

1296 MHz Transverter

DESIGN AND CONSTRUCTION DETAILS

1296 and 902 MHz TRANSVERTERS



23 CM OVERVIEW

- 70 CM IF
- Both FM and SSB/CW use
 - FM provides 20 MHz repeater offset RX-TX
 - SSB;CW normal transverter operation
- IF sensed keying
- 444.0 MHz converts to 1296.0
- Si532 two frequency LO (852 MHz, 832 MHz)
- Mitsubishi 18W PA module
- 0.5 dB NF front-end (Mini-Circuits LNA)

CIRCUIT SUMMARY

- Four circuit boards:
 - RF board
 - Sequencer (IF keyed)
 - PA board
 - TX IF pad
- Surface mount assembly
- Silicon Labs Si532 (2 frequency) LO
- Printed RF filters
- IF TX sensed, T/R sequenced
- IF TX power load
- IF pass through to antenna when powered off

LOCAL OSCILLATOR

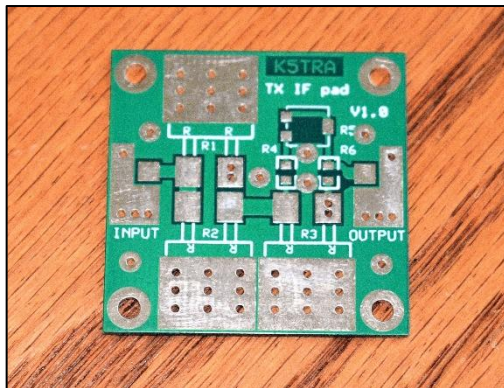
- Silicon Labs Si532
- IF frequency = 444.000 MHz
- LO frequency = 852.0 MHz (for RF= 1296.0 MHz)
- FM repeater offset option:
 - LO = 852.0 MHz during RX
 - LO = 832.0 MHz during TX

RECEIVER

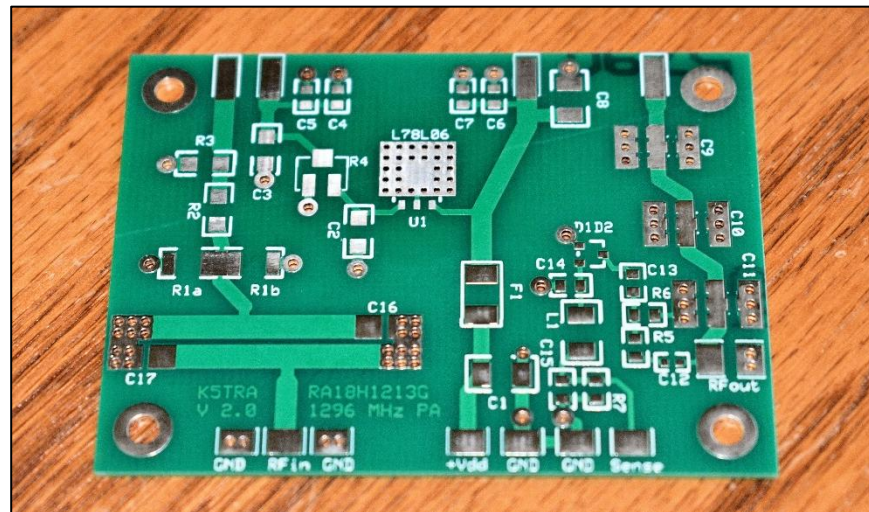
- LNA is CMA162LN
 - pHEMT IC
 - Minicircuits
 - $F_{min}=0.5$ dB
- ADEX-10H mixer: 7 dB conversion loss, +17 dBm LO
- Sirenza SGA6486 IF amplifier followed by a π pad
- π pad also has PIN diode to step loss during transmit
- Overall RX NF ≈ 0.8 dB

TRANSMITTER

- PA is 18 W Mitsubishi RA18H1213G module
- Bias regulator on PA board
- Transmit UHF IF drive is 45 dBm (nominal)
- IF power pad is adjustable (IF drive dependent)
- Printed RF BP and PA LP filters
- RF level detector on PA board drives LED display



