

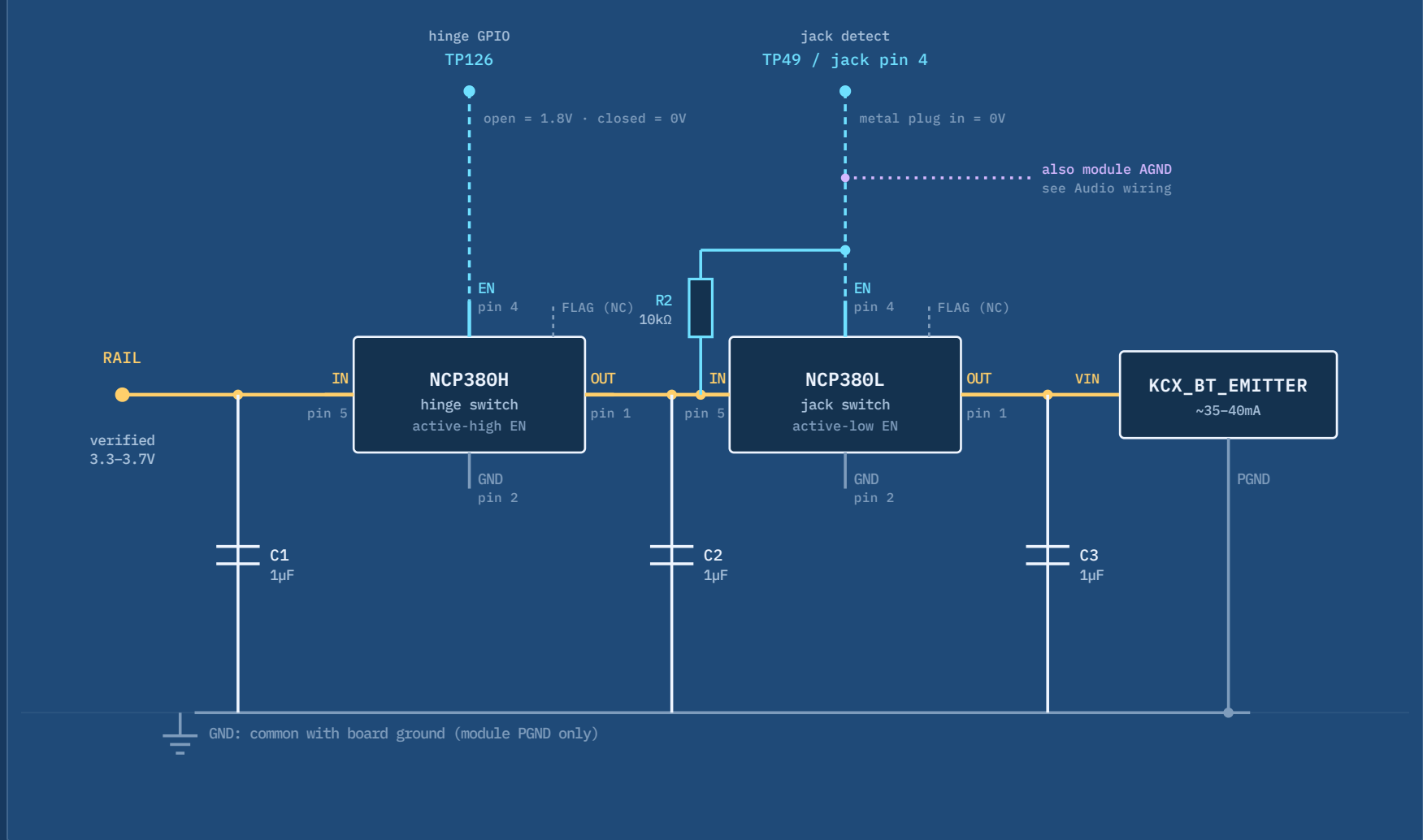
3DS Bluetooth Power Gate

Gates power to the KCX_BT_EMITTER Bluetooth module so it only runs while the headphone jack is plugged in *and* the clamshell is open. Two cascaded load switches, no discrete transistors. Rev C added the audio wiring that fixed static and muffled sound during the build. Rev D notes that the plug used to switch on Bluetooth must be metal.

WHAT CHANGED IN REV C AND D

- Rev D: use a metal plug to turn on Bluetooth.** The jack only registers a plug when the plug's metal barrel bridges the detect contact (pin 4) to ground. A plastic dummy plug of the same size pushes the contacts into place but doesn't conduct, so the module stays off or loses its audio ground. Any metal 3.5mm plug works: a bare 3-pole TRS plug with no cable or a metal dust plug.
- Module AGND goes to jack pin 4, not pin 1.** Pin 1 was listed as audio ground but gave static. Pin 4 (insert detect) sits at 0V whenever a metal plug is in, and using it made the static disappear.
- AGND and PGND on the module stay separate.** They were already separate when the static was present, so this is not the fix, but don't bridge them.
- The two stock inline caps on the module's L and R inputs are removed.** That cured the muffled sound.
- Three checks at the end** confirm the jack still switches the module, a metal plug turns it on, and the uncapped inputs don't clip.

