

**DEM Part Number: MINI2304**

\_\_\_\_\_ MHz Low Level Transverter with \_\_\_\_\_ MHz IF, S/N \_\_\_\_\_

Power Out:	>50 mW linear	
Noise Figure and Gain:	1.5 dBNF ,>17 dBG nominal (without IF gain Stage)	
DC Power Requirement:	12 - 15.5 VDC, 13.8 nominal @ 0.6 Amps	
IF Option:	Common	Separate TX &RX
IF Drive Level Maximum:	-20dBm 0dBm 100 mW 1-10watts Other	
Keying Option:	PTT-L ( to ground)	PTT-H (Positive Voltage)
RF Option:	Common	Separate TX & RX
RXIF Gain Stage Installed:	YES	NO

**Operational Overview:**

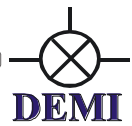
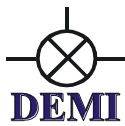
The DEM MINI2304 is a low power transverter that is designed to utilize a 28, 50 or 144 MHz IF. If you have used any DEM or Q5 transverters in the past, you will find the DEM MINI2304 transverter has many of the same standard features. Read through this document before attempting set up and you should have a full understanding of how to install the MINI in your system. BUT—always refer to this simple procedure, component placement document and the configuration listed above. The MINI2304 configuration is indicated above and should be ready to operate in your system. If a discrepancy is found consult DEMI or see the user options on the last pages of this document for direction on how to re-configure the MINIVERTER.



**Connecting and using the MINI2304:**

The local oscillator stability is provided by a **Q5 Signal digiLO**. This provides the transverter with frequency stability from its accurate internal source or can be connected to an external 10 MHz source via the small SMA connector. The digiLO also provides the versatility in selecting a IF frequency, but understand there are other components in the IF side of the transverter that allow the difference in IF frequency.

The MINI2304 is supplied with an assembled cable that contains the DC input, The PTT input and the PTT output. The cables are marked. The transverter has 2 BNC connectors on the IF and 2 SMA connectors on the RF side but depending on the IF/RF configuration, as many as two connectors may not be in use. Consult the configuration on the top page for the actual active connectors then make the coaxial connections to the transceiver and connect the RF connection to your microwave system or your measuring equipment if you require to first set the output level. Then connect the DC cable to the same 13.8 VDC power supply the transceiver is connected to.



The transverter does not have an ON/OFF switch and is controlled by the DC input only. If your transceiver has an auxiliary +DC output, please be sure it is able to supply up to 1 Amp of current before utilizing it. The PTT IN is connected to your transceiver or your systems sequencer. The PTT-OUT may be connected to the microwave system directly if a sequencer is not in use. The PTT-OUT is grounded during transmit and can sink 100 mA. Remove the bottom flanged cover and locate the TXIF and RXIF adjustments. The RXIF is set to Zero attenuation and the TXIF is set to maximum attenuation generating the lowest RF output level.

**Begin testing:**



Apply power to the system and verify that it is in receive mode. The Lock LED should be lit on the MINI and will be RED if you are utilizing its internal source or Green if you are using a external 10 MHz source. Next verify the receive noise floor. With all of the system equipment on, the MINI RXIF gain can be adjusted to a comfortable receive level with a slight S meter deflection. You can disable your microwave system's

LNA to verify the noise floor drops. Also tune to a microwave signal or generate one to verify receiver performance.

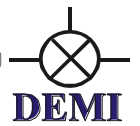
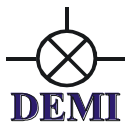
To test the transmit, without applying any IF drive to the system, key the PTT to verify the Red TXON led is lit on the MINI and the microwave system cycles correctly. Next in CW mode, apply the desired drive level with your transceiver. You may notice some output power in your microwave system or your measuring equipment connected to the MINI. Now slowly adjust the TXIF gain control in the MINI to achieve the desired output level of your microwave system or the required measured output of the MINI. The MNI4 will go beyond the +17 dBm output but will soon start to compress. Also output above +17 dBm may contain undesirable spurious signals. If all is at the correct level, you are ready to go. Close the MINI and place it mechanically in your system for operation.

