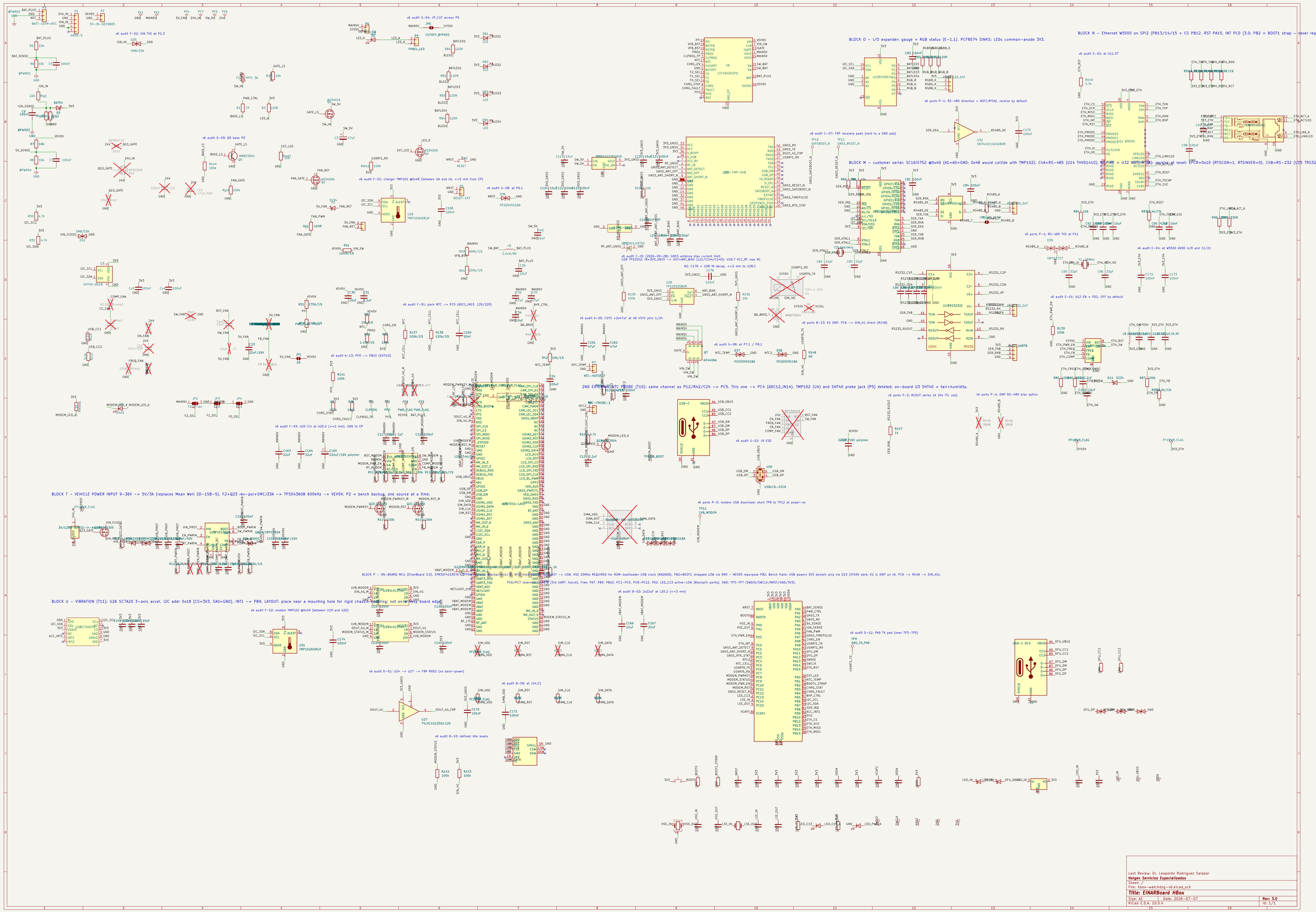
BLOCK T — VEHICLE POWER INPUT 9–36V -> 5V/3A (replaces Mean Well SD-15B-5). F2+Q23 rev-pol+SMCJ33A -> TPS54360B 600kHz -> VEH5V. P2 = bench backup, one source at a time.
BLOCK U — VIBRATION (T11): U26 SC7A20 3-axis accel, I2C addr 0x18 (CS=3V3, SA0=GND), INT1 → PB9. LAYOUT: place near a mounting hole for rigid chassis coupling; not on the key board edge.
BLOCK O — I/O expander: gauge + RGB status (E-1.1). PCF8574 SINKS: LEDs common-anode 3V3.