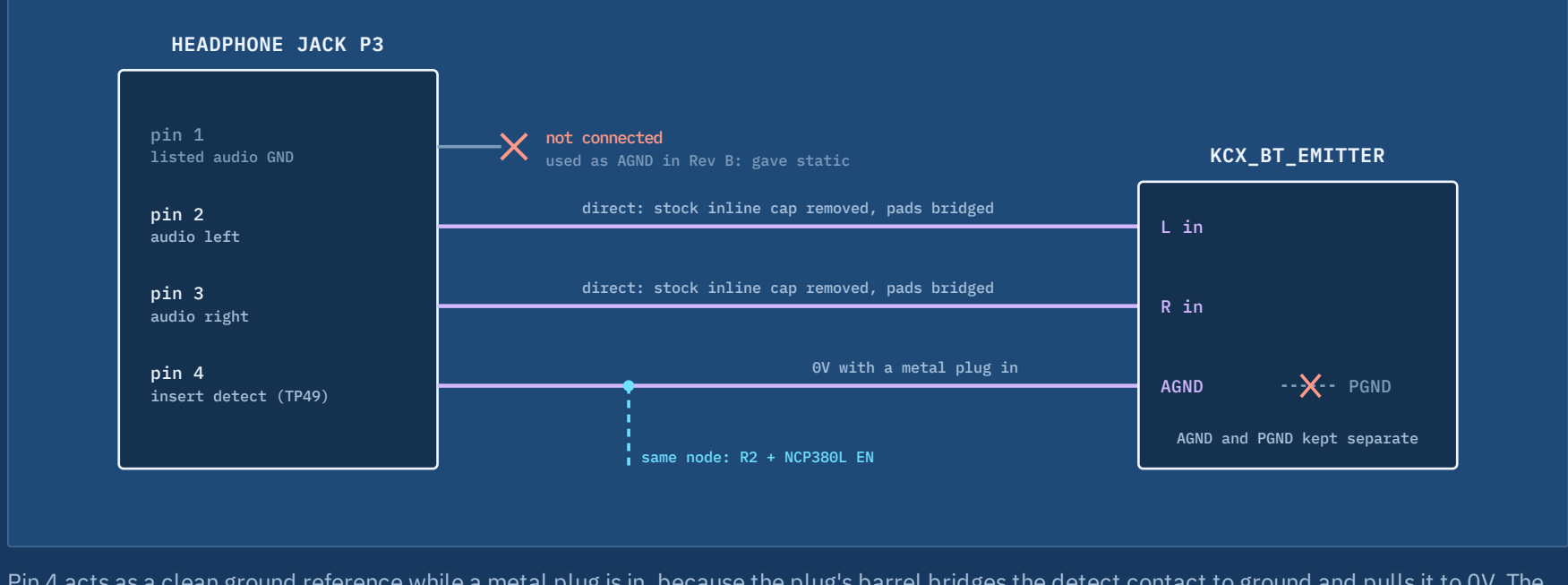
01 POWER CIRCUIT



Power reaches the Bluetooth module only when both series switches conduct. NCP380H closes when the clamshell is open (TP126), and NCP380L closes when the jack is plugged in (TP49). That's an AND in hardware with no logic gate.

— power path --- control signal — audio — ground

02 AUDIO WIRING



Pin 4 acts as a clean ground reference while a metal plug is in, because the plug's barrel bridges the detect contact to ground and pulls it to 0V. The module only runs while a plug is in, so that's the only time the reference matters. A plastic plug doesn't conduct, so it leaves pin 4 floating.

Why pin 1 caused static isn't confirmed yet. The likely reason is that it isn't a direct ground. It may reach ground through a ferrite bead or resistor, or it may be the headphone amp's sense or virtual-ground line. Either way, the module was measuring audio against a reference that moved. To confirm it, with the 3DS off and a plug in, measure resistance from pin 1 and pin 4 to board ground (pin 4 should read about 0Ω). Then, with the 3DS on and silent, measure DC volts from pin 1 to ground. A few ohms or any voltage on pin 1 means it isn't a true ground.

