

# WCARC PROJECT CANDIDATES

Some opportunities for collective project fun

# WCARC Project Build Candidates

## The legend

- The first square represents the level of difficulty. Green is easy, orange moderate, and red more difficult
- Second square provides a estimate of the number of 3 to 4 hour sessions needed to complete the project
- A rough cost estimate is provided in the third area. \$ is under \$20, \$\$ is between \$20 and \$60 and \$\$\$ is over \$60



## VE3CZO PCB's & Kits

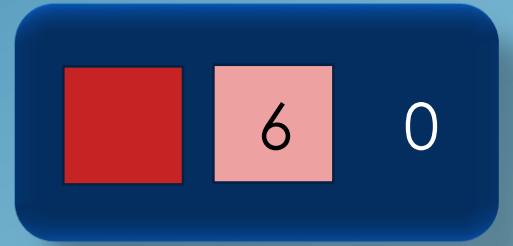
- A complete kit of parts can be put together for 4 or more
- If only a couple people interested I will sell PCB's

Build sessions – get together – place & time?

# 13 Cm Transverter

Start

- LED's



# QRP Labs Ultimate 3S QRSS WSPR Kit



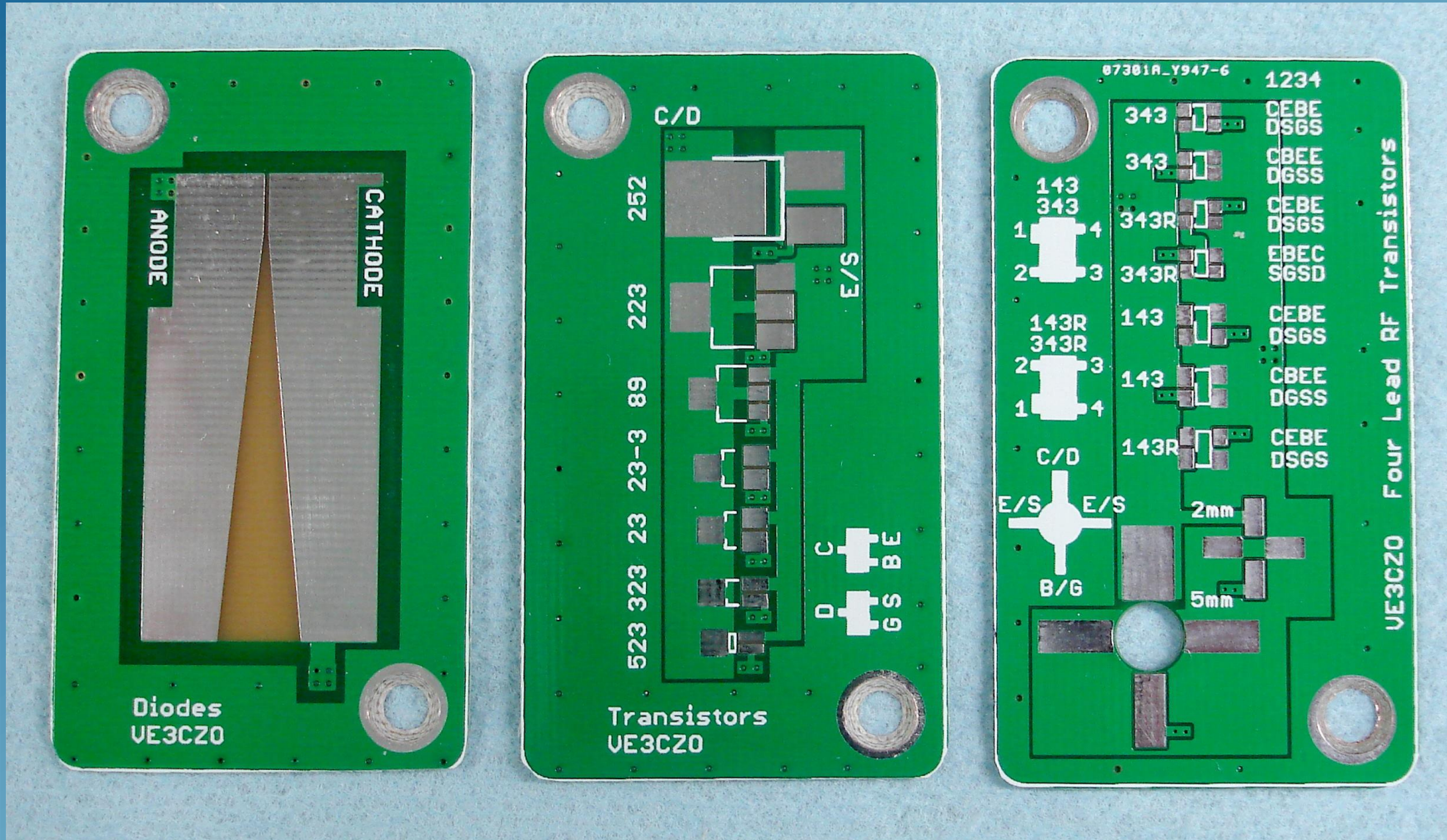
3S transmitter kit produce QRSS, Hell, WSPR, Opera and PI4 slow-signal modes anywhere from 2200m to 2m bands. Plug-in LPF filters are available for all 13 HF/MF/LF bands from 2200m to 6m.

- U3S
- Case
- GPS module?





# Curve Tracer SMD Test Jigs



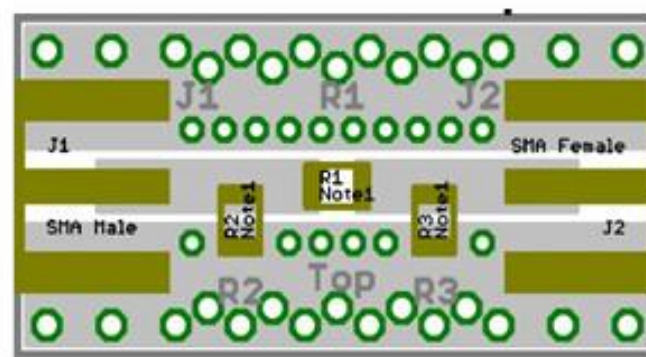
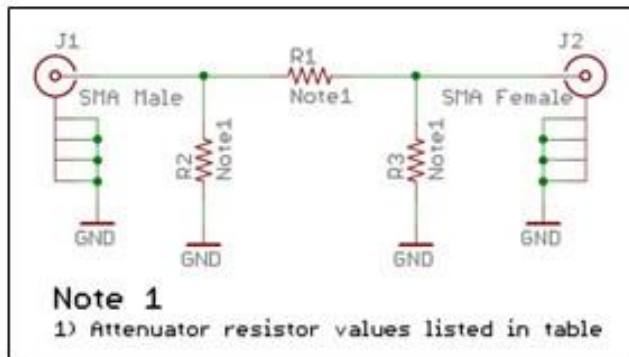
Ever try to test  
SMD parts on a  
curve tracer?

These jigs make  
the task much  
easier!