BLOCK N — Ethernet W5500 on SPI2 (PB13/14/15 + CS PB12, RST PA15, INT PC0 (3.0: PB2 = BOOT1 strap — never repr
BLOCK M — customer serial: SC16IS752 @0x4D (A1=A0=GND; 0x48 would collide with TMP102). ChA=RS-485 (U14 THVD1410), ChB=RS-232 (U15 TRS32
BLOCK P — ON-BOARD MCU (EinarBoard 3.0). STM32F411RETB. LQFP64 (Blackpill). PA11/PA12 reserved for USB. HSE 25MHz REQUIRED for ROM-bootloader USB clock (AN2606). PB2=BOOT1 strapped LOW via R99 — NEVER repurpose PB2. Bench flash: USB powers 3V3 domain only via D13 (5V5V dark; K1 is DNP on v6. PC6 -> R148 -> DIN_4G.
PC6/PC7 reserved (3rd UART, future). Free: PA7, PB9, PB10, PC1–PC5, PC8–PC12, PD2. LED_C13 active-LOW (Blackpill parity). SWD: TP3–TP7 (SWDIO/SWCLK/NRST/GND/3V3).
v6 audit B-02: 2x22uf at L20.2 (<=3 mm)
v6 audit B-09: at J14.C1
v6 audit B-10: defined idle levels
v6 audit D-01: U24 -> U27 -> F9P RXD2 (no back-power)
v6 audit F-52: modem TMP102 @0x49 (between U19 and U20)
v6 ports P-1: RS-485 TVS at P11
v6 ports P-2: R10UT series 1k (Nk TTL use)
v6 ports P-4: DNP RS-485 bias option
v6 ports P-5: modem USB download: short TP8 to TP12 at power-on
v6 audit B-12: PA9 TX pad (near TP3-TP5)
v6 audit E-01: U12 EN = PD2, OFF by default
v6 audit E-04: at W5500 AVDD 4/8 and 11/21
v6 audit E-02: at U11.37
v6 ports P-1: RS-485 direction = NOT(~RTSA). receive by default
v6 audit C-07: F9P recovery pads (next to a GND pad)
v6 audit C-01 (2026-09-28): GNSS antenna bias current limit
U28 TPS2552: IN=3V3_GNSS -> OUT=ANT_BIAS (L21/C144/C145): U18.7 VCC_RF now NC
N2: C176 = U28 IN decap. <=2 mm to U28.1
v6 audit A-05: CSYS +2x47uf at U6 VSYS pins 1/24
v6 audit G-08: at P7.1 / PB.1
v6 audit G-02: J9 ESD
v6 audit F-03: U20 Cin at U20.2 (<=2 mm). GND to EP
v6 audit A-13: PFO -> PB10 (EXTI10)
v6 audit F-51: pack NTC -> PC5 (ADC1_IN15, 120/220)
v6 audit F-51: charger TMP102 @0x48 (between U6 and L6, <=5 mm from EP)
v6 audit D-09: Q5 base PD
v6 audit G-04: JP_CUT across P5
v6 audit G-08: at P6.1
v6 audit F-02: IGN TVS at P1.3
2ND EXTERNAL NTC PROBE (T10): same channel as P12/R42/C24 -> PC5. This one -> PC4 (ADC12_IN14). TMP102 (U4) and SHT40 probe jack (P5) deleted: on-board U3 SHT40 = tair+humidity.
BAT_PLUS
VEH5V
3V3
5V_FAN
GND
U29 TMP102AIDRLR
U31 TMP102AIDRLR
U26 SC7A20TR
U27 74LVC1G125GV,125
U24 74LVC4245A
U30 USBLC6-2SC6
USB-C
USB-C DFU
SHT40-AD1B
U3 SHT40
U13 PCF8574
U6 LTC4040EUFD
U2 F9P-04B
U11 W5500
U12 SC16IS752
U14 THVD1410
U15 TRS3232E
U16 TPS54360B
U18 TPS2552
U19 TMP102
U20 TPS54360B
U21 TMP102
U22 TMP102
U23 TMP102
U24 74LVC4245A
U25 TMP102
U26 SC7A20
U27 74LVC1G125
U28 TPS2552
U29 TMP102
U30 USBLC6-2SC6
U31 TMP102
U32 SN74LVC1G04DBVR
U33 AO3400A
U34 AO3401A
U35 AO3400A
U36 AO3400A
U37 AO3400A
U38 AO3400A
U39 AO3400A
U40 AO3400A
U41 AO3400A
U42 AO3400A
U43 AO3400A
U44 AO3400A
U45 AO3400A
U46 AO3400A
U47 AO3400A
U48 AO3400A
U49 AO3400A
U50 AO3400A
U51 AO3400A
U52 AO3400A
U53 AO3400A
U54 AO3400A