**DEM MINIVERTER User Options:**

Depending on the configuration of your MINI, all components listed in the parts list, on the component placement diagram, and in the schematic, may or may not be installed or utilized. All components are listed and indicated on the component placement document so that all options may be installed or un-installed as desired.

**1. RF connections:** Reconfiguration of the RF ports may be done at any time if desired. The SMA connectors are installed and the difference between common RF connection and a separate TX and RX connection depends on the placement of C4. It is labeled C4 and C4b on the component placement. Install or un-install as follows. Use C4 for Separate TX and RX connections. Use C4b for a common connection.

**2. IF connections:** Reconfiguration of the IF ports may be done at any time if desired. The BNC connectors are installed and the difference between a common IF connection and a separate TXIF and RXIF connection depends on the placement of C43. It is labeled C43a and C43b on the



component placement. Install or un-install as follows. Use **C43a** for a common IF connection and use **C43b** for separate IF connections.

**3A. Optional TXIF Gain Stage:** If you require using a TXIF drive level of less than 1 mW (0 dBm) you have the option of installing a additional gain stage in the TXIF section of the transverter. Please feel free to consult Down East Microwave Inc. for the proper MMIC. The MMIC is then placed in the U11 position after cutting the shorting ribs. Refer to the component placement diagram and proceed to install MMIC. Understand depending on the MMIC installed, the value of R27 may need to be changed. Also understand, adding this stage will not increase the RF output of the transverter beyond its specified limit.

**3B. Optional TXIF Attenuation:** If you decide to increase to or decrease from the drive level range between 1 and 10 watts. It requires the removal or installation of R44 and the value change of C54. This is not a simple task and requires the circuit board removal. If you decide to attempted this you may consult DEMI for the required components. In addition, if you are installing R44, R39 and D12 are also required.

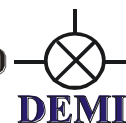
**4. Optional RXIF Gain Stage:** If you require additional RXIF gain such as if the MINI is installed remotely with a long RXIF cable, you have the option of installing a additional gain stage in the RXIF section of the transverter. Please feel free to consult Down East Microwave Inc. for the proper MMIC. The MMIC is then placed in the U10 position after cutting the shorting ribs. Refer to the component placement diagram and proceed to install MMIC. Understand depending on the MMIC installed, the value of R35 may need to be changed.

**5. PTT-H or PTT-L:** If you require to change the PTT input from either High or Low, simply change the position of the wire on the circuit board. Verify for the new solder connection is not shorted to ground.

**6. Changing the IF frequency:** The 28 MHz IF version does not have any options. The 144 MHz version has options to change to 145 MHz It also can be changed to 50 MHz if desired. The 144MHz IF version can also operate at a RF output frequency of 2320. Consult the Q5 Signal digiLO frequency list or proper jumper settings. To change the IF frequency from 144MHz to 28 MHz requires additional components in the IF section of the transverter. It can be done if desired but consult Down East Microwave Inc for details.

### DC/PTT Connector Pin Out

Pin Number & Color	Function
1 RED	+ DC input, (11-17.5 VDC)
2	not connected
3 BLUE	PTT -IN (High or Low)
4	not connected
5 BROWN	PTT-OUT (Low on TX
6 – 9 Black, Green, White	Ground connection

**DEM MINI2304 RF Board Component List****Resistors (R) values are in Ohms and are chips unless otherwise specified.**

R1 36	R13 1.0K	R25 220K	R37 220
R2 220	R14 1.0K	R26 5.1K	R38 1 K POT
R3 36	R15 1.0K	R27 330	R39 470
R4 220	R16 5.1K	R28 470	R40 10K
R5 220	R17 5.1K	R29 5.1K	R41 470
R6 100	R18 5.1K	R30 5.1K	R42 220
R7 36	R19 1.0K	R31 5.1K	R43 1K POT
R8 220	R20 470	R32 10.0K	R44 50 Ohm Load
R9 100	R21 470	R33 10.0K	R45 220
R10 10K	R22 5.1K	R34 10K	R46 36
R11 10K	R23 10.0K	R35 330	R47 51
R12 1.5K	R24 5.1K	R36 220	

