

Control Panel: Scaffold — Functionality Overview

Control Panel Scaffold V2.3

Rev 0.0

Companion: Control Panel Functionality Overview

Caleb Taylor | 2026-07-11

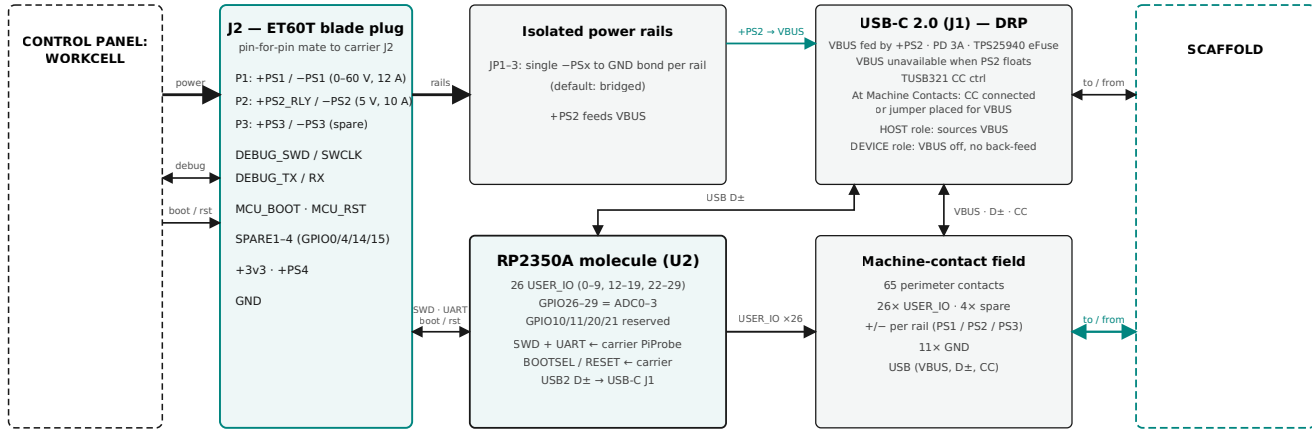
FUNCTIONS

Carrier dock (J2)	Samtec ET60T: x4 power blades, SWD/UART debug, MCU_BOOT/MCU_RST, 4 spare (GPIO 0,4,14,15), +3v3/+PS4.
User MCU	RP2350A molecule — 26 user GPIO exposed (USER_IO.0—9, 12—19, 22—29; GPIO10/11/20/21 reserved), GPIO26—29 ADC-capable.
Breakout field	65 perimeter machine contacts: 26 USER_IO, rails (+/- per PSx), 11 GND, 4 spares, USB.
User USB-C	PD 3.0A. USB 2.0 to RP2350. Role-aware VBUS: host role sources PS2; client role blocks back-feed. PD determined by CC: For Machine Contact PD at VBUS, connect CC contact or place CC Jumper.
USB role	Dual-role (DRD) — TUSB321 PORT pin floating. As host : CC ID pulls low → Q1 turns on → the board sources VBUS (PS2 → eFuse → P-FET). As device (plugged into a PC for UF2/CDC): ID is hi-Z → VBUS sourcing off, and the eFuse blocks the external host from back-feeding PS2.
Ground bonds	JP1/JP2/JP3 bond -PS1/2/3 → GND (bridged by default) — the single galvanic bond per rail for the whole stack; remove to float a rail.
Programming	Flashed/debugged by the carrier's PiProbe over the dock (SWD + UART); BOOTSEL/reset driven by the carrier; UF2 via user USB-C also available.

BLOCK DIAGRAM

Control Panel: Scaffold — Block Diagram

Scaffold V2.3 · Rev 0.0



-PS1/2/3 isolated through Workcell Control Panel, GND jumpers live on Scaffold Control Panel (JP1-3)

RP2350 PIN TREE

Molecule pads → nets, from the routed PCB netlist. Full numbered contact map: Scaffold_Pinout_Map.

RP2350A molecule (U2) — 48 pads

1	+3V3	+3v3	27	GPIO17	USER_IO.17
3	GPIO0	USER_IO.0	28	GPIO18	USER_IO.18
4	GPIO1	USER_IO.1	29	GPIO19	USER_IO.19
6	GPIO2	USER_IO.2	31	Rx1	DEBUG_RX
7	GPIO3	USER_IO.3	32	Tx1	DEBUG_TX
8	GPIO4	USER_IO.4	33	GPIO22	USER_IO.22
9	GPIO5	USER_IO.5	34	GPIO23	USER_IO.23
11	GPIO6	USER_IO.6	36	GPIO24	USER_IO.24
12	GPIO7	USER_IO.7	37	GPIO25	USER_IO.25
14	GPIO8	USER_IO.8	38	GPIO26_ADC0	USER_IO.26
15	GPIO9	USER_IO.9	39	GPIO27_ADC1	USER_IO.27
16	GPIO12	USER_IO.12	41	+3V3	+3v3
19	GPIO13	USER_IO.13	42	GPIO28_ADC2	USER_IO.28
20	GPIO14	USER_IO.14	43	GPIO29_ADC3	USER_IO.29
21	GPIO15	USER_IO.15	44	USB_D-	MCU_USB2_D-
23	SWCLK	DEBUG_SWCLK	45	USB_D+	MCU_USB2_D+
24	SWD	DEBUG_SWD	47	BOOT	MCU_BOOT
26	GPIO16	USER_IO.16	48	RST	MCU_RST

Ground — 12 pads · Reserved by molecule — GPIO10/11/20/21 (not exposed)