

**DEM Part Number: MINIVERTER**

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

Power Out:	50 mW linear (+17 dBm)	
Noise Figure and Gain:	3.0 dBNF ,5 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 MINIVERTER is a low level single band transverter that was designed to provide an 2<sup>nd</sup> IF converting a Microwave transverters to a HF or VHF transceiver. If you have utilized any DEM or Q5 transverters in the past, you will find the MINIVERTER 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 MINIVERTER’s 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 MINIVERTER:**

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. It is recommended that if the MINI is utilized as a 2<sup>nd</sup> IF for a frequency locked microwave transverter, that both transverters should share the same 10 MHz source.

The MINIVERTER 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 4 RF connectors (BNC ,N or SMA) but 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 system, microwave transverter, 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 directly to the microwave system 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.

**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's RXIF gain can be adjusted to a comfortable

receive level with a slight S meter deflection. You can disable the microwave system to verify the noise floor drops. Also tune to a RF 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 rest of the 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 when connected to the MINI. Now slowly adjust the TXIF gain control in the MINI to achieve the desired output level of your RF system or the required measured output of the MINI. The MNI 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:**

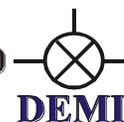
Depending on the configuration of your MINI, all components listed in the parts list, on the component placement diagram, and in the schematic, may or may not be installed or utilized. All components are listed and indicated on the component placement document so that all options may be installed or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

**1. RF connections:**

Reconfiguration of the RF ports may be done at any time if desired. The RF connectors are installed and the difference between common RF connection and a separate TX and RX connection depends on the placement of **C15**. It is labeled **C15a** and **C15b** on the component placement. Install or un-install as follows. Use **C15b** for Separate TX and RX connections. Use **C15a** for a common connection.

**2. IF connections:**

Reconfiguration of the 10M 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 **C37**. It is labeled **C37a** and **C37b** on the component placement. Install or un-install as follows. Use **C37a** for a common IF connection and use **C37b** 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 U7 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 R39 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 R15 and the value change of C35. 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 R15, R44 and D15 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 U5 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 R40 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 the new solder connection is not shorted to ground. If +DC keyin on the coax is desired, L22 will need to be installed

**6. Changing the Operating Frequency:**

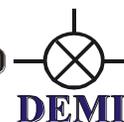
This requires reviewing the jumper setting chart of the digiLO and removing and selecting new positions. But because id the IF filtering, the transverter will not operate correctly if you choose to move the IF frequency to a different band. You may select any frequency combination that keeps the IF frequency in the same range. i.e, 28 to 30 MHz, or 144 to 146 MHz. If you desire to change the IF band, please consult DEMI.

**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 MINI144 RF Board Component List**

**Resistors (R) values are in Ohms and are chips unless otherwise specified.**



R1 300	R12 1K POT	R24 10.0K	R35 470
R2 220	R13 220	R25 10.0K	R36 5.1K
R3 220	R14 220	R26 5.1K	R37 36
R4 18	R15 Load or Jumper	R27 5.1K	R38 36
R5 330	R16 470	R28 10.0K	R39 330
R6 220	R18 1.0K	R29 1.0K	R40 330
R7 470	R19 10.0K	R30 5.1K	R41 1.0K
R8 470	R20 10.0K	R31 5.1K	R42 5.1K
R9 220	R21 1.0K	R32 10.0K	R43 1.5K
R10 220	R22 1.0K	R33 10.0K	R44 470
R11 1K POT	R23 1.0K	R34 220.0K	