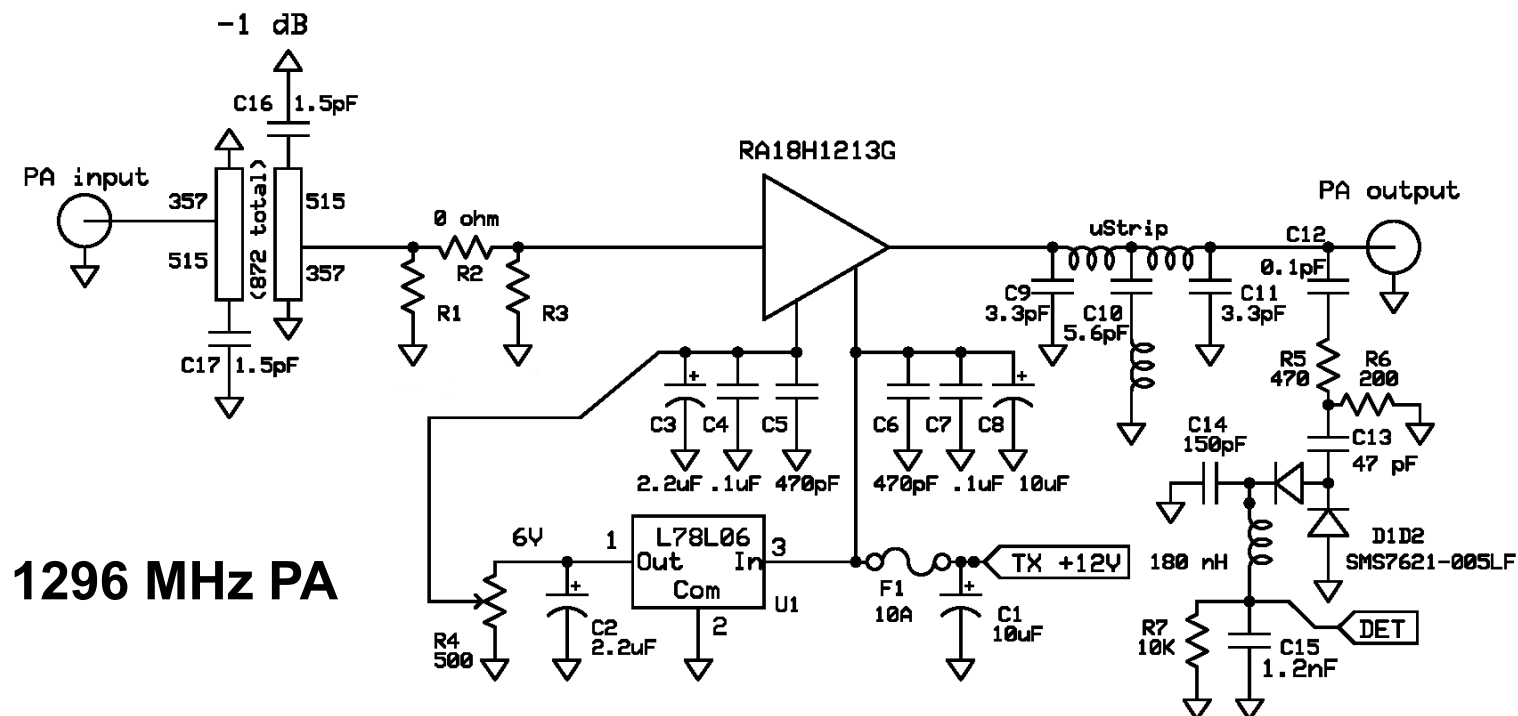
TX IF PAD



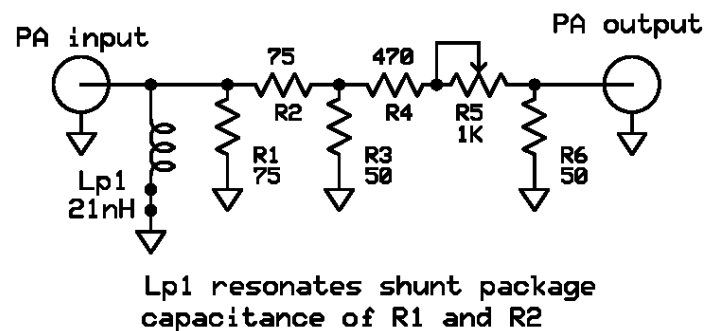
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23 CM PA BOARD

