 V loads (probe, RGB) modest; power hungry LED strips get their own supply.

COMPLETE HOOKUP MAP — A8 PLUS → BOARD

A8 PLUS ITEM	BOARD PORT	NOTE
PSU 24 V output	**POWER**	V+ → 12/24V, V− → GND, ferrules
Bed heater	**HB**	either orientation, 14–16 AWG
Hotend cartridge	**E0**	either orientation
Hotend thermistor	**TH0**	either orientation
Bed thermistor	**THB**	either orientation
X / Y / Z endstop switch pairs	**X/Y/Z-STOP**	2 switch wires only; LED wire insulated
X / Y motors	**XM / YM**	plug straight in
Z motors (left / right)	**ZAM / ZBM**	parallel driver, one each
Extruder motor	**EM**	plug straight in
Part-cooling fan (24 V)	**FAN0**	red → +
Board-cooling fan (24 V)	**FAN1**	optional, runs with motors
Hotend heatsink fan (24 V)	**PSU direct**	ALWAYS ON — never switched
12 V LEDs / 12 V fans	**12 V module**	never on board ports
TFT35 E3 — RS232 cable	**TFT**	touch mode, 115200
TFT35 E3 — EXP3 ribbon	**EXP1**	Marlin knob mode

FIRST POWER-UP — IN THIS ORDER

1. **Cold checks**
   All plugs seated, no stray strands, heater screws tight, LED wire insulated.
2. **Temps sane**
   Power on. Hotend AND bed read ~20–30 °C. Bad reading = stop, fix sensor.
3. **M119 endstops**
   All 'open'; each flips to TRIGGERED held by hand. TFT terminal → M119.
4. **Directions**
   Jog each axis +10 mm from mid-travel: X right, Y bed forward, Z up.
5. **First home**
   G28 with a finger on the power switch. One axis at a time if nervous.
6. **Fans**
   M106 S255 → part fan blasts; M106 S0 stops it. Jog an axis → FAN1 spins.
7. **Heat test**
   M104 S200: steady climb, no jumps. Heatsink fan already running (hardwired).
8. **PID tune**
   M303 E0 C8 S200 U1, then M303 E-1 C8 S60 U1, then M500 to save (U1 applies the result).
9. **First print**
   Small test cube. Watch the first layers with part fan behaviour.

SHIPPED FIRMWARE.BIN — MARLIN 2.1.2.8

SETTING	VALUE
Motherboard	`BOARD_BTT_SKR_MINI_E3_V2_0`
Machine name	Anet A8 Plus
Drivers	TMC2209 UART × 4
Thermistors (both)	type 5 — 100k / 4.7k pullup
Endstops	X/Y/Z MIN, inverting true
Bed size	300 × 300 mm
Travel	X −26→300, Y −6→297, Z 0→370
Steps/mm	80 / 80 / 400 / 95
Serial	TFT port + USB, 115200
Display	CR10_STOCKDISPLAY via EXP1
Safety	thermal runaway ON, both heaters

