

Q5 SIGNAL 10MHz AMPLIFIED AND FILTERED 4-WAY DIVIDER

A Down East Microwave Product Manufactured by Q5 SIGNAL, LLC

Part Number L10-4, CK, and B

DESCRIPTION:

The DEM L10-4 was designed to utilize one single 50 Ohm 10 MHz signal input up to a level of +10dBm and provide 4 separate filtered 50 Ohm 10 MHz outputs at or near the same level with all harmonic levels much lower than the original input signal. This design also maintains high port to port isolation. The DEM L10-4 is provided as an assembled unit. If this is what you have purchased please move to the "Operation" section of this document. If you have purchased the L10-4 as a kit in any form, please start with reading the complete document first, and then go to the "Circuit Board Assembly" section of this document, as a complete kit as the DEM L10-4CK, and as a board kit as the DEM L10-4B. The assembled and CK version are provided with BNC type connectors as a standard but may be ordered with SMA female connectors or combinations of for an additional cost. The DC power is provided with a matching set of DC connectors for easy hook up. The B version is a pre-assembled circuit board only requiring the 4 MMIC's, and one large chip capacitor to be installed for operation and ready for your own enclosure.

CIRCUIT BOARD ASSEMBLY:

The circuit board assembly is easy. Consult the circuit board diagram at the end of this document for the placement of U1 – U4. Install using the dots on the input side of the MMIC as alignment. Do not be afraid of overheating the ground leads while attempting to get a good solder flow. Next, install C33 paying attention to the polarity. The band is the positive side of the chip. Flow the ground side will require a lot of heat. The Board is ready to be utilized in your system after checking with an ohm meter for shorts around the MMICs and C33. The board is ready to utilize as is if you complete you own RF and DC connections. Follow the next steps for the Complete Kit.

COMPLETE KIT ASSEMBLY:

If you have the complete kit, the L10-4CK, drop the board into the enclosure and attach it with four 4-40 pan head screws. Start all screws first, and then tighten. Next, trial fit all RF connectors to verify if the Teflon extends past the inside wall of the enclosure or not. If so, trim the excess flush with the inside wall. You may also trim the pin of the connector if it extends past the exposed metal on the circuit board. If all fits, attach the connectors with the remaining 4-40 pan screws and after screws are tight, solder the pins.

Next install the DC connector. Start by placing the PC board mount connector in the position as indicated on the component placement diagram and then insert the external pin connector through the clearance hole in the enclosure and mate the connectors. This will determine the correct placement of the PC board connector. Solder the three tabs of the board connector while the connectors are mated. When finished, verify that the connectors connect and disconnect. Verify the connection with an Ohm Meter for shorts or opens.

Next install the LED holder in the remaining enclosure hole and install the LED leads in the circuit board. The Ground side of the LED is the shorter lead but you should trim the leads to an equal length so the positive lead does not pass through the board and touch the enclosure. Place the leads in the holes indicated on the component placement diagram and solder. After soldering bend the LED into position and insert it into the LED holder. Check for the positive lead being shorted to ground. If so, only heat that and pull it up through the circuit board. The 10-4 is now ready for test.

TEST:

Prep the DC input connector if you have the CK solder DC input wires to the board if you just have the board. Apply 11 to +18 VDC to the DC terminals. First check the regulator (9 VDC) and the voltages on the MMIC's. The MMIC's should be approximately 2.5 VDC on the input and 3.5 VDC on the output. If all is OK, connect a 10 MHz signal of a know level that is +10dBm or less to the input connector and measure the level of every output connector to verify its level. All four levels should be the same and very close to the level of the input signal applied. The other three output ports should be terminated when in use but do not need to be terminated for a brief test. Lack of termination will only affect the output level slightly and the isolation. Remove the input signal to verify actual signal amplification and is not oscillating. If all is operational and equal, the 10-4 is ready to use.

If you encounter any difficulty with the testing, review the voltage testing and/or the supply voltage. If using a "Wall Wart" type of supply, verify its supply current. A 200 mA supply is a good safety margin. If one port is not working as expected, check the chip capacitor that is close to the output pin that is low. Sometimes when heating the pin, the capacitor may become damaged. Then same for if the complete unit is low power. Check the input pin capacitor. Other factors are a bad MMIC but a difference in voltage would indicate the bad one and the supplied schematic would be helpful in checking other components on the board. Install the lid to the enclosure with the four 4-40 x ¼ flat head screws and the unit is complete.

OPERATION:

The DEM L10-4 is easy to use. There are no adjustments to make or levels to set. Just simply connect a DC source between 11 and 18 VDC that can source 200 mA. (The mating DC power connector is supplied) Then connect the 10 MHz input signal not exceeding +10dBm. The outputs will then produce the same level 10 MHz signal (+/- 2dBm) with the harmonic level being less than -35dBC. Be sure to terminate the unused ports with a 50 Ohm termination. A simple leaded resistor soldered to a connector and connected to the unused port is OK to use at 10 MHz. Output port to input port isolation is > 35 dB. Output port to output port isolation is > 25 dB. All isolation is measure with DC voltage applied. If you need more than 4 ports, simply add an additional DEM L10-4 to one of the output ports to increase it to 7 ports. You may add as many DEM L10-4's as you desire because the levels will remain the same as the input within +/- 2 dB. This level should be well within specification of most test equipment and frequency sources that require a 10 MHz reference signal.

Electronics PARTS LIST

All components on this list are standard size and are hand solder repairable if required. They are also stocked by DEMI if you require replacement. Highlighted components are installed by the Kit builder.

C1-C4, C5, C9-C12, C16-C20, C24-C27, C31, C32	0.1 μ F chip (pre installed)
C5, C7, C13, C15, C21, C23, C28, C30	390 pF chip (pre installed)
C6, C14, C22, C29	680 pF chip (pre installed)
C33	4.7 μF tantalum (band is positive)
L1 –L8	1.0 μ H 1008 chip (pre installed)
R1, R2, R5, R7, R9	33 Ω chip (pre installed)
R4, R6, R8, R10	120 or 130 Ω chip (pre installed)
R3	1000 Ω chip (pre installed)
U1- U4	MAR-3 or ERA-2 MMIC
VR1	78M09 SMD regulator (pre installed)
Misc.	LED

Hardware PARTS LIST

Pre-drilled box and lid
(5) connectors (BNC Standard)
0.6 mm PWR connector with matching Plug
LED Holder
(28) 4-40x 3/16" screws
(4) 4-40 x 1/4" flat head screws

