

## Non-Catalog Model

# Frequency Mixer

# TUF-11ALH

Level 10 (LO Power +10 dBm)

### Important Note

This is a non-catalog model and can be manufactured on specific request.  
Pricing and delivery information can be supplied upon request.



Please click "Back", and then click "Contact Us" for Applications support.

CASE STYLE : B02

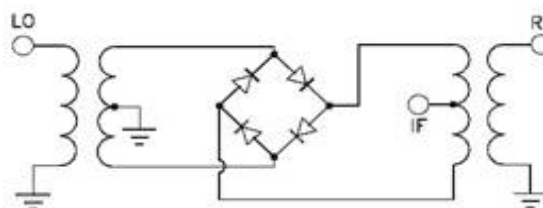
| ELECTRICAL SPECIFICATIONS 50Ω @ +25°C |               |      |      |      |       |
|---------------------------------------|---------------|------|------|------|-------|
| Parameter                             |               | Min. | Typ. | Max. | Units |
| Frequency                             | LO (fL to fU) | 1400 |      | 1900 | MHz   |
|                                       | RF (fL to fU) | 1400 |      | 1900 | MHz   |
|                                       | IF            | 40   |      | 500  | MHz   |
| Conversion Loss                       |               |      | 7.0  | 8.6  | dB    |
| LO-RF Isolation                       |               | 20   | 36   |      | dB    |
| LO-IF Isolation                       |               | 15   | 28   |      | dB    |
| 1 dB Comp. Input Power                |               |      | +5   |      | dBm   |

Note: Non-hermetic.

| MAXIMUM RATINGS       |                |
|-----------------------|----------------|
| Operating Temperature | -55°C to 100°C |
| Storage Temperature   | -55°C to 100°C |
| RF Power              | 50mW           |
| IF Current            | 40mA           |

| PIN CONNECTIONS |   |
|-----------------|---|
| LO              | 4 |
| RF              | 1 |
| IF              | 2 |
| GROUND          | 3 |