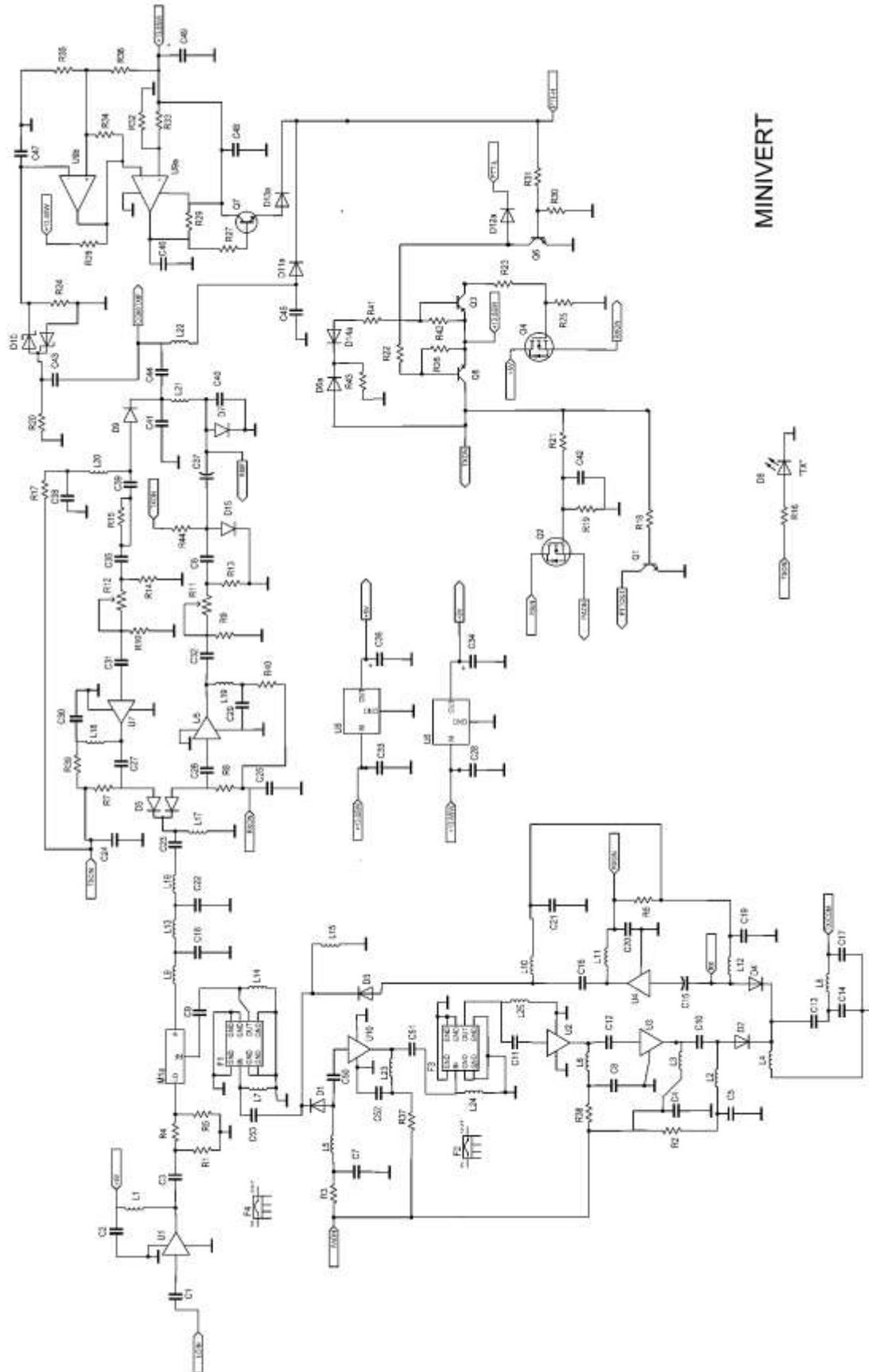
**Capacitors (C) values are in pF and are chips unless otherwise specified.**

C1 100	C15a,b 100	C29 0.1 $\mu$ F	C43 3
C2 0.1 $\mu$ F	C16 100	C30 0.1 $\mu$ F	C44 1000
C3 100	C17 33	C31 1000	C45 1000
C4 0.1 $\mu$ F	C18 120	C32 1000	C46 0.1 $\mu$ F
C5 1000	C19 1000	C33 0.1 $\mu$ F	C47 1000
C6 1000	C20 0.1 $\mu$ F	C34 4.7 $\mu$ F TANT	C48 1000
C7 1000	C21 1000	C35 1000	C49 4.7 $\mu$ F TANT
C8 0.1 $\mu$ F	C22 120	C36 4.7 $\mu$ F TANT	C50 100
C9 12	C23 1000	C37a,b 100	C51 12
C10 100	C24 1000	C38 1000	C52 0.1 $\mu$ F
C11 100	C25 1000	C39 1000	C53 12
C12 100	C26 1000	C40 120	
C13 100	C27 1000	C41 120	
C14 33	C28 0.1 $\mu$ F	C42 4.7 $\mu$ F TANT	

**Inductors (L) are in nH**

L1 330	L8 56	L15 1.0 uH	L22 1.0 uH
L2 1.0 uH	L9 220	L16 220	L23 330
L3 330	L10 1.0 uH	L17 1.0 uH	L24 56
L4 1.0 uH	L11 330	L18 1.0 uH	L25 56
L5 1.0 uH	L12 1.0 uH	L19 1.0 uH	
L6 330	L13 330	L20 1.0 uH	
L7 56	L14 56	L21 270	

D1 BAP50	D10 HSMS8202 (OPT)	Q1 MMBT3904	U3 PHA-1
D2 BAP50	D11 MMBD914	Q2 FDV303	U4 TQP3M9008
D3 BAP50	D12 MMBD914	Q3 MMBT3906	U5 MAR6 (OPT)
D4 BAP50	D13 MMBD914	Q4 FDV303	U6 78M09
D5 HSMS3814	D14 MMBD914	Q6 MMBT3904	U7 MAR6 (OPT)
D6 MMBD914	D15 BAP50	Q7 MMBT3904	U8 78M05
D7 BAP50	F1/F4 SAW filter	Q8 MMBT3906	U9 LM393
D8 LED	F2/F3 SAW filter	U1 MAR4	U10 ERA2
D9 BAP50	M1 ADE-5+ or ADE-3G	U2 ERA2	



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