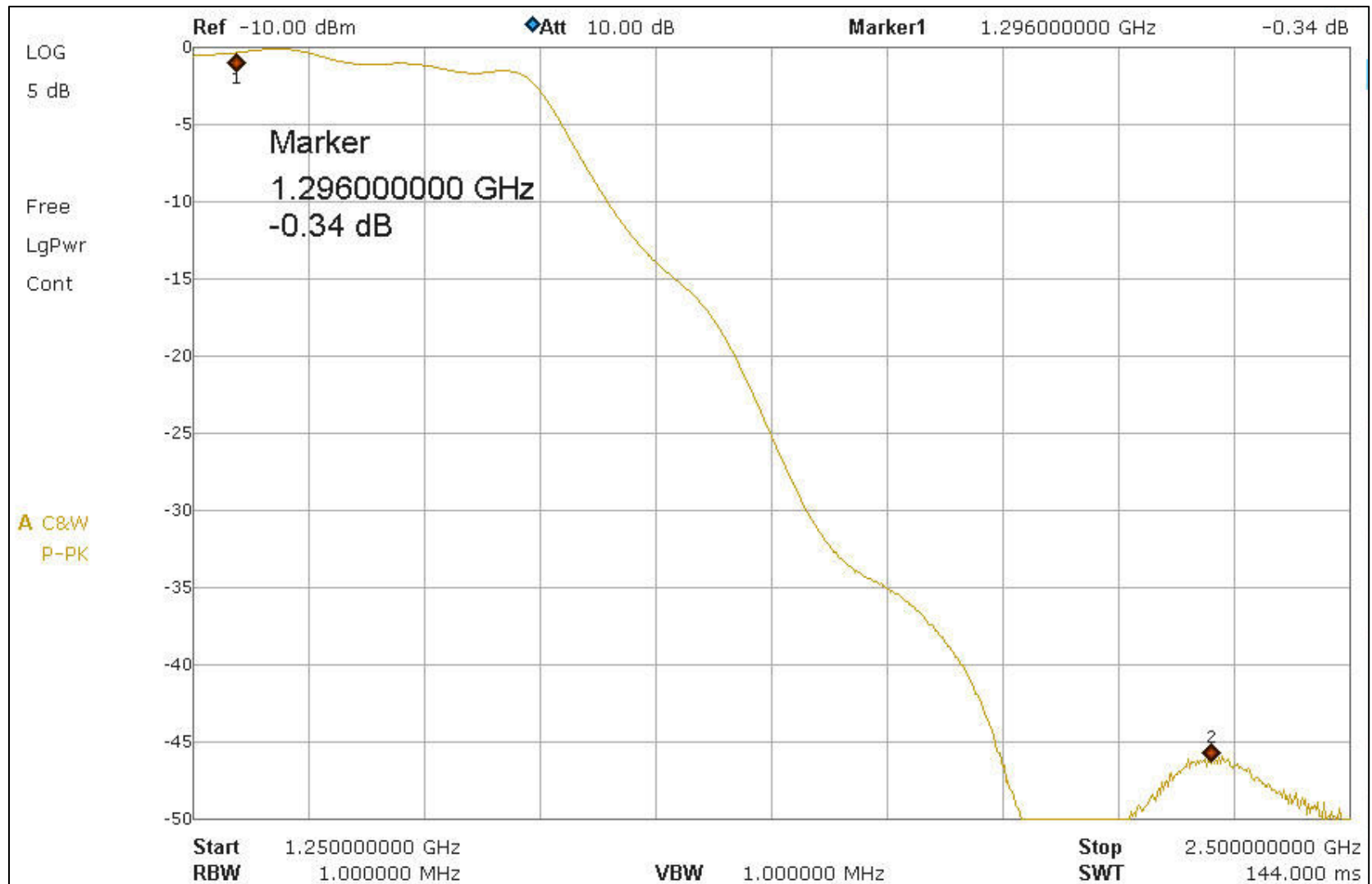
PA and TX IF PAD SCHEMATICS



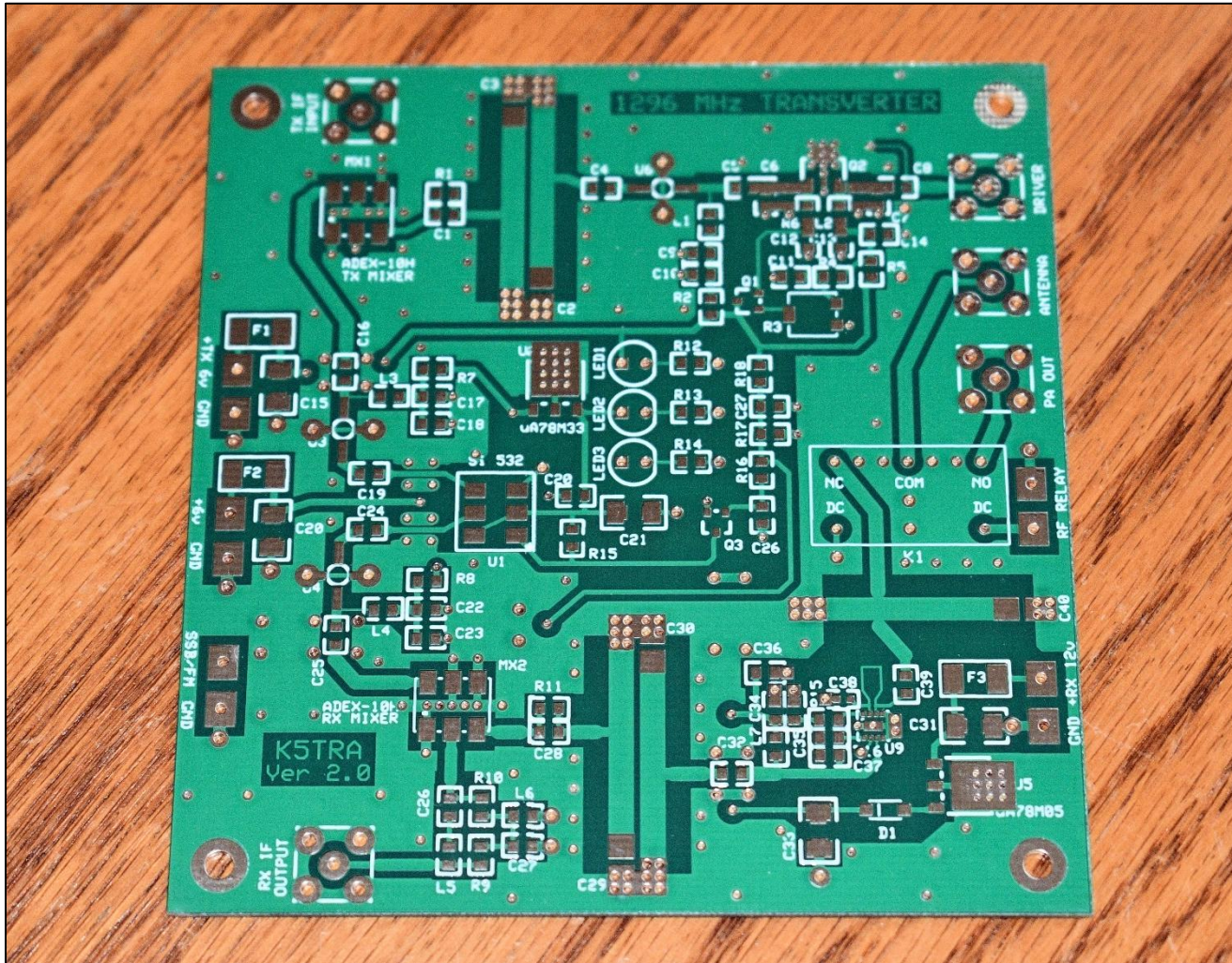
UHF IF PAD



PA LPF



23 CM RF BOARD



The schematic diagram illustrates the K5TRA 1296 MHz Transverter R, a complex electronic circuit designed for radio frequency (RF) transceiving. The circuit is divided into several functional blocks:

- TX Mixer Section:** Utilizes a TX mixer (J2) and a TX IF section (MX1) to process the transmitted signal. It includes components like C1, R1, C2, R2, C3, R3, C4, R4, C5, R5, C6, R6, C7, R7, C8, R8, C9, R9, C10, R10, C11, R11, C12, R12, C13, R13, C14, R14, C15, R15, C16, R16, C17, R17, C18, R18, C19, R19, C20, R20, C21, R21, C22, R22, C23, R23, C24, R24, C25, R25, C26, R26, C27, R27, C28, R28, C29, R29, C30, R30, C31, R31, C32, R32, C33, R33, C34, R34, C35, R35, C36, R36, C37, R37, C38, R38, C39, R39, C40, R40, C41, R41, C42, R42, C43, R43.
- TX PA Section:** Employs a TX PA section (U3) and a TX PA section (U4) to amplify the transmitted signal. It includes components like C1, R1, C2, R2, C3, R3, C4, R4, C5, R5, C6, R6, C7, R7, C8, R8, C9, R9, C10, R10, C11, R11, C12, R12, C13, R13, C14, R14, C15, R15, C16, R16, C17, R17, C18, R18, C19, R19, C20, R20, C21, R21, C22, R22, C23, R23, C24, R24, C25, R25, C26, R26, C27, R27, C28, R28, C29, R29, C30, R30, C31, R31, C32, R32, C33, R33, C34, R34, C35, R35, C36, R36, C37, R37, C38, R38, C39, R39, C40, R40, C41, R41, C42, R42, C43, R43.
- RX IF Section:** Utilizes a RX IF section (J1) and a RX IF section (MX2) to process the received signal. It includes components like C1, R1, C2, R2, C3, R3, C4, R4, C5, R5, C6, R6, C7, R7, C8, R8, C9, R9, C10, R10, C11, R11, C12, R12, C13, R13, C14, R14, C15, R15, C16, R16, C17, R17, C18, R18, C19, R19, C20, R20, C21, R21, C22, R22, C23, R23, C24, R24, C25, R25, C26, R26, C27, R27, C28, R28, C29, R29, C30, R30, C31, R31, C32, R32, C33, R33, C34, R34, C35, R35, C36, R36, C37, R37, C38, R38, C39, R39, C40, R40, C41, R41, C42, R42, C43, R43.
- RX PA Section:** Employs a RX PA section (U5) and a RX PA section (U6) to amplify the received signal. It includes components like C1, R1, C2, R2, C3, R3, C4, R4, C5, R5, C6, R6, C7, R7, C8, R8, C9, R9, C10, R10, C11, R11, C12, R12, C13, R13, C14, R14, C15, R15, C16, R16, C17, R17, C18, R18, C19, R19, C20, R20, C21, R21, C22, R22, C23, R23, C24, R24, C25, R25, C26, R26, C27, R27, C28, R28, C29, R29, C30, R30, C31, R31, C32, R32, C33, R33, C34, R34, C35, R35, C36, R36, C37, R37, C38, R38, C39, R39, C40, R40, C41, R41, C42, R42, C43, R43.
- Control Section:** Includes a control section (U1) and a control section (U2) to manage the transverter's operation. It includes components like C1, R1, C2, R2, C3, R3, C4, R4, C5, R5, C6, R6, C7, R7, C8, R8, C9, R9, C10, R10, C11, R11, C12, R12, C13, R13, C14, R14, C15, R15, C16, R16, C17, R17, C18, R18, C19, R19, C20, R20, C21, R21, C22, R22, C23, R23, C24, R24, C25, R25, C26, R26, C27, R27, C28, R28, C29, R29, C30, R30, C31, R31, C32, R32, C33, R33, C34, R34, C35, R35, C36, R36, C37, R37, C38, R38, C39, R39, C40, R40, C41, R41, C42, R42, C43, R43.

The circuit is powered by a +6V supply (F1, F2) and a +12V supply (F3). It features various passive components, including capacitors (C1-C43), inductors (L1-L7), and resistors (R1-R18). The TX PA section includes a driver output (J3) and a PA output (J4). The RX PA section includes a PA output (J5) and an RF relay (K1). The control section includes a switch (SW1) and a relay (K1). The schematic is labeled "K5TRA" and "1296 MHz Transverter R".

