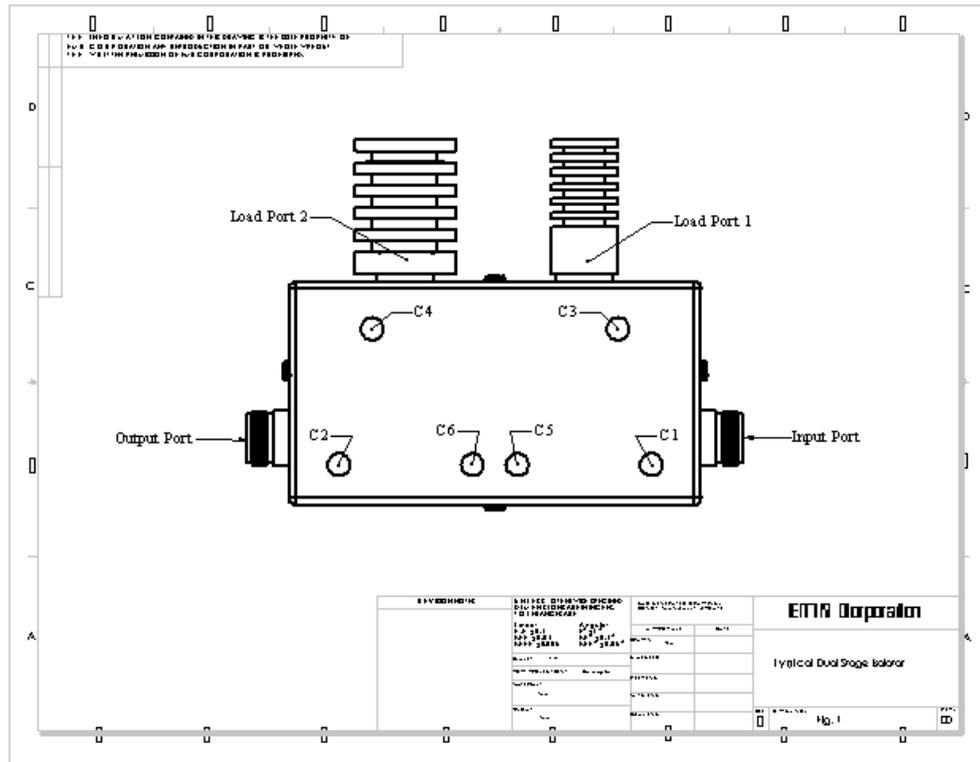


Dual Stage Isolator Field Tuning Instructions



Tuning Using a Network Analyzer

1. Set up and calibrate the analyzer for a frequency band that will accommodate the frequency bandwidth of the isolator (see the isolator specifications at the end of this document). Refer to the manufacturer's instructions for analyzer setup and calibration.
2. Set markers at the band center and edges.
3. Connect the analyzer port 1 (S11 or A/R) to the input port of the isolator and the analyzer port 2 (S21 or B/R) to the isolator output port (refer to the isolator diagram above).
4. Adjust C1 for best return loss.
5. Connect the analyzer port 1 (S11 or A/R) to the isolator output port and the analyzer port 2 (S21 or B/R) to the isolator input port.
6. Adjust C2 for best return loss. Adjust C3 and C4 for best isolation.
7. Connect the analyzer port 1 (S11 or A/R) to the isolator input port. Remove the load from load port 1 and connect the analyzer port 2 (S21 or B/R) to the isolator load port 1. Attach the load, which was taken from load port 1, to the isolator output port.
8. Adjust C5 and C6 for maximum isolation.

9. Place the load back on load port 1 and connect the analyzer port 1 (S11 or A/R) to the input port of the isolator and the analyzer port 2 (S21 or B/R) to the isolator output port. Record the insertion loss and input return loss measurements. Make sure these are within the specifications (see the specifications chart).
10. Connect the analyzer port 1 (S11 or A/R) to the isolator output port and the analyzer port 2 (S21 or B/R) to the isolator input port. Record the isolation and output return loss measurements. Make sure these are within the specifications.

Tuning Using a Spectrum Analyzer and Tracking Generator

1. Set the spectrum analyzer and tracking generator for the frequency band required to tune the isolator. Set the tracking generator power level for 0 dBm. Using an N(F-F) through adapter, reference the spectrum analyzer for 0 dBm (this will allow for a more accurate measurement of the isolator performance).
2. If available on the spectrum analyzer, set markers at the band center and edges.
3. Connect the tracking generator to the input port of the isolator and the spectrum analyzer to the isolator output port (refer to the isolator diagram above).
4. Adjust C1, C2, C5, and C6 for minimum loss (maximum signal).
5. Connect the analyzer to the isolator input port and the tracking generator to the isolator output port.
6. Adjust C3 and C4 for best isolation (minimum signal).
7. Connect the tracking generator to the isolator input port. Remove the load from load port 1 and connect the analyzer to the isolator load port 1. Attach the load, which was taken from load port 1, to the isolator output port.
8. Adjust C5 and C6 for maximum isolation (minimum signal).
9. Connect the tracking generator to the isolator output port. Remove the load from load port 2 and connect the analyzer to the isolator load port 2. Attach the load, which was taken from load port 2, to the isolator input port.
10. Adjust C2 for minimum loss (maximum signal).
11. Place the load back on load port 2 and connect the tracking generator to the input port of the isolator and the analyzer to the isolator output port. Record the insertion loss and make sure it is within the specifications (see the specifications chart).
12. Connect the analyzer to the isolator output port and the tracking generator to the isolator input port. Record the isolation and make sure it is within the specifications.