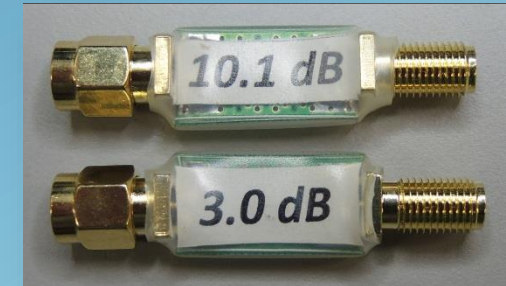
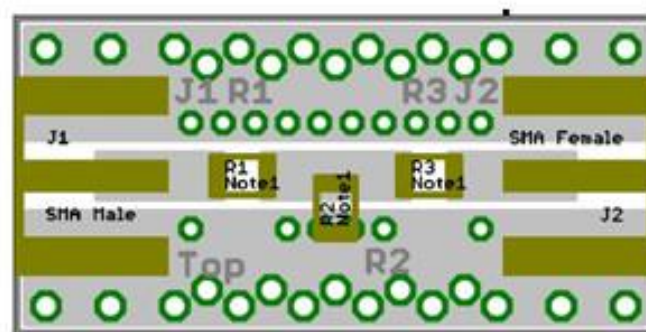
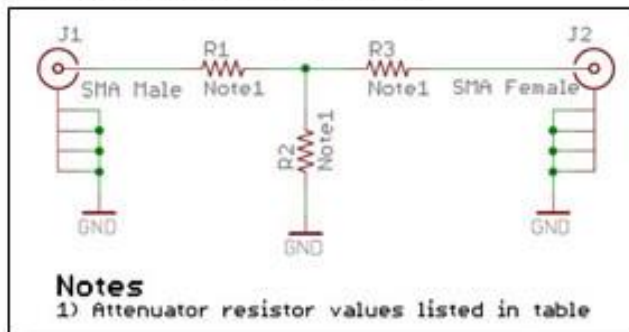


# PI and T Attenuators

- S0805 Resistors make attenuators good to 3 GHz
- 1% resistors result in better than .25dB accuracy



*Schematics & PCB T Attenuator*



# 12 to 28 V Switching Regulator

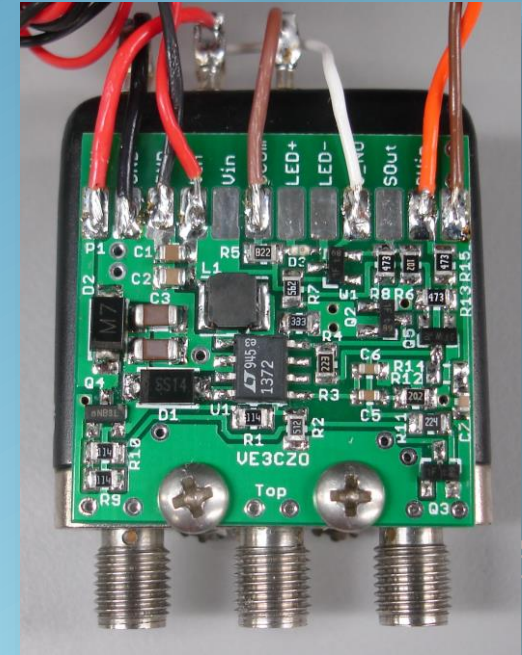


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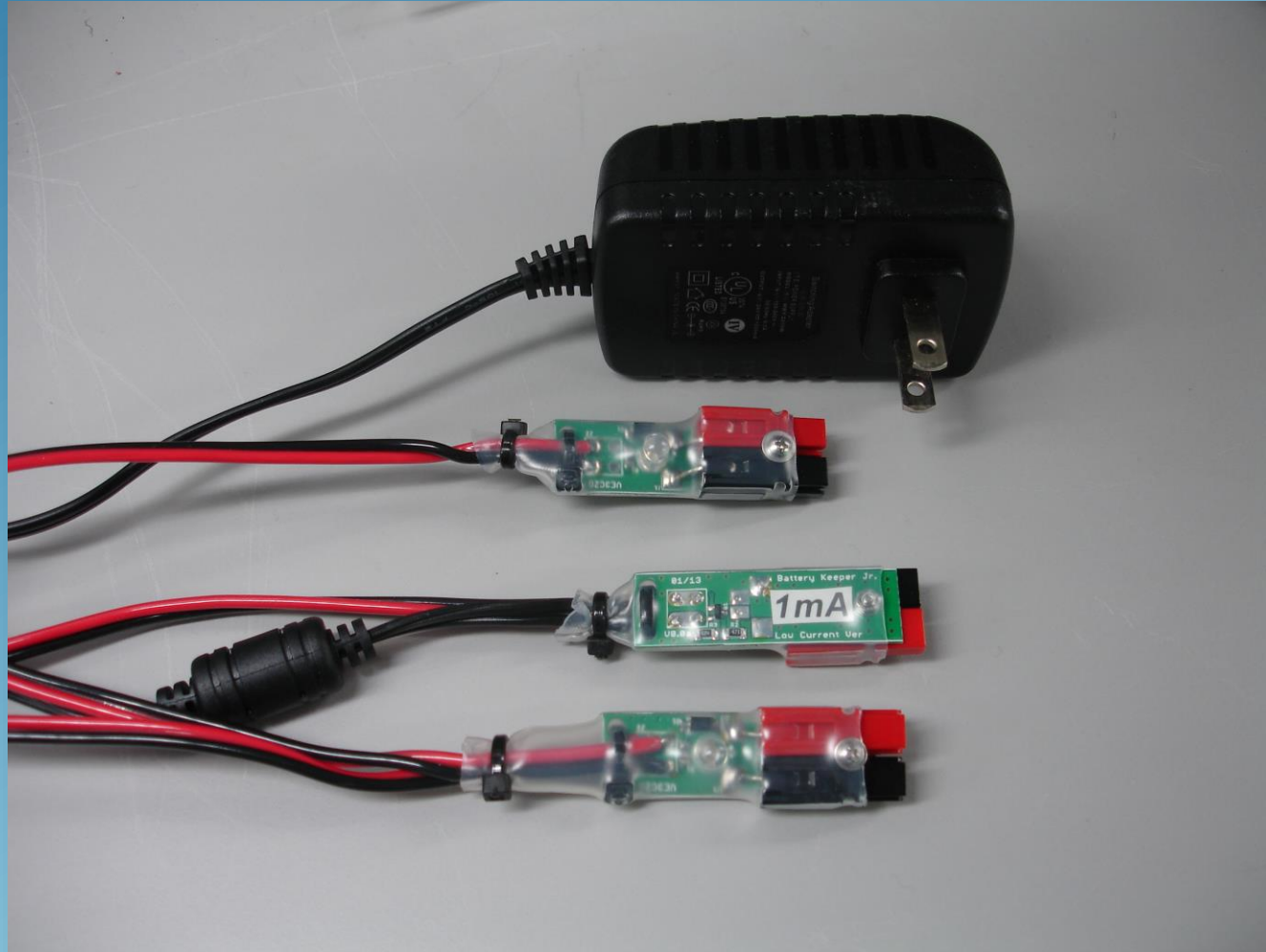
## Boost switching regulator on a 30 x 30 mm PCB

- Drives 24-28V relay coils requiring up to about 500mA
- Wide input voltage range, from under 10 to 15V.
- On-board catch diode suppresses relay coil transients
- Low standby current - under 150uA and typically 120uA
- Typically 90% efficient
- Relay state O/P indicator using LED & 5V logic output
- PCB can be mounted directly on relay
- Relay control via SPST switch or remote logic configurable to ground, Vin or 5V
- Low power option has the potential to reduce supply power by a factor of 4

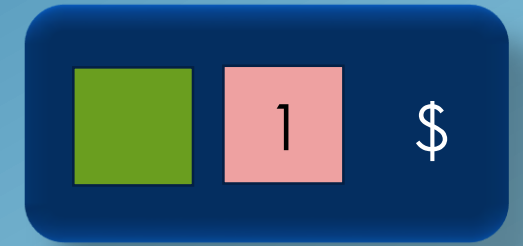


# Battery Keeper Jr.

Three Battery Keeper Jr's connect to a single 24V wall wart

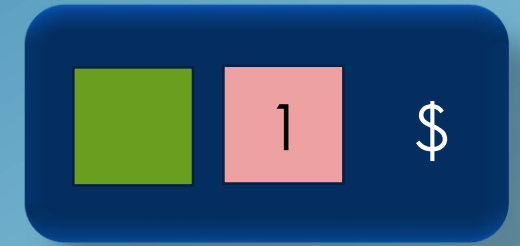


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# Battery Keeper Jr.



