NICK'S KNACKS

DNVT Switch

Features

- 4 DNVT (Digital Non-Secure Voice Terminal) Phone Interfaces supporting 16 kHz or 32 kHz operation.
- Rugged extruded aluminum case.
- 128x64 pixel OLED display.
- Front panel expansion header.
- Foolproof USB firmware update.
- Terminal block and RJ45 DNVT interface options.
- Transient voltage protection.

Applications

- Stand-alone local switching of four DNVTs
- VOIP to DNVT adapters.
- DNVT operation for functional film props.

Supported Phones

- TA-1042/U
- TA-1035/U
- TA-954/TT
- CA-67A/U (Untested)
- KY-68 (Assumed compatible in non-secure mode)

Figure 1: Front View of DNVT Switch

General Description

This PCBA is a Raspberry Pi Pico carrier board which interfaces DNVTs with a Raspberry Pi Pico. This document describes the function of the carrier board subassembly and does not cover custom software which may run on the Raspberry Pi Pico microcontroller.

DNVTs are powered in common battery (CB) mode through center-tapped isolation transformers from a 48 V DC barrel jack input allowing phones to operate at a distance of up to 4 km from the switch through CAT5e or equivilent wiring. RS422 transceivers translate the 3.3 V logic level signals of the Raspberry Pi Pico to the differential signals required to interface with the DNVTs.

The design files for this switch can be found in the project's Github repository, and Nick Andre's example firmware can be found in his Github repository. Details on the design of this board and the process of reverse engineering the DNVT's control codes can be found here.

This project is entirely open source. Design files for the PCBAs and vill of materials for the case and auxillary components can be found at the above linked repository.

Electrical Specifications

All specifications are in $0°C \leq T_A \leq 70°C$. All components are rated to -40 to +85 aside from the line transformers which are rated to $0°C$ to $70°C$ but which have been tested in qualification to $-20°C$ to $+85°C$.

Table 1: Example Data Sheet Specifications

Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**	**Conditions**
DNVT PWR Input Voltage	V_{in}	24	48	56	V	Standard A4 paper
DNVT PWR Input Current	I_{in}	29.6	29.7	29.8	A	All phones consuming maximum specified power with 4 km CAT5e Cable
DNVT Current Limit	I_{ph-max}		150		mA	Current limit per phone
Input Differential Swing	ΔV_{TH}	50			mV	$VIN_P - VIN_N$
Output Differential Swing	E_{max}		3		V	$VOUT_P - VOUT_N$

Absolute Maximum Ratings

Table 2: Absolute Maximum Ratings of Example Data Sheet

Parameter	**Rating**
DNVT PWR Input Voltage	60 V
Storage Temperature	$100°C$
Operating Temperature	$85°C$

Note: Stresses above those listed under Absolute Maximum Ratings can cause permanent damage to the device. This is a stress rating only. Functional operation of the device is not implied in any conditions above those indicated in the Electrical Specifications section.

Raspberry Pi Pico 4 Port DNVT (Digital Non-secure Voice Terminal) Switch

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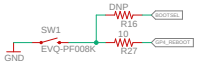
2022

Bootloader Select Switch

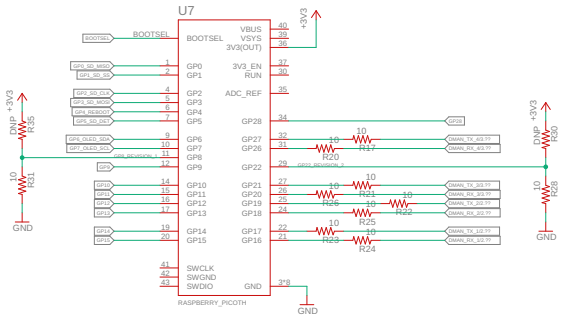
A through hole via has been placed under the BOOTSEL test point to allow for a Mil-Max 0978-0-15-20-75-14-11-0 Pogo pin to be installed to connect to it. This pogo pin may be slightly short, so add a solder bump to the test point.

By default, the BOOTSEL pogo pin is not used and instead software must monitor GP4 to trigger reboot into USB bootloader mode.