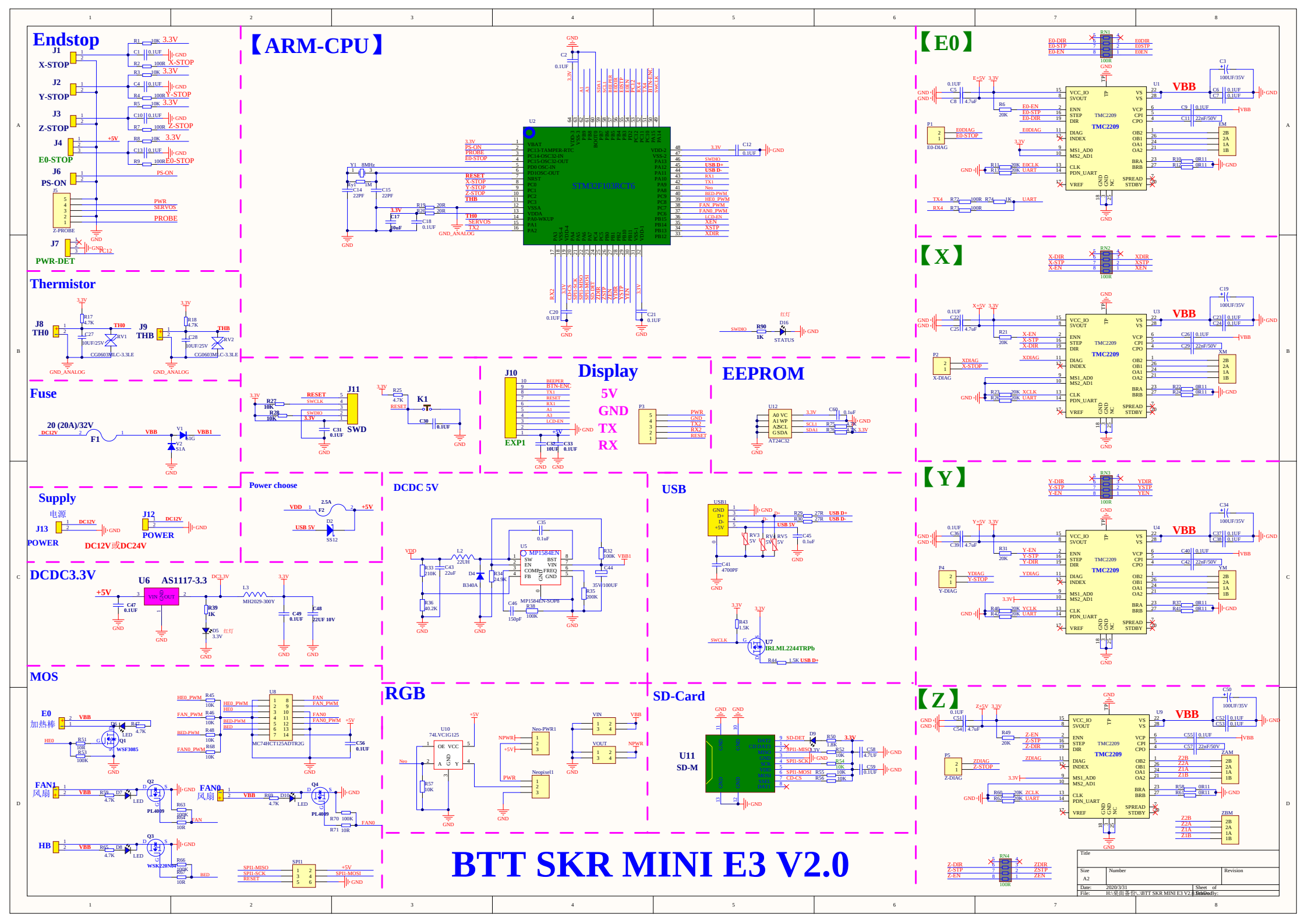
WHERE EVERYTHING LIVES

Download page: honeybadger.software/downloads — 'Anet A8 Plus firmware for SKR Mini E3 V2' card. The zip carries firmware.bin, the exact Configuration.h / Configuration_adv.h it was built from, and the flash guide. Flashing: firmware.bin on the board's microSD, power-cycle, ~30 s; the file renaming to FIRMWARE.CUR confirms it.

CHANGE POLICY

Direction flips, fan-role changes (e.g. FAN1 as an auto hotend fan), BLTouch, runout sensor, or a build for a different frame are one-line config changes — rebuilt and republished in minutes. Machine 2 is the same model: the SAME firmware.bin applies, but run the full sheet-9 checklist on it independently.

END OF AUTHORED SHEETS — OFFICIAL BTT SCHEMATIC FOLLOWS AS APPENDIX A


Endstop
X-STOP
Y-STOP
Z-STOP
E0-STOP
PS-ON
PWR-DET
Z-PROBE
【ARM-CPU】
STM32F103RCT6
Thermistor
TH0
THB
Fuse
F1
20 (20A)/32V
Display
5V
GND
TX
RX
EXP1
EEPROM
AT24C32
【E0】
【X】
【Y】
【Z】
TMC2209
VBB
Supply
电源
POWER
DC12V或DC24V
Power choose
DCDC 5V
MP1584EN
USB
DCDC3.3V
AS1117-3.3
MOS
WSF3085
PL4099
WSK220N04
RGB
SD-Card
SD-M
BTT SKR MINI E3 V2.0