Simple trickle charger for Lead Acid or NiMH rechargeable batteries

- Two versions, low current, 0.1 to 4mA; high current 4 to 50mA
- Low total power consumption typically well under one watt
- LED indicator illuminates only when providing trickle current to a battery.
- LED current is the same brightness for all trickle current values.
- PCB Input connector allows multiple boards to be connected to a single supply.
- Trickle currents are set by resistors selected from a list or by spreadsheet
- Configurable trickle currents range from 0.1 to 50 mA.
- Powerpole connector to battery

# Universal Serial Port Radio Programmer

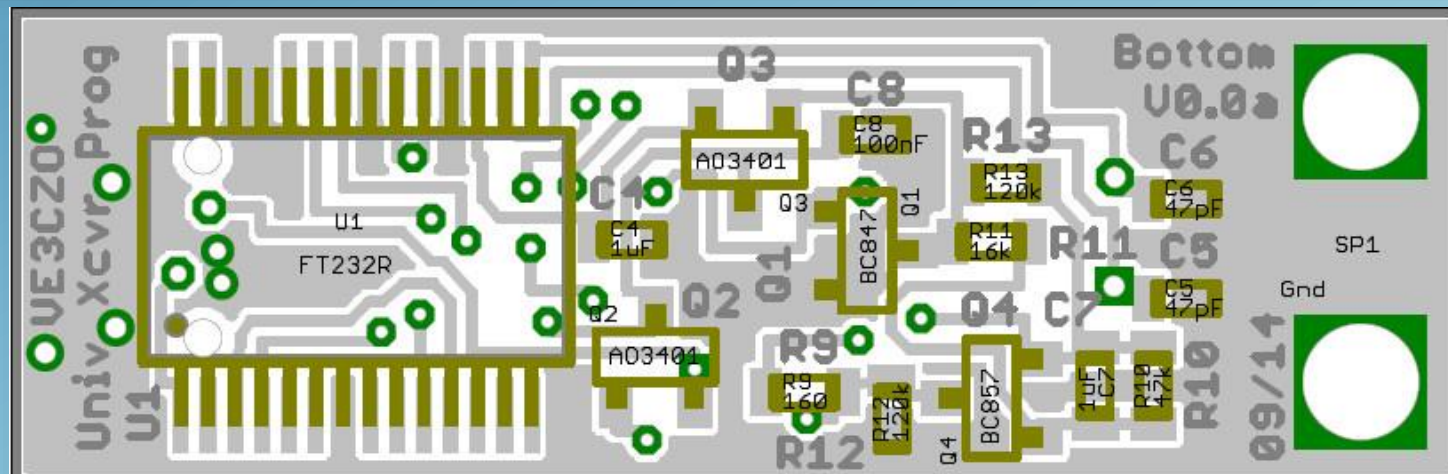


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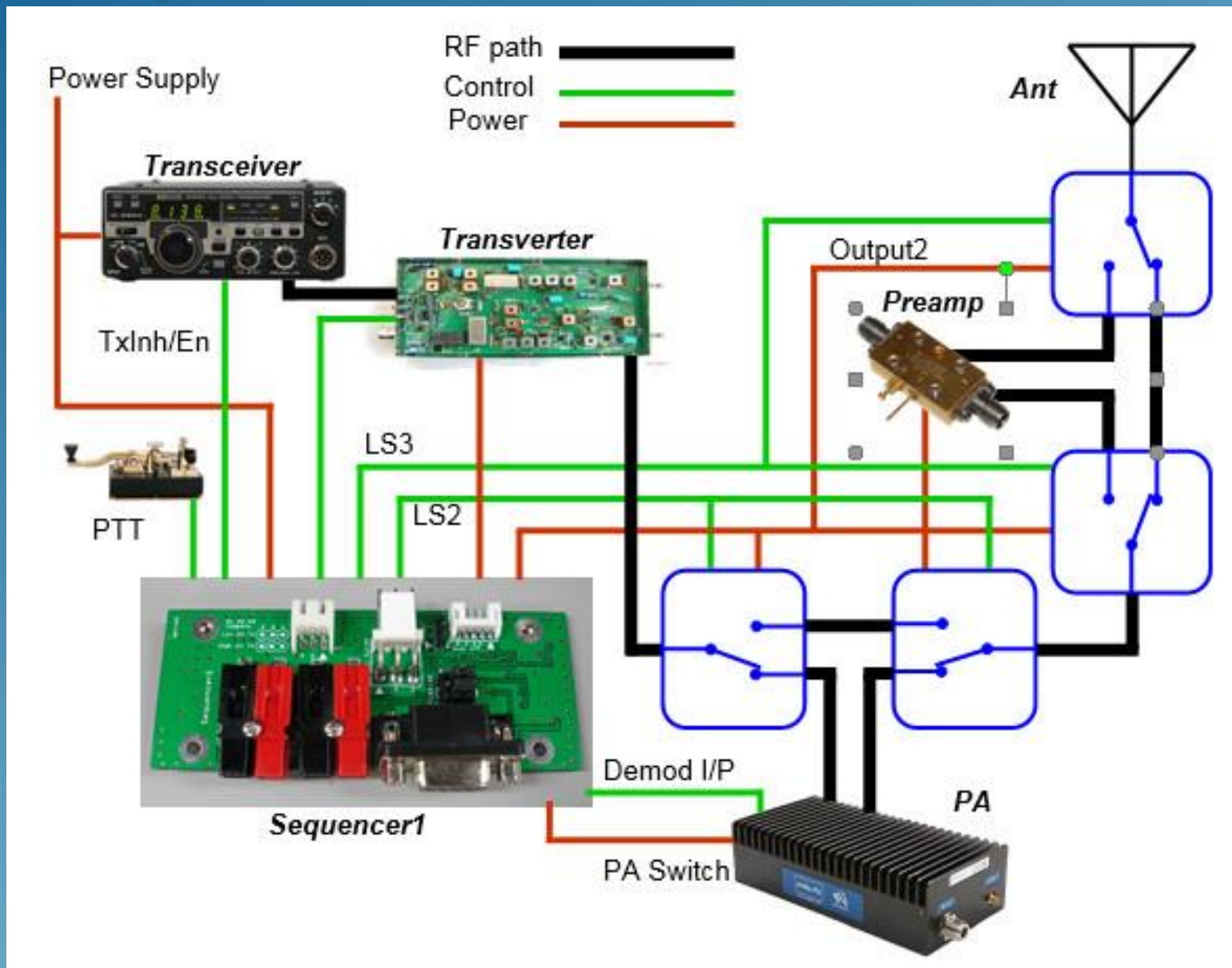
FTDI based PCB can program either 3.3V or 5V radio interfaces

- LEDs indicate Power, Rx data, Tx data, and 3.3V operation
- FTDI based PCB can program either 3.3V or 5V radio interfaces



# Sequencer 1

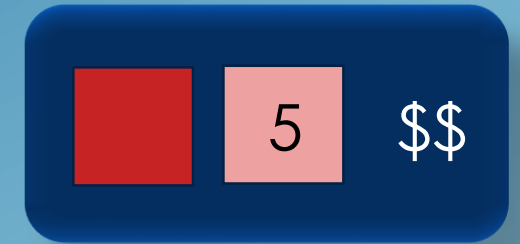
5 \$\$



Smart control of transverter transceiver, power amplifier, preamp, and Tx/Rx relay to best insure safe Rx to Tx and Tx to Rx system transitions



# Sequencer1



Smart feedback monitoring for peripherals to insure that they have changed state before transitioning between Tx and Rx

