DEM 1296-144
23 cm Transverter, and Transverter Kits

Specifications

| Frequency range: | 1296 MHz = 144 MHz. |
| Noise Figure and Gain: | <1.5 dB NF, > 17 dB Gain with a +17dBm high level mixer |
| Power Output: | >3 Watts. Lower levels with different configurations |
| TXIF Drive level: | 1 mW to 10 watts maximum |
| DC Power requirements: | 13.8 VDC nominal. 11 to 16.5 VDC operational. |
| DC Current drain: | 500 mA to 2 Amps depending on output power level. |

General Information:

Down East Microwave’s new 23 cm Transverter and kits are now available. The transverter, the DEM1296-144 may be ordered with many different IF and RF configurations as well as a 28MHz IF version. Substitute 28 for the 144 in the part number. The 1296-144 transverter has both a RF and IF switch built in to the circuit board. The RF switch may be bypassed for separate TX and RX ports for 23 cm. The connectors are SMA only for the split TR configuration and a type “N” female for the common antenna port. The IF switch may also be bypassed if you transceiver has its TR port split. A IF drive level of up to 10 watts may be applied with any configuration. Lower drive levels may be used (1 mW minimum) if the attenuators are bypassed. All IF connections are BNC connectors. Keying the transverter is done by either a voltage or a ground on transmit. It is not RF sensed. The transverter has an auxiliary connection to power a external TR switch or a power amplifier.

The transverter kits are either a circuit board kit, the DEM1296-144K and a complete kit, the DEM1296-144CK. The 1296-144K circuit board kits are for experimenters only. The circuit board kit is complete with all components required to produce a 10 mW transverter with the standard specified receiver performance. It can be the basis of a high powered transverter system if coupled with a high gain, high power amplifier. The PCB kit alone may be difficulty to mount in a standard die cast enclosure because of the mechanical layout of the helical filters and the overall design of the printed circuit board. If you desire to build a 3 watt output version in a kit form, we strongly recommend the complete kit.

The 1296-144CK is the kit version of our assembled transverter. It has a machined mounting plate that enables the hybrid to be mounted with the circuit board and connector mounting plate. It also provides heat sinking of the hybrid and ensures proper grounding with the circuit board and oscillator shield. The transverter may then be assembled and tested before installing it in the enclosure. This is a handy feature if troubleshooting is required on the circuit board.

A circuit board is available as the DEM1296-144PCB. This circuit board is definitely for experimenters only. It comes with the complete kit document so you may review it and if you decide to purchase the complete kit, it will only cost the difference of the two.

Circuit Description:

Looking at the 1296-144 circuit board, the first thing that is noticed is the absence of the printed hairpin filters. Although they were a very important feature of the traditional “No-Tune” transverter design, they have been replaced with miniature 3 pole helical filters. The good news is that the design is still “No-Tune” because the filters used do not require adjustment. The use of these filters is the reason for the increased performance of the design and the “narrowing” of the operation bandwidth of the receive converter. If you wish to examine the difference of the “Old verses New” designs, take an
opportunity to read a paper soon to be placed in the library section on the Down East Microwave web site. For full operation details please continue here.

Basic improvements over the older designed 23 cm transverter are as follows.

1. A high level mixer and local oscillator output of +17dBm after it is double filtered to reduce noise in the mixer.
2. A tuned low noise PHEMT FET low noise amplifier with LC input circuitry that is biased for high third order intercept performance. This improves out of band performance before filtering.
3. 2 separate 3 pole helical filters in the RX stage before the mixer that narrows the operation bandwidth of the transverter.
4. A high level IP3 performance second RX gain stage that will not compress before the mixer.
5. Built in IF switching and level control of up to 10 watts of drive.
6. Additional transmit filtering to produce second harmonic levels of under -65 dBC and local oscillator leakage of -80 dBC.

The theory of operation is as follows. A local oscillator of 192 MHz is multiplied 6 X, filtered, and amplified to the +17dBm level and is injected into a high level mixer. In receive, the 23 cm signal enters through either the RX port or the common antenna port. It is amplified by a high level, tuned input PHEMT FET low noise amplifier that has approximately 15-16 dB of gain with <1.0 dB noise figure. The amplified signal then passes through a 3 pole helical filter that allows approximately 20 MHz of amplified bandwidth. This signal is then amplified by a high level MMIC before being filtered by a 3 pole helical filter that further restricts the receivers operational bandwidth. This signal enters the high level mixer and exits the IF port of the mixer. It then passes through a VHF band pass filter and optional high IP3 gain stage with a variable attenuator. Then depending on the configuration, it will pass through the IF switch or not before becoming available to the 2 meter receiver.

On transmit, it is a reverse process. The 2 meter transceiver applies a signal of up to 10 watts of drive and it is then switched, attenuated and filtered before entering into the mixer. The 23 cm transmit signal then exits the mixer and is filtered by a 3 pole helical before being switch to the transmit gain stages. It is then amplified up to approximately +15 dBm before it is filtered again to reduce the LO component even further. At this point the signal can be used as is or be amplified up to the 3 watt level before either exiting the TX port or the common antenna port.