Tuning Using a Spectrum Analyzer, Tracking Generator & Return Loss Bridge

1. Set the spectrum analyzer and tracking generator for the frequency band required to tune the isolator. Set the tracking generator power level for 0 dBm. Using an N(F-F) through adapter, reference the spectrum analyzer for 0 dBm (this will allow for a more accurate measurement of the isolator performance).

2. If available on the spectrum analyzer, set markers at the band center and edges.
3. Connect the tracking generator to the return loss bridge and the bridge to the isolator input port. Connect the spectrum analyzer to the return loss bridge reflected signal port. Place a 50 Ω test load on the isolator output port.
4. Adjust C1 for best return loss.
5. Switch the return loss bridge to the isolator output port and the test load to the isolator input port.
6. Adjust C2 for best return loss.
7. Remove the return loss bridge and 50 Ω test load. Connect the analyzer to the isolator input port and the tracking generator to the isolator output port.
8. Adjust C3 and C4 for best isolation (minimum signal).
9. Connect the tracking generator to the isolator input port. Remove the load from load port 1 and connect the analyzer to the isolator load port 1. Attach the load, which was taken from load port 1, to the isolator output port.
10. Adjust C5 and C6 for maximum isolation (minimum signal).
11. Place the load back on load port 2 and connect the tracking generator to the input port of the isolator and the analyzer to the isolator output port. Record the insertion loss and make sure it is within the specifications (see the specifications chart).
12. Connect the analyzer to the isolator output port and the tracking generator to the isolator input port. Record the isolation and make sure it is within the specifications.

Tuning Using a Wattmeter and Signal Generator or Transmitter

1. Set the Signal generator/transmitter for the desired frequency and power level. The power level should be as low as possible while still allowing for accurate wattmeter measurement. The power level must not exceed the maximum rated power of the smallest load on the isolator, which will usually be a 15 or 30 W load. The test load used with the wattmeter must have a power rating at least as great as the signal source power level. All the wattmeter measurements will be with the wattmeter set for forward signal.
2. Connect the signal source to the isolator input and the wattmeter to the isolator output. Place the test load on the wattmeter output. Key the signal generator.
3. Adjust C1, C5, C6, and C2 for minimum loss (maximum signal). Dekey the signal source.
4. Connect the signal source to the isolator output port and the wattmeter/test load to the isolator input port. Key the signal generator.
5. Adjust C4 and C3 for best isolation (minimum signal). Dekey the signal generator.
6. Connect the signal source to the isolator output port. Remove the load from load port 2 and connect the wattmeter/test load to the isolator load port 2. Attach the load, which was taken from load port 2, to the isolator input port. Key the signal generator.
7. Adjust C2 for minimum loss (maximum signal).

8. Remove the load from load port 1 and connect the wattmeter/test load to the isolator load port 1. Leaving load port 2 open, key the signal generator.
9. Adjust C5 and C6 for minimum loss (maximum signal). Dekey the signal generator.
11. Place the loads back on load port 1 & 2 and connect the signal generator to the input port of the isolator and the wattmeter/test load to the isolator output port. Record the insertion loss and make sure it is within the specifications (see the specifications chart). Note: Insertion loss = $10 \log(\text{power out} \div \text{power in})$.
12. Connect the wattmeter/test load to the isolator input port and the signal generator to the isolator output port. Key the signal and verify that the wattmeter is unable to detect signal. One may turn the signal source up to the maximum rated power of the load on load port 2 to verify that the isolator has good isolation. Unless the meter is capable of μwatt measurements, it should be unable to detect any power even with the signal source set at the isolators maximum rated reflected power.

Isolator Specification Chart

Band Range (MHz)	Insertion Loss (dB)	Isolation (dB)	I/P Return Loss (dB)	O/P Return Loss (dB)	Bandwidth (MHz)
132-174	0.60	50 (70)	20 (30)	20 (30)	3
406-512	0.55	50 (70)	20 (30)	20 (30)	9
806-960	0.50	50 (70)	20 (30)	20 (30)	15

Values in parenthesis are center frequency specifications. The values not in parenthesis are the values that should be obtained over the bandwidth shown in the last column.