- Two inputs monitored by CPU LS1 & LS2 can be configured active high or low

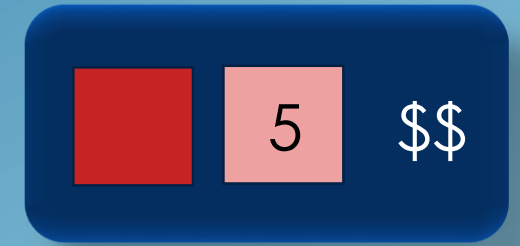
## Additional inputs

- PTT active high or low
- Transverter Tx/Rx state sense
- Band sense input for FT817 – insures Xcvr is set to correct band before Tx allowed
- RF Envelope Demod – sampled PA demod flashes LED at mod rate during Tx

## Outputs

- Switched PA supply up to 30A –PA current monitored & failsafe thresholds SW set

# Sequencer1 (cont'd)



## Outputs

- Transverter PTT - active low
- Tx LED – single LED also used to signal fault and modulation
- TX Inh / Enable output
- Uncommitted output 1 – open drain on during Tx off Rx 2A protected
- Uncommitted output2 – open drain 2A protected config on for either Tx or Rx

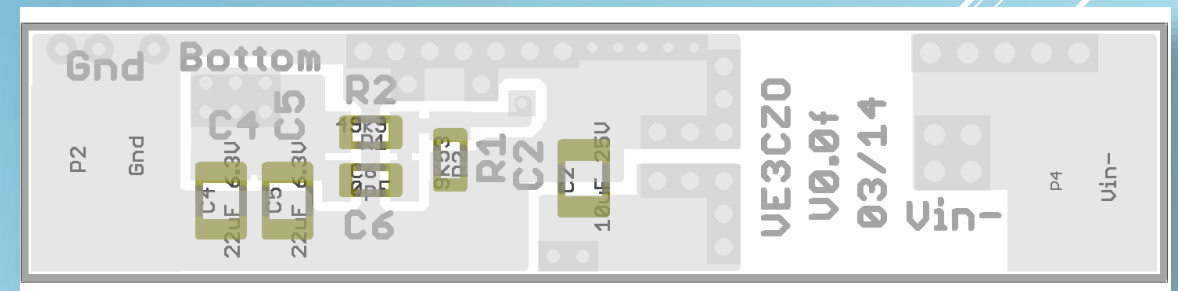
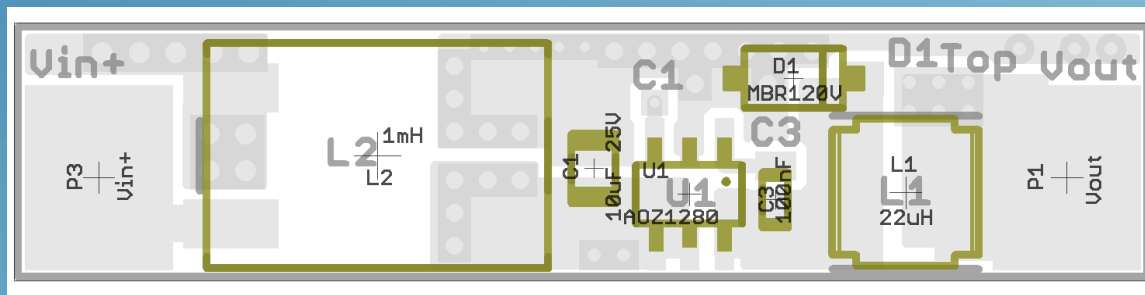
## User Definable S/W parameters

- Output2 active Tx or Rx - Supply switch current threshold –set –ignore
- Ignore state change for LS1 LS2 or RfDetect - LS2 or LS3 never changes
- LS3atTxInhEn - Band - Tx delay - Rx delay - Hangtime
- Timeout time - ignore timeout

# Tiny Buck Converter

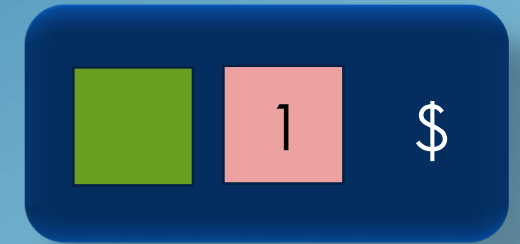


- Designed to efficiently drive 5V USB devices from a 12V battery with 90%+ efficiency
- Small 7x31 mm PCB can be encased in heat shrink and placed in the device power supply line
- Handles load currents up to about 900 mA
- Care in layout has been used to achieve low EMI / RFI – common mode I/P choke
- Buck converter IC features short circuit and thermal overload protection
- Input and output solder pads are used for wire connections to supply and load

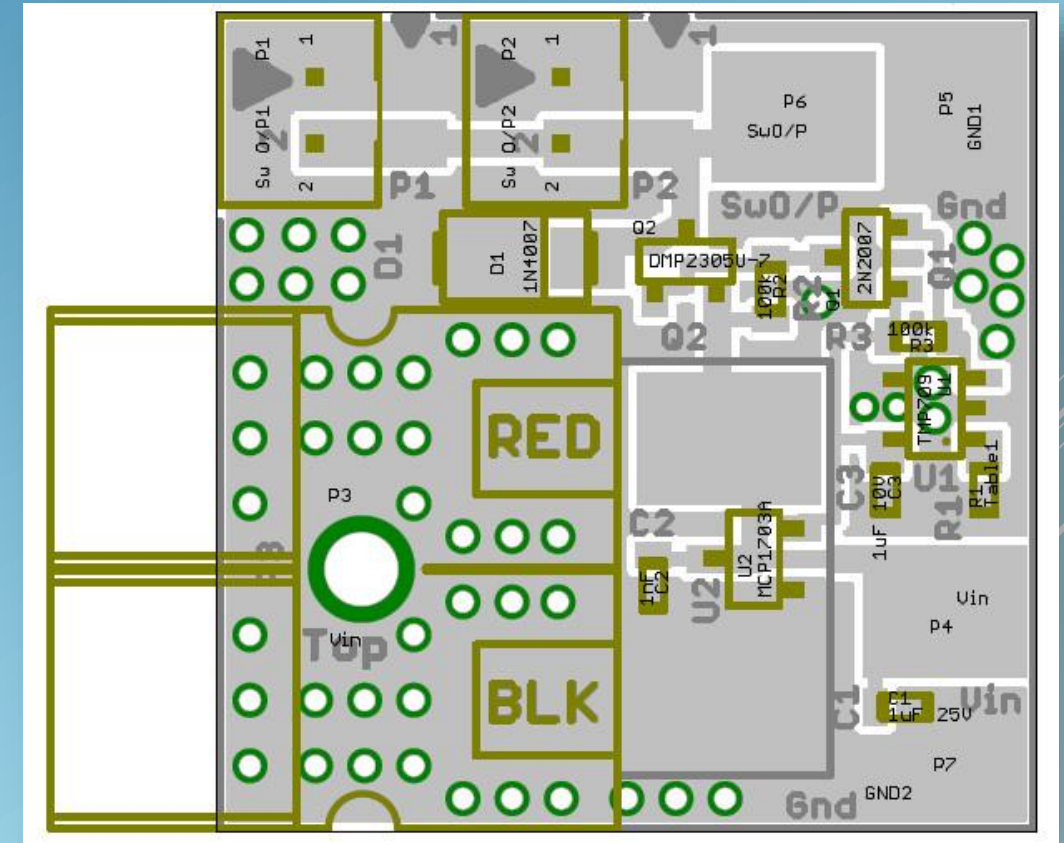




# Thermal Switch



- Configurable on threshold temperature with hysteresis
- 6-15V operation
- 25mm x 25mm PCB
- Output switch handles up to 4A from V+
- Switch O/P transient protection
- Connectorized I/O Powerpole input