03 NODE REFERENCE

NODE	CONNECTS TO	CARRIES	NOTES
Rail	NCP380H pin 5 (IN), via C1	power	already verified 3.3–3.7V
TP126	NCP380H pin 4 (EN), direct	signal	1.8V open / 0V closed, no bias resistor needed
NCP380H OUT	NCP380L pin 5 (IN), via C2	power	also feeds R2's top
TP49 / jack pin 4	NCP380L pin 4 (EN), R2, module AGND	signal audio ref	0.783V unplugged / 0V with metal plug (plastic plug does not pull it low)
NCP380L OUT	BT module VIN, via C3	power	final switched output
GND bus	both ICs, BT module PGND, board ground	ground	common reference; module AGND not on this bus
Jack pin 2	BT module L in, direct	audio	stock inline cap removed
Jack pin 3	BT module R in, direct	audio	stock inline cap removed
Jack pin 1	nothing	not connected	caused static as AGND

04 ASSEMBLY ORDER

- Both control signals confirmed**
TP126 measured 1.8V open / 0V closed, cleanly above and below the NCP380 EN thresholds (1.2V min high, 0.4V max low), so no bias resistor is needed on that leg. TP49 measured 0.783V unplugged / 0V plugged. The unplugged reading falls between the two thresholds, which is why R2's pull-up is still required there.
- Place the decoupling caps**
Tack C1, C2, and C3 near where each will sit (IN of NCP380H, IN of NCP380L, and VIN of the BT module) before running the rest of the wiring.
- Mount both switch ICs**
NCP380H and NCP380L on a small scrap of perfboard or dead-bug style, leads accessible for hand wiring.
- Wire the ground bus first**
Tie NCP380H GND, NCP380L GND, BT module PGND, and board ground together. Ground is the reference every other measurement depends on.
- Wire the power path**
Rail → C1 → NCP380H IN → NCP380H OUT → C2 → R2 top-tap → NCP380L IN → NCP380L OUT → C3 → BT module VIN.
- Wire EN(H)**
TP126 straight to NCP380H pin 4. No extra resistor needed, since its swing is clean on both ends.
- Wire EN(L)**
TP49, the R2 pull-up, and NCP380L pin 4 all land on the same node.
- Power up without the BT module attached**
Confirm NCP380L OUT reads correctly across all four open/closed × plugged/unplugged combinations (table below) before anything downstream is at risk.
- Connect the BT module's power**
VIN and PGND only, once the switching logic checks out clean on its own.
- Prepare the module's audio input**
Remove the two stock capacitors in series with the L and R inputs and bridge each footprint so the signal passes straight through. Leave AGND and PGND separate. Don't bridge them.
- Wire the audio**
Jack pin 2 → module L in. Jack pin 3 → module R in. Jack pin 4 → module AGND. Leave jack pin 1 unconnected. Keep these wires short, twisted together where you can, and away from the module's antenna.
- Check that the jack still switches the module**
AGND now shares the TP49 node, so confirm it hasn't pinned that node low. Open the lid and unplug the jack: the module must power off, and TP49 must read **above 1.2V**. If the module stays on, move AGND to the jack's metal shell lug or a nearby board ground pad and listen for static again. Don't go back to pin 1.
- Test with a metal plug**
Plug a metal 3.5mm plug into the jack and open the lid. The module should power on, and TP49 should read **near 0V**. Use a metal plug for this and *every* later test. A plastic dummy plug won't switch the module on with this wiring.
- Check the uncapped inputs for DC offset and clipping**
With the 3DS on and silent, measure DC from jack pin 2 and pin 3 to ground. You want close to 0V, under about 50mV. Then play something bass-heavy at max volume and listen for crunch. If either fails, fit 4.7–10µF caps in the L and R footprints instead of bridges. Larger caps block DC without muffling the sound the way the stock ones did.

05 EXPECTED STATES

CLAMSHELL	JACK	NCP380H	NCP380L	BT MODULE
Open	Metal plug in	ON	ON	POWERED
Open	Unplugged	ON	off	off
Closed	Metal plug in	off	ON	off
Closed	Unplugged	off	off	off

Closed + plugged still reads off because Switch 1 has no input power to pass to Switch 2, whatever the jack is doing. That's the point of nesting them in series. Re-run the Open + Unplugged row after wiring the audio (step 12). "Plugged" always means a metal plug. A plastic plug reads the same as unplugged.

06 BILL OF MATERIALS

REF	PART	VALUE	PACKAGE
U1	NCP380HSN05AAT1G	active-high load switch	TSOP-5
U2	NCP380LSN05AAT1G	active-low load switch	TSOP-5
R2	RMCF0805JT10K0	10kΩ, ±5%	0805
C1–C3	C0805C105K4RACTU	1µF, X7R, 16V	0805
P1	Any metal 3.5mm plug	3-pole TRS, bare plug or metal dust plug. Required to turn on Bluetooth	3.5mm
C4–C5	only if step 14 fails	4.7–10µF, X5R/X7R, ≥10V	0805