**Capacitors (C) values are in pF and are chips unless otherwise specified.**

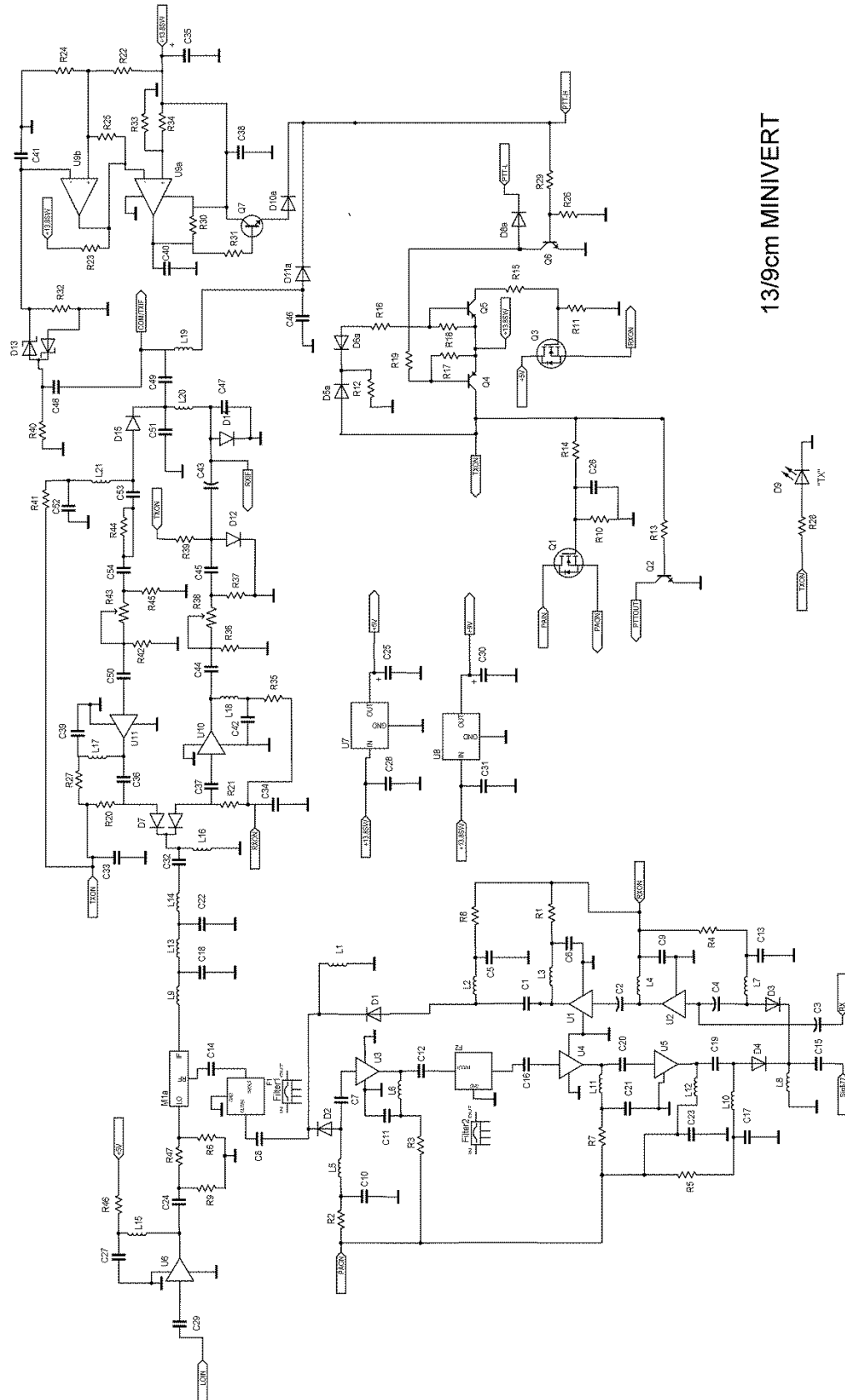
C1 15	C15 10	C29 15	C43a 1000
C2 15	C16 10	C30 4.7 $\mu$ F	C43b 1000
C4 100	C17 100	C31 0.1 $\mu$ F	C44 1000
C4b 100	C18 120 **	C32 1000	C45 1000
C5 100	C19 15	C33 1000	C46 1000
C6 0.1 $\mu$ F	C20 15	C34 1000	C47 120 **
C7 15	C21 0.1 $\mu$ F	C35 4.7 $\mu$ F TANT	C48 3
C8 10	C22 120 **	C36 1000	C49 1000
C9 0.1 $\mu$ F	C23 0.1 $\mu$ F	C37 1000	C50 1000
C10 100	C24 1000	C38 1000	C51 120 **
C11 0.1 $\mu$ F	C25 4.7 $\mu$ F TANT	C39 .1 $\mu$ F	C52 1000
C12 10	C26 4.7 $\mu$ F TANT	C40 .1 $\mu$ F	C53 1000
C13 100	C27 0.1 $\mu$ F	C41 1000	C54 1000
C14 10	C28 0.1 $\mu$ F	C42 .1 $\mu$ F	