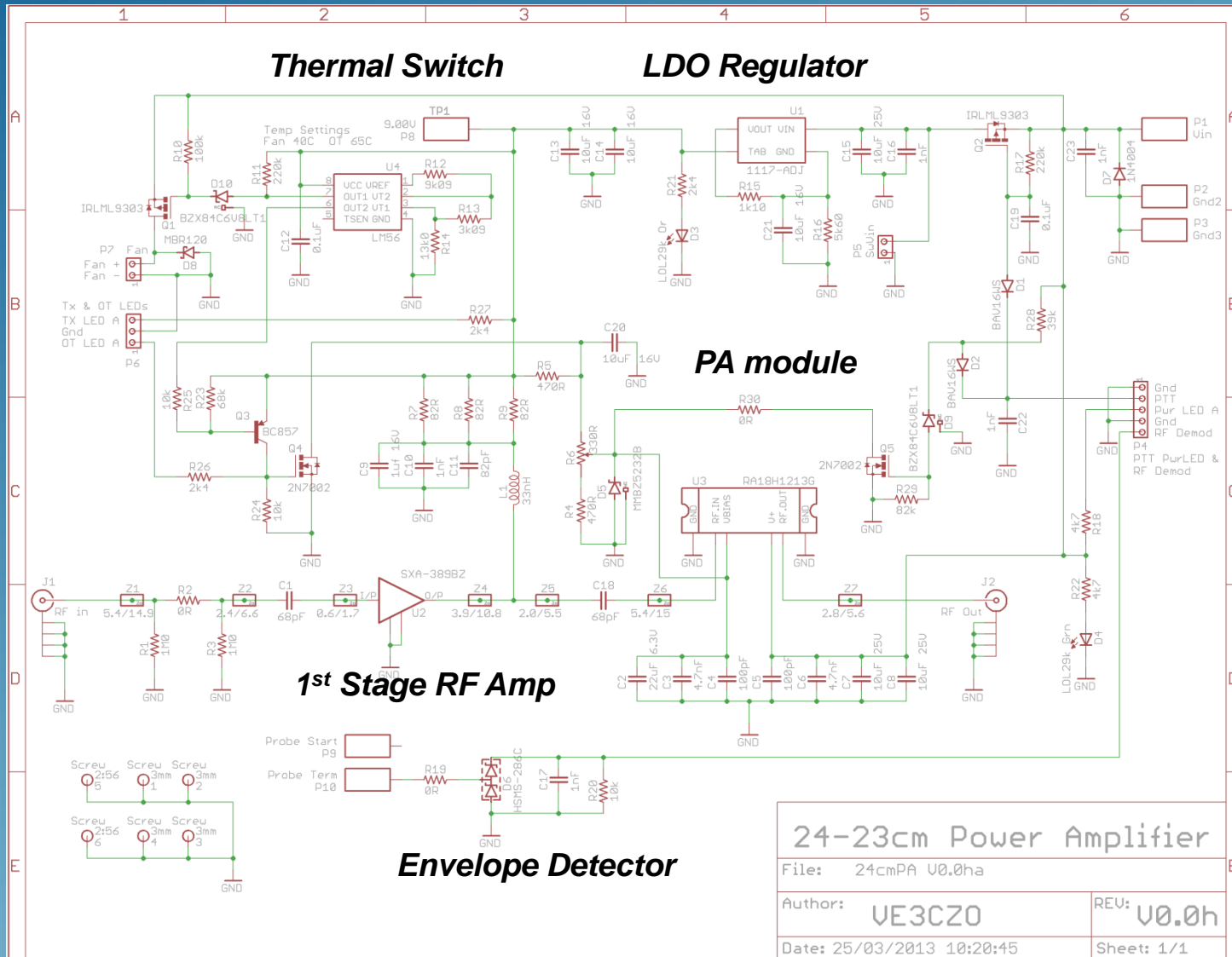


# 24 – 23 Cm Power Amp (cont'd)



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# 24 – 23 Cm Power Amplifier

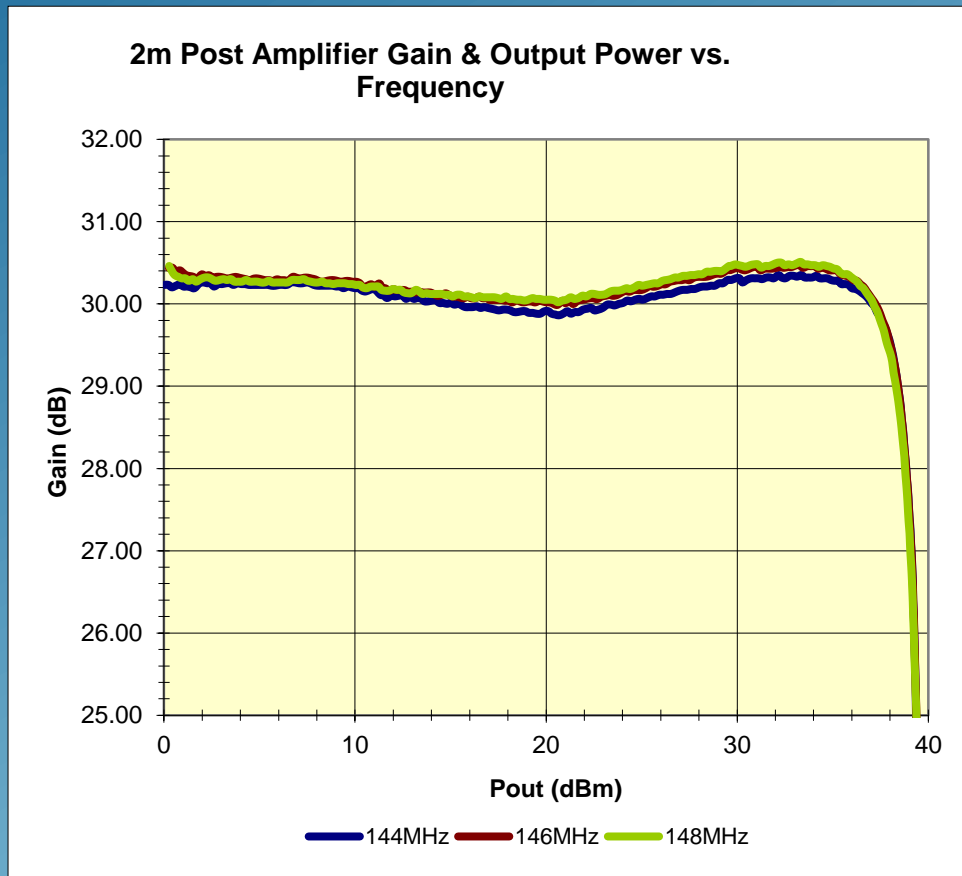


- 20 Watt linear RF power amplifier covering the entire 24 – 23 cm amateur band
  - Capable of covering 1240 to 1300 MHz for use with either ATV at the low end of the band or SSB / CW operation at the high end
- Power from a 12V battery. Needs to operate over a 10 to 15V range
- Moderate size for portable operation
- Input power between 6 & 10 dBm for full output power to interface with most transverters and ATV modulators
- Input attenuator for gain adjustable up to about 1<sup>st</sup> stage gain
- Linear output power to about 20 watts – so about 36dB gain
- Low power use when not in transmit – less than 5 mA with LEDs
- LED indicators for power and transmit
- Provisions for antenna relay switching
  - Single antenna port separate ports to an exciter and receiver
- Output power modulation envelope detector