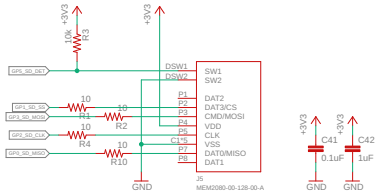
Revision Strapping

Raspberry Pi Pico



Revision Strapping

uSD Card Slot



External Expansion Header

Configuration DIP Switch

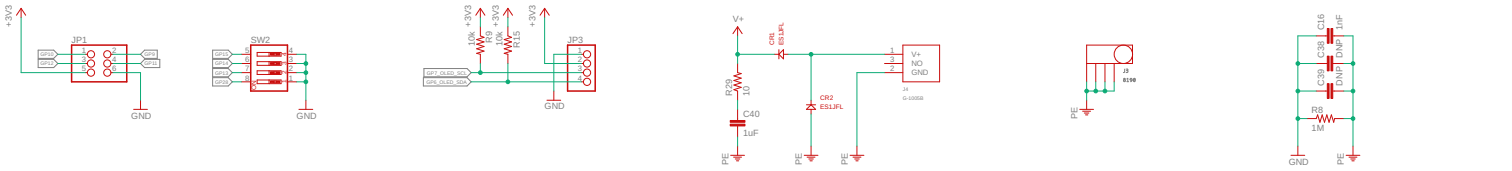
OLED Screen Header

Supply Protection

48V DC Barrel Jack

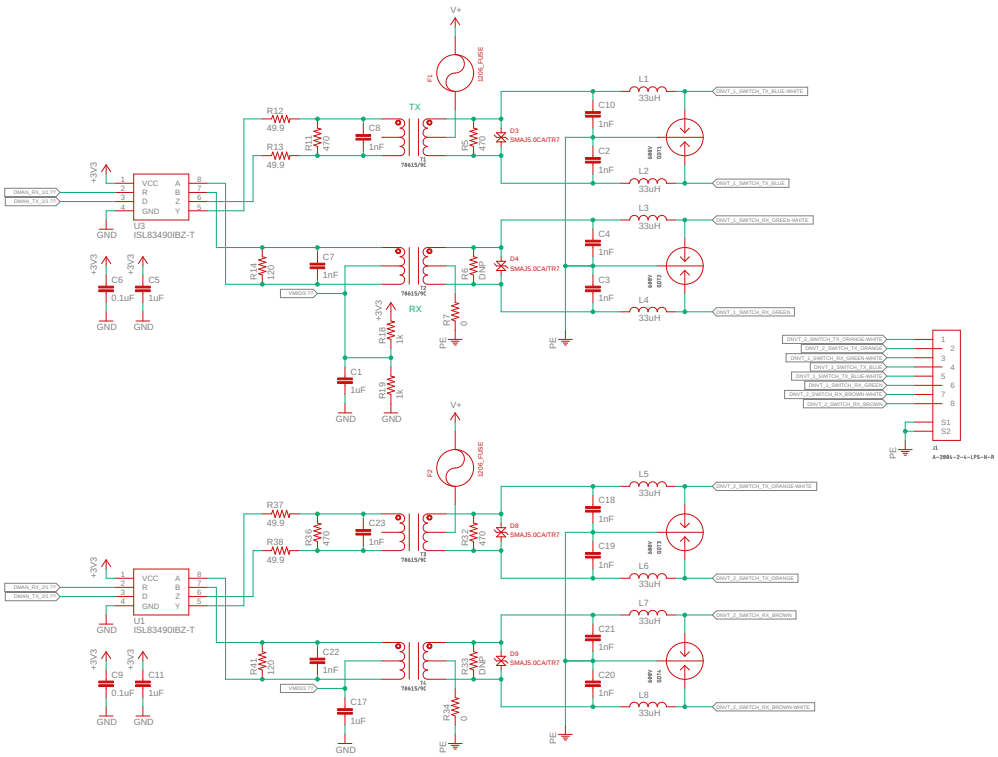
6-32 Screw Grounding Leg

Ground Couping



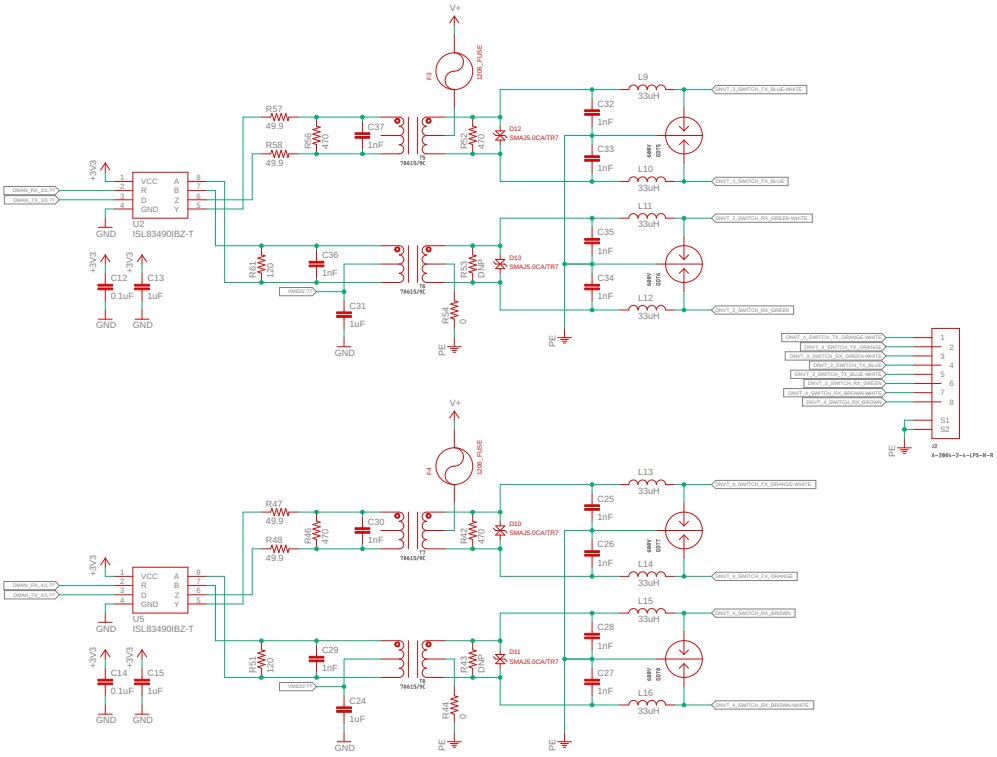
Raspberry Pi Pico 4 Port DNVT (Digital Non-secure Voice Terminal) Switch

DNVT Line Interface
Phones 1&2



Raspberry Pi Pico 4 Port DNVT (Digital Non-secure Voice Terminal) Switch

DNVT Line Interface
Phones 3&4



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