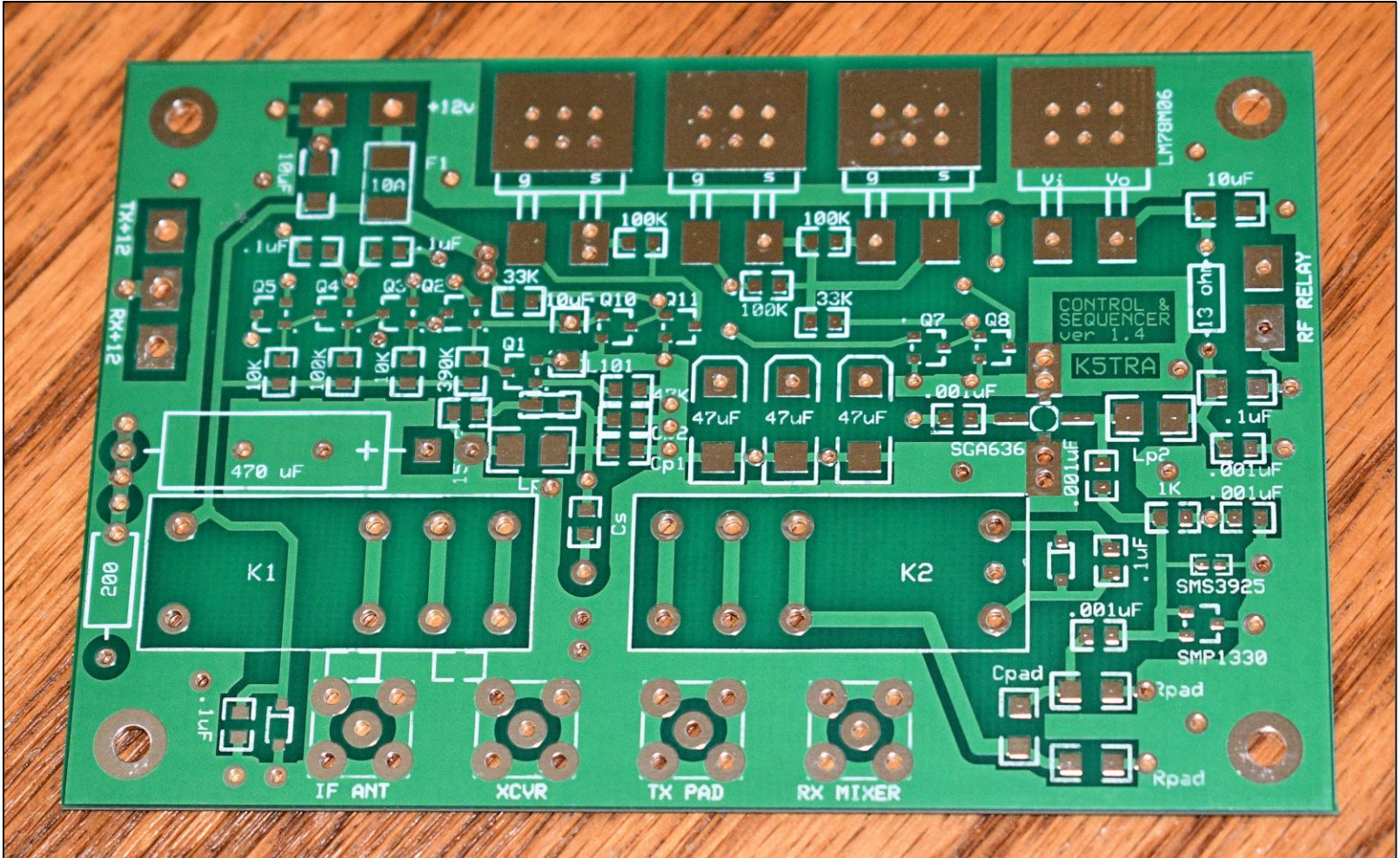
K5TRA		
1296 MHz Transverter RF		
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23 CM GAIN and POWER BUDGET

TRANSMIT		
	Gain	Output Level
RF relay	-0.2	43.0
LPF	-0.3	43.2
PA	22.0	43.5
Pad	-1.5	21.5
BPF	-0.5	23.0
Driver	12.0	23.5
PreDriver	14.0	11.5
BPF	-0.5	-3.0
Mixer	-7.0	-2.5
TX IF pad	-40.5	4.5
IF XCVR		45.0
Total Gain = 38.0		

RECEIVE		
	Gain	Input Level
RF relay	-0.2	-138.0
Input resonator	-0.6	-138.2
LNA	19.0	-138.8
BPF	-0.5	-119.8
Mixer	-7.0	-120.3
Bridged-T	-1.0	-127.3
RX IF Amp & pad	9.0	-128.3
IF XCVR		-119.3
Total Gain = 18.7		