# Toshiba S-AV12 VHF Linear Amplifier

144-148 MHz. -36dB gain 5-7W O/P



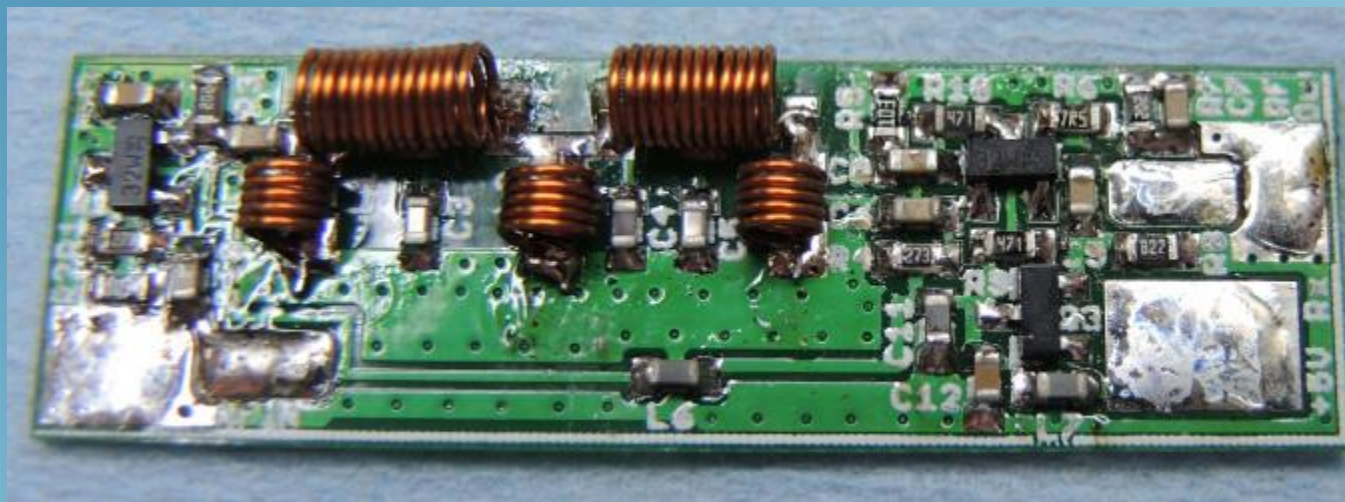
# Xcvr Panadapter Interface to SDR Dongle



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- Works with any radio that has a first IF in the 50 to 70 MHz frequency range
- Works with inexpensive SDR dongles
- Won't adversely impact receive sensitivity
- Low power consumption 5 to 6 mA
- Configurable for 5-15V Vin
- Stable with or without a SDR receiver attached to the interface output.
- The PCB back side is a ground plane only enabling solder mounting to most any ground shield within a transceiver.



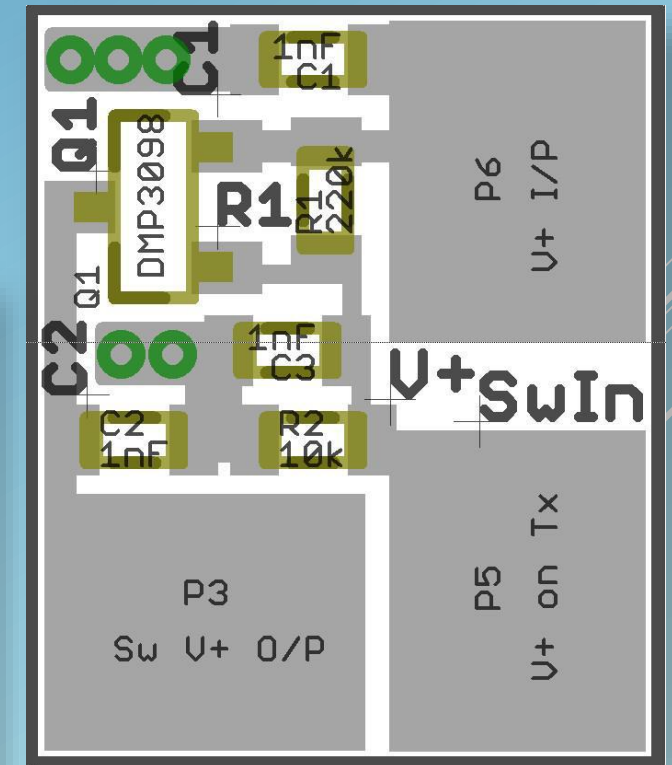
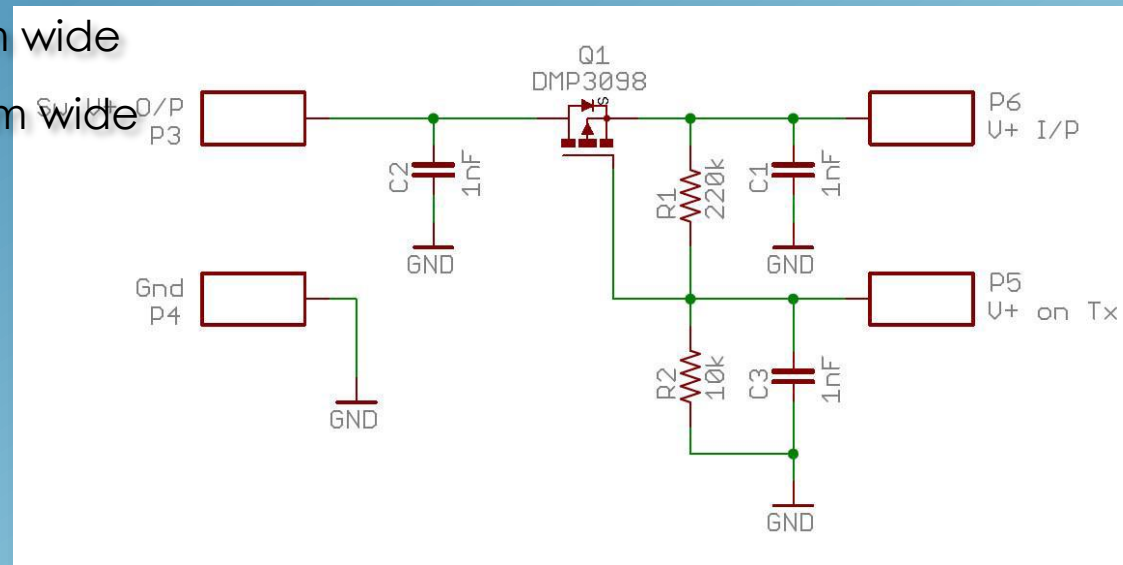


# Panadapter Supply Switches



Panadapter requires +5V switched off during Tx. If 5V on Rx isn't available or not able to supply the dongle then two switch boards are available

- Inverting Sw for low on Rx, high on Tx lines
- Programmable for either sense
- Both PCB's are the same height as the panadapter board
  - V+ Tx is 10mm wide
  - V+ Sw is 13mm wide

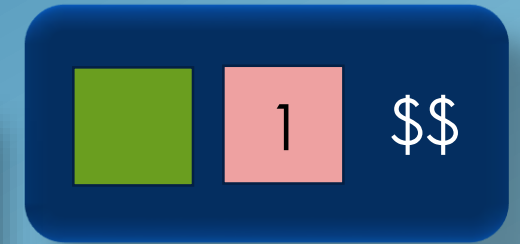




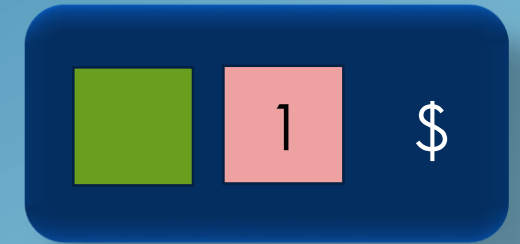
# Omron RF Relay

## Omron based RF Relay

- Low loss & good isolation to 2.4 GHz.
  - Loss 0.2B@70cm 0.4dB@23cm 0.5dB@13cm
  - Isolation 75dB@70cm >55dB@23cm >40dB @ 13cm
- Power levels to 10W if not hot switched
- Kit contains 2 PCB versions, all SMA connectors one side or common one side I/O opposite
- Surface mount & through hole PCB versions
- Supply voltage configurable 10-50V
- PTT Control input configurable for positive Vin or open collector to ground drive
- State indicator O/P drives LED or 5 V logic