**Inductors (L) are in nH**

L1 100	L7 100	L13 330 **	L19 1.0 uH
L2 100	L8 100	L14 220 **	L20 220 **
L3 100	L9 220 **	L15 100	L21 1.0 uH
L4 100	L10 100	L16 1.0 uH	
L5 100	L11 100	L17 1.0 uH	
L6 100	L12 100	L18 1.0 uH	

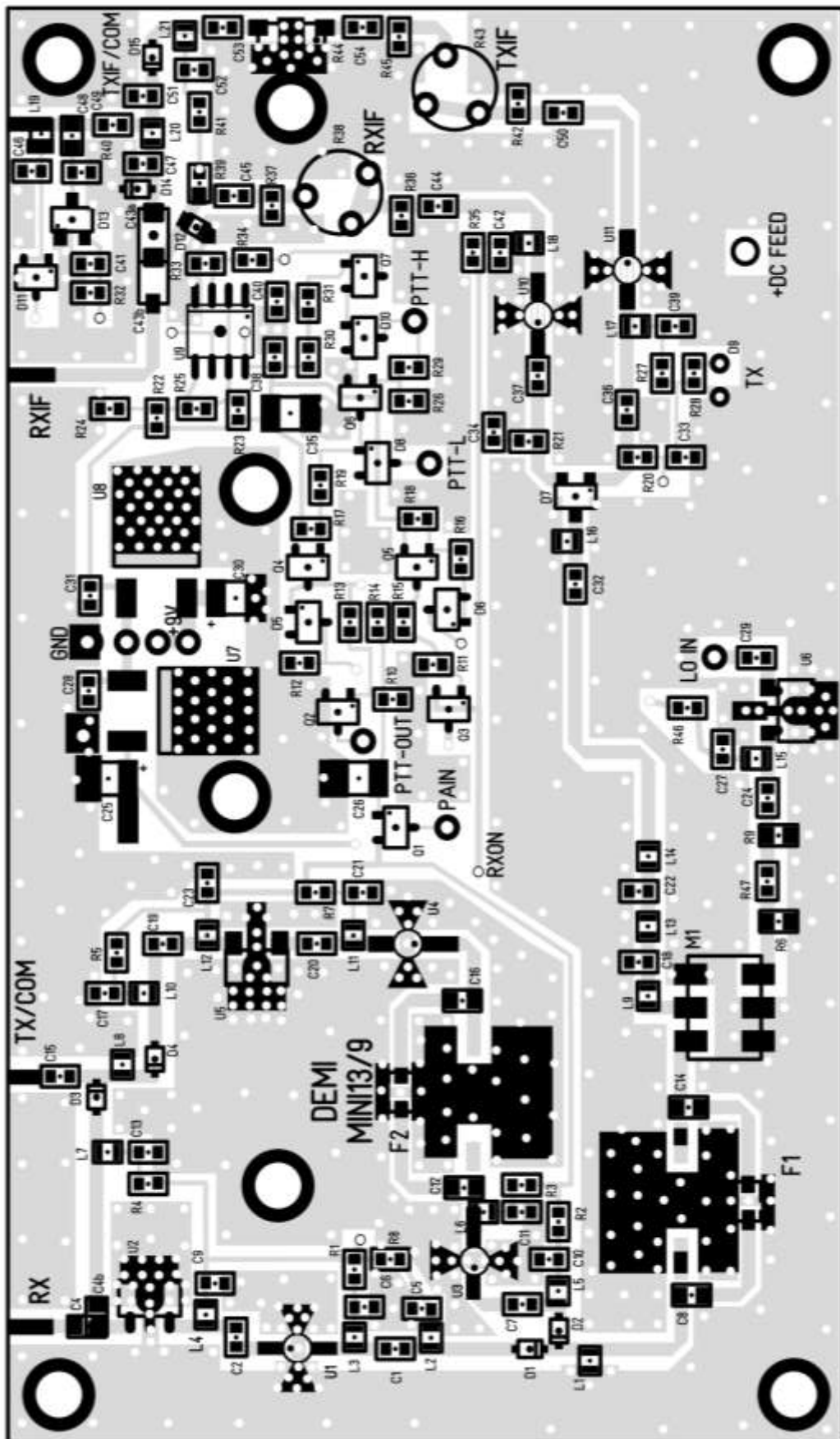
D1 BAP50	D10 MMBD914	Q1 FDV303	U3 ERA2
D2 BAP50	D11 MMBD914	Q2 MMBT3904	U4 ERA2
D3 BAP50	D12 BAP50	Q3 FDV303	U5 PHA-1
D4 BAP50	D13 HSMS8202	Q4 MMBT3906	U6 ERA2
D5 MMBD914	D14 BAP50	Q5 MMBT3906	U7 78M05
D6 MMBD914	D15 BAP50	Q6 MMBT3904	U8 78M09
D7 HSMS3814	F1 2304 MHz filter	Q7 MMBT3904	U9 LM393
D8 MMBD914	F2 2304 MHz filter	U1 ERA2	U10 ERA2
D9 LED	M1 ADE-3G	U2 TQP3M9008	U11 MAR6

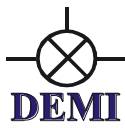
**\*\* For 144 MHz IF operation note the following: L9 and L14 are 100 pf. C18 and C22 are 33pF L13 is 56 nH. C47 and C51 are 15 pF and L20 is 100 nH**



13/9cm MINIVERT







**Special Notes:**

Because of the filtering in the IF section of the Mini transverter, changing the IF frequency of operation from 28 MHz to 144 MHz requires circuit board component adjustment along with changing the setting of the DigiLO synthesizer. It is possible to change from a 144 MHz IF to a 50 or 28 MHz IF with reduced performance by just selecting the correct jumper setting on the DigiLO. Below is a list of RF to IF frequency combinations that may be utilized if desired with the indicated jumper selections of the DigiLO. It is also important to note the transverter will not operate at 2400 or 2424 MHz without a RF filter change but will function at 2320 MHz if desired.

RF Frequency in MHz	IF Frequency in MHz	Jumper Settings
2304	28	3,1
2304	144	3,0
2304	145	4,2,0
2304	50	7,6,5,0
2320	144	7,6,5
2304	29	Future Consideration
2304	52	Future Consideration

If the desire is to change the IF range between VHF and HF, it is best to consult DEMI for retrofit components indicated on the component list or allow us to make the circuit changes for you.