SEQUENCER BOARD

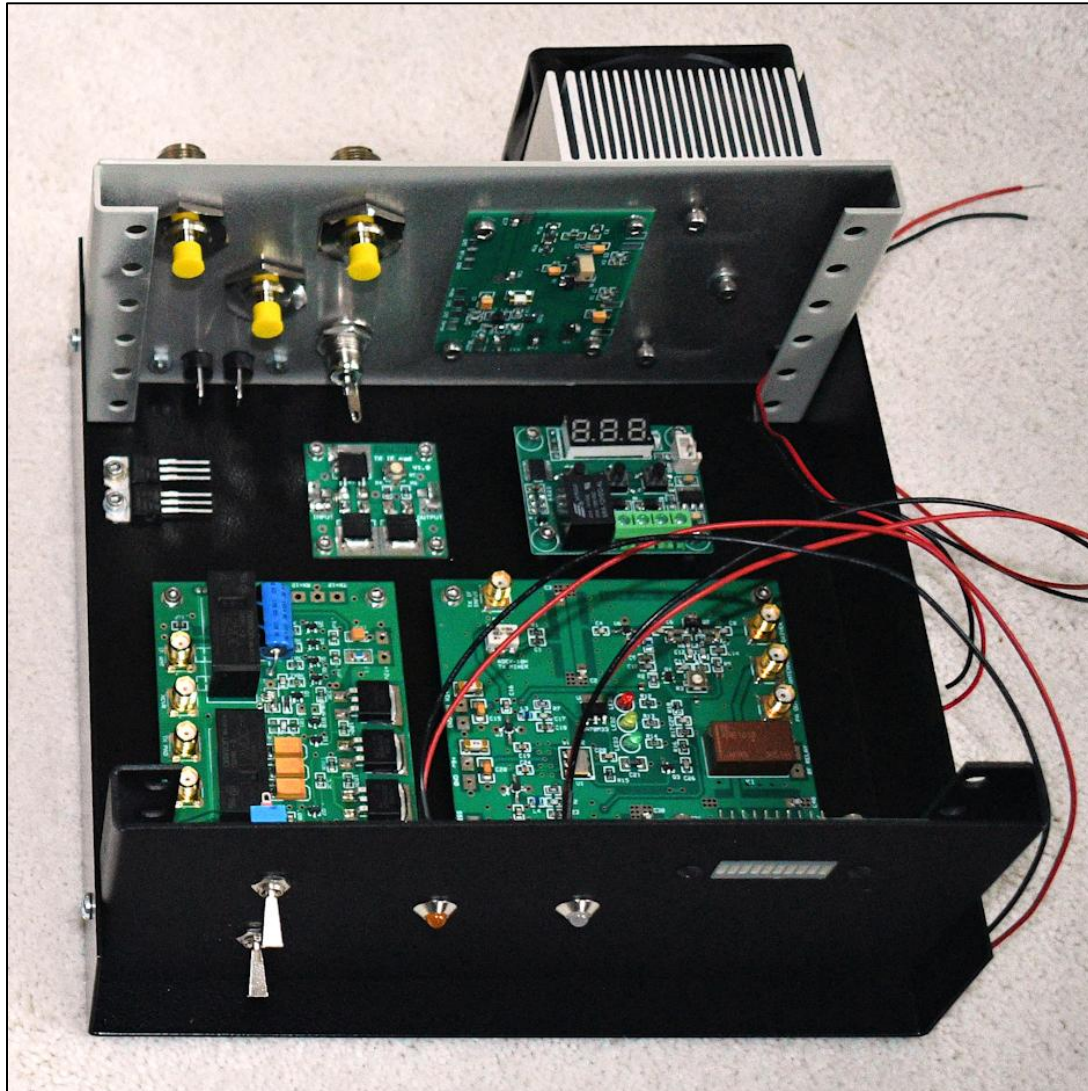


K5TRA



K5TRA		
Transverter Control		
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CHASSIS & BOARDS BEFORE WIRING



COMPLETED TRANSVERTER – TOP VIEW



REAR PANEL of 23CM and 33CM UNITS



QUESTO E' TUTTO