# Diode Envelope Detector



A simple passive amplitude modulation detector provides user feedback when transmitting SSB or CW

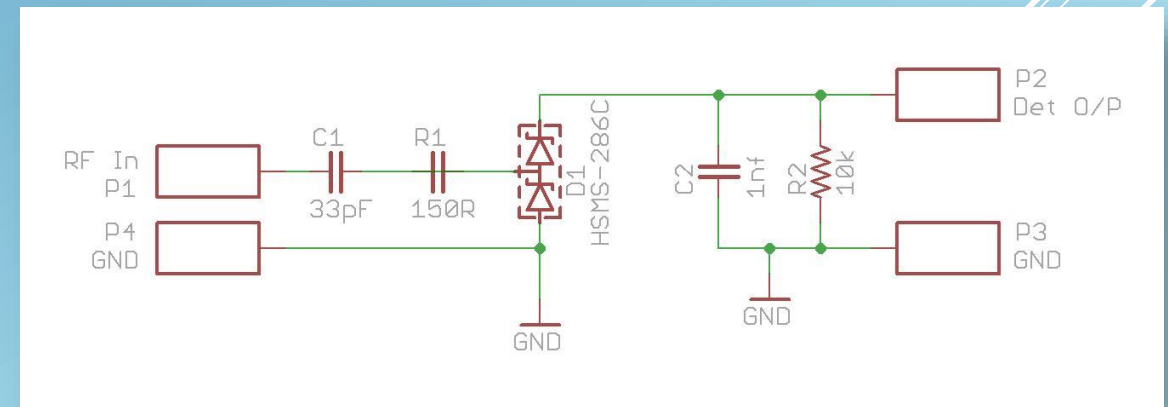
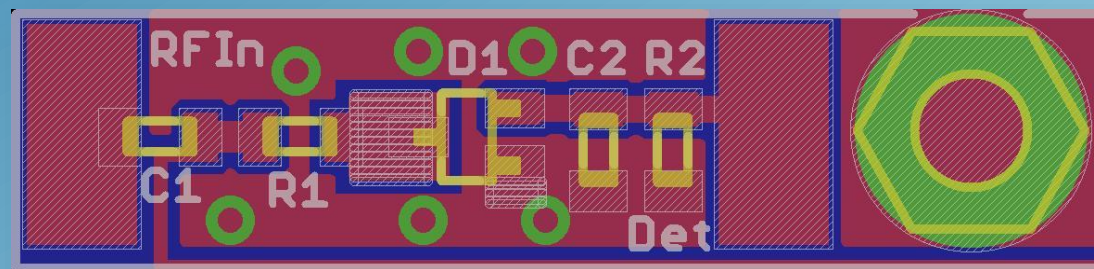
Uses the sample port available on most power amplifiers

Can be inductively or capacitively coupled to most amplifiers

- Inductive coupling line on PCB for higher frequencies

Wide RF input bandwidth

- Should work to 5GHz

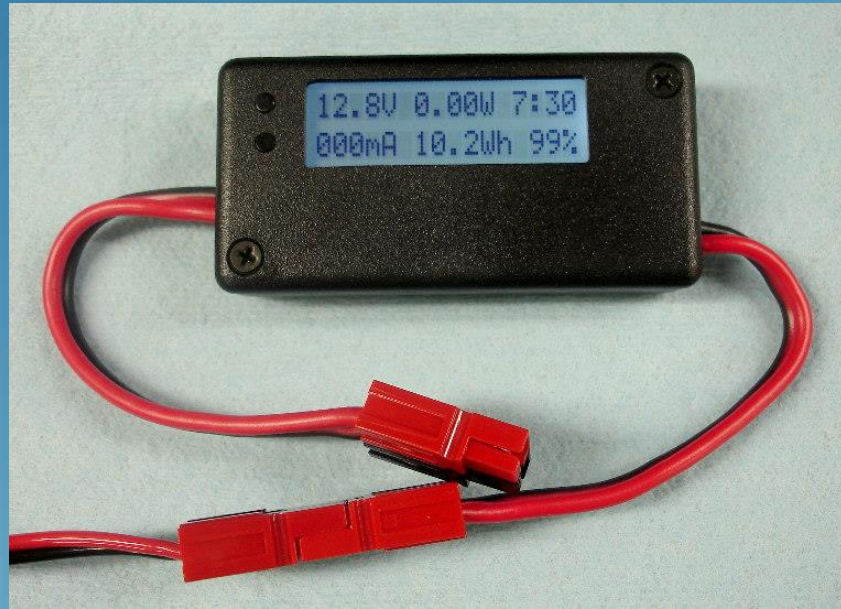




# Battery Monitor

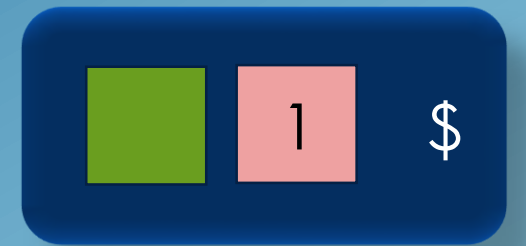
## Battery management tool

- Simultaneously displays
  - Source Voltage
  - Load Current
  - Load Power
  - Accumulated Ah or Wh
  - Session time
  - % battery capacity left
- Saves session current peaks and voltage minimums
- Unique Features
  - Utilities Menu selects user options using two push button switches
  - Auto ranges low current & power measurement down to 1mA, 1mAh, 1mWh
  - Hibernate mode – saves readings to EEPROM - 2uA supply current when off
  - Low supply current 2mA typical without backlight
  - Display Backlight – four levels off, low, med, high consumes up to 2.5mA
  - % battery capacity remaining tied to user definable battery char. table



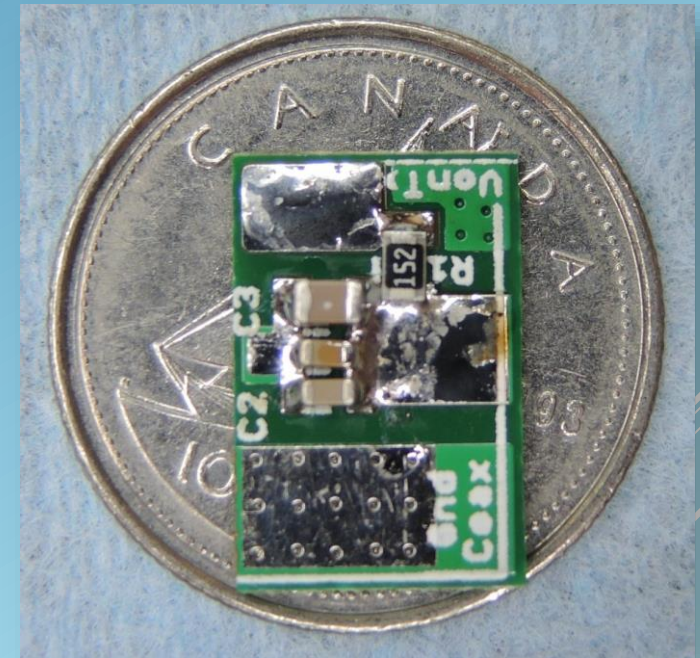


# DC on Transmit



Add-in for transverters that use DC on RF output to sense req to Tx

- Designed primarily for FT-817 but should fit most other radios
- 12 x 18 mm PCB attaches directly to RF connector
- DC blocking caps
  - 250V operation
  - Virtually no attenuation 1.6 to 470MHz.



# SOT-89 INTERMEDIATE POWER AMPLIFIER

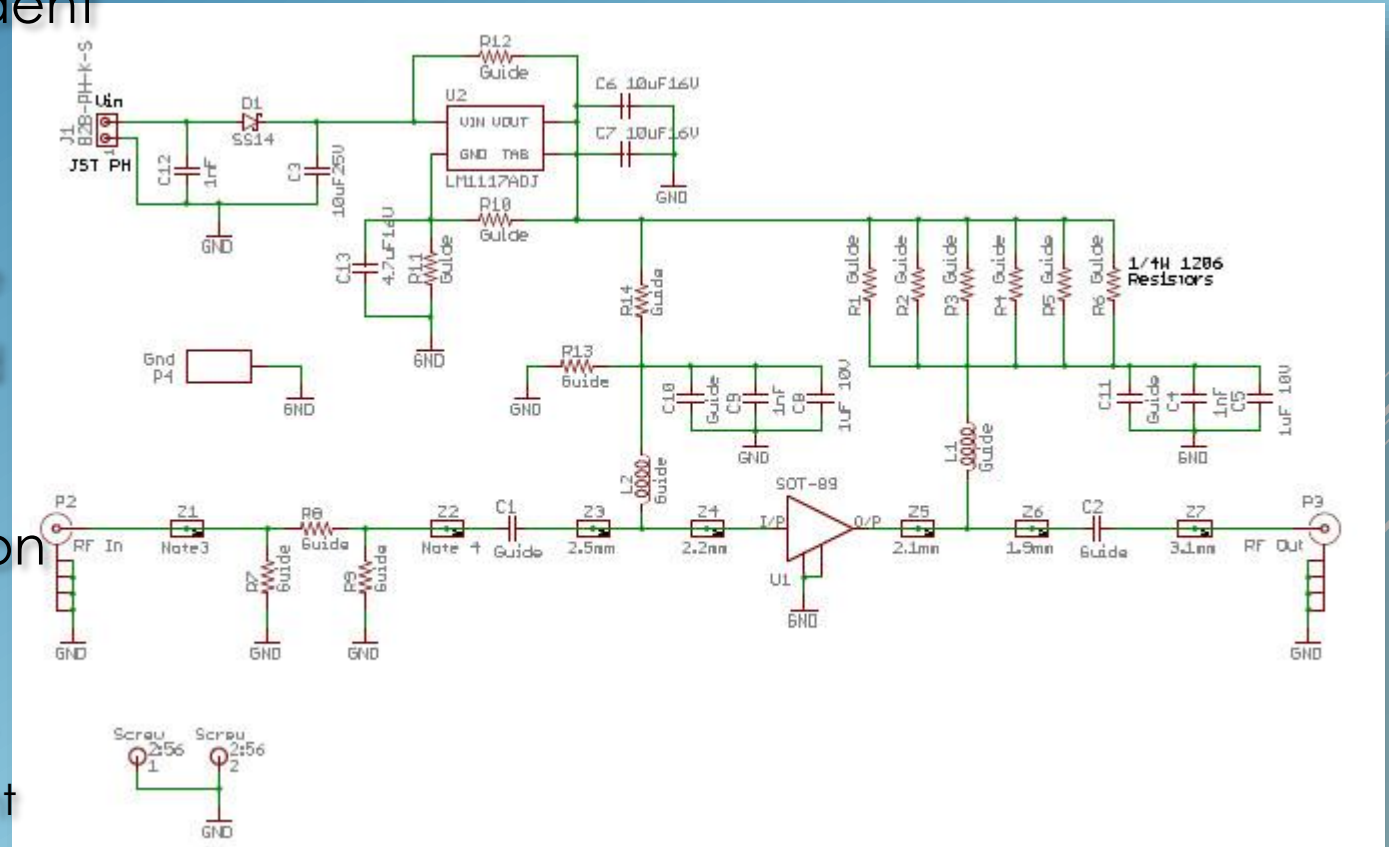


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## SOT-89 RF IPA Amplifier

- Po up to 23dBm amp dependent
- Freq range 50MHz. to 6GHz.
- On-board adjustable LDO
  - 1.5W series resistors & idiot diode
- All components top mounted
- Input atten. & bias options
- 50 ohm TL line back annotation
  - Zin & Zout matching
- PCB edge connector options
  - Through hole - SMD - edge mount



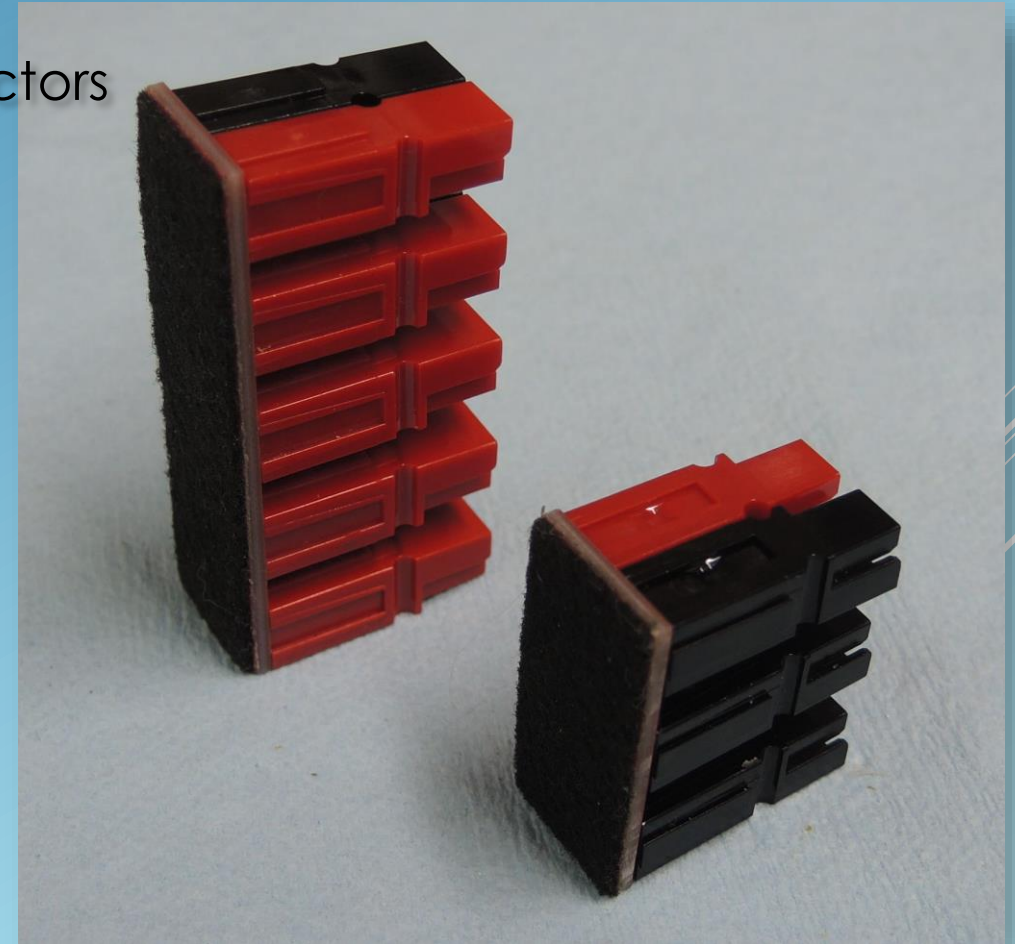
# Two and 4 Way Powerpole Distribution



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Inexpensive multi-output Powerpole

- 2 and 4 way pcb kit available without connectors





# FT817 TRANSVERTER SEQUENCER



Senses FT817 PTT or key and provides positive going transition to key transverters

- Uses FT-817 Tx Inh ACC signal to delay RF to transverter
  - Default delay is 50 ms
- Provides hang time on transition from Tx to Rx
  - Prevents excessive Tx/Rx switching for CW operation
  - Default delay is 150ms
- Brings out pins for TXD, RxD & Gnd
  - Simplifies connection to external rig controllers
- Built into the ACC Mini-DIN connector