### Electrical Schematics



# Frequency Mixer

# TUF-11ALH

## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>IF FIXED<br>@IF(OUT)=40MHz<br>(dB) |       |      |
|---------------------|-------------|-------------------------------------------------------|-------|------|
|                     |             | @LO (dBm)                                             |       |      |
|                     |             | +7                                                    | +10   | +13  |
| 800.1               | 840.1       | 10.73                                                 | 10.10 | 9.76 |
| 880.6               | 920.6       | 8.99                                                  | 8.59  | 8.38 |
| 961.1               | 1001.1      | 8.03                                                  | 7.72  | 7.55 |
| 1041.6              | 1081.6      | 7.76                                                  | 7.47  | 7.29 |
| 1122.1              | 1162.1      | 7.86                                                  | 7.56  | 7.42 |
| 1202.6              | 1242.6      | 8.07                                                  | 7.72  | 7.59 |
| 1283.1              | 1323.1      | 8.34                                                  | 7.81  | 7.60 |
| 1363.6              | 1403.6      | 8.45                                                  | 7.80  | 7.50 |
| 1444.1              | 1484.1      | 8.35                                                  | 7.64  | 7.27 |
| 1524.6              | 1564.6      | 8.21                                                  | 7.40  | 7.01 |
| 1605.1              | 1645.1      | 8.01                                                  | 7.13  | 6.74 |
| 1685.6              | 1725.6      | 7.90                                                  | 6.96  | 6.56 |
| 1766.1              | 1806.1      | 7.81                                                  | 6.95  | 6.56 |
| 1846.6              | 1886.6      | 7.81                                                  | 6.91  | 6.51 |
| 1927.1              | 1967.1      | 7.74                                                  | 6.84  | 6.50 |
| 2007.6              | 2047.6      | 7.68                                                  | 6.88  | 6.52 |
| 2088.2              | 2128.2      | 7.63                                                  | 6.85  | 6.51 |
| 2168.7              | 2208.7      | 7.77                                                  | 6.99  | 6.58 |
| 2249.2              | 2289.2      | 7.89                                                  | 7.09  | 6.76 |
| 2329.7              | 2369.7      | 7.94                                                  | 7.14  | 6.75 |
| 2410.2              | 2450.2      | 7.95                                                  | 7.27  | 6.86 |
| 2490.7              | 2530.7      | 8.00                                                  | 7.35  | 6.97 |
| 2571.2              | 2611.2      | 8.05                                                  | 7.42  | 7.09 |
| 2651.7              | 2691.7      | 8.10                                                  | 7.52  | 7.21 |
| 2732.2              | 2772.2      | 8.17                                                  | 7.62  | 7.29 |
| 2812.7              | 2852.7      | 8.24                                                  | 7.67  | 7.34 |
| 2893.2              | 2933.2      | 8.25                                                  | 7.70  | 7.38 |
| 2973.7              | 3013.7      | 8.27                                                  | 7.74  | 7.47 |
| 3054.2              | 3094.2      | 8.34                                                  | 7.76  | 7.47 |
| 3134.7              | 3174.7      | 8.44                                                  | 7.83  | 7.52 |
| 3215.2              | 3255.2      | 8.63                                                  | 7.94  | 7.56 |
| 3295.7              | 3335.7      | 8.92                                                  | 8.15  | 7.70 |
| 3376.2              | 3416.2      | 9.30                                                  | 8.54  | 8.01 |
| 3456.7              | 3496.7      | 9.60                                                  | 8.75  | 8.23 |
| 3537.2              | 3577.2      | 9.83                                                  | 8.93  | 8.40 |
| 3637.8              | 3677.8      | 10.29                                                 | 9.21  | 8.76 |
| 3718.3              | 3758.3      | 10.75                                                 | 9.36  | 8.94 |
| 3819.0              | 3859.0      | 11.41                                                 | 9.65  | 9.16 |
| 3899.5              | 3939.5      | 12.32                                                 | 9.83  | 9.15 |
| 4000.1              | 4040.1      | 13.77                                                 | 10.48 | 9.30 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | IP3 INPUT<br>(dBm) |       |       |
|---------------------|-------------|--------------------|-------|-------|
|                     |             | @LO (dBm)          |       |       |
|                     |             | +7                 | +10   | +13   |
| 800.1               | 840.1       | 20.20              | 23.37 | 24.54 |
| 880.6               | 920.6       | 19.32              | 20.89 | 20.90 |
| 961.1               | 1001.1      | 17.40              | 19.24 | 21.09 |
| 1041.6              | 1081.6      | 18.30              | 19.61 | 21.34 |
| 1122.1              | 1162.1      | 18.63              | 21.17 | 22.20 |
| 1202.6              | 1242.6      | 20.32              | 21.51 | 22.89 |
| 1283.1              | 1323.1      | 22.98              | 22.75 | 22.41 |
| 1363.6              | 1403.6      | 22.30              | 26.19 | 23.95 |
| 1444.1              | 1484.1      | 19.30              | 21.54 | 23.37 |
| 1524.6              | 1564.6      | 17.57              | 19.57 | 20.91 |
| 1605.1              | 1645.1      | 16.75              | 18.19 | 18.92 |
| 1685.6              | 1725.6      | 16.05              | 18.02 | 18.95 |
| 1766.1              | 1806.1      | 15.29              | 16.90 | 17.57 |
| 1846.6              | 1886.6      | 14.60              | 16.17 | 17.94 |
| 1927.1              | 1967.1      | 14.86              | 16.37 | 18.05 |
| 2007.6              | 2047.6      | 15.35              | 17.30 | 18.11 |
| 2088.2              | 2128.2      | 15.74              | 17.19 | 19.01 |
| 2168.7              | 2208.7      | 15.60              | 16.93 | 18.84 |
| 2249.2              | 2289.2      | 15.46              | 16.60 | 18.15 |
| 2329.7              | 2369.7      | 15.93              | 17.62 | 19.00 |
| 2410.2              | 2450.2      | 17.81              | 17.64 | 18.87 |
| 2490.7              | 2530.7      | 17.91              | 18.80 | 19.39 |
| 2571.2              | 2611.2      | 17.65              | 19.49 | 19.76 |
| 2651.7              | 2691.7      | 17.92              | 18.64 | 19.25 |
| 2732.2              | 2772.2      | 19.32              | 20.32 | 20.30 |
| 2812.7              | 2852.7      | 19.45              | 20.48 | 20.62 |
| 2893.2              | 2933.2      | 19.34              | 21.48 | 21.41 |
| 2973.7              | 3013.7      | 20.02              | 21.11 | 23.30 |
| 3054.2              | 3094.2      | 19.48              | 23.88 | 23.13 |
| 3134.7              | 3174.7      | 19.92              | 21.85 | 24.41 |
| 3215.2              | 3255.2      | 17.94              | 20.29 | 21.95 |
| 3295.7              | 3335.7      | 19.53              | 20.30 | 22.81 |
| 3376.2              | 3416.2      | 19.86              | 19.41 | 20.70 |
| 3456.7              | 3496.7      | 19.78              | 22.38 | 20.82 |
| 3537.2              | 3577.2      | 20.18              | 21.07 | 20.04 |
| 3637.8              | 3677.8      | 19.44              | 25.85 | 23.29 |
| 3718.3              | 3758.3      | 18.10              | 21.16 | 22.63 |
| 3819.0              | 3859.0      | 16.98              | 20.19 | 23.31 |
| 3899.5              | 3939.5      | 15.14              | 17.53 | 23.47 |
| 4000.1              | 4040.1      | 14.39              | 19.54 | 19.94 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | COMPRESSION<br>@RF IN=+5dBm<br>(dB) |      |      |
|---------------------|-------------|-------------------------------------|------|------|
|                     |             | @LO (dBm)                           |      |      |
|                     |             | +7                                  | +10  | +13  |
| 800.1               | 840.1       | 0.52                                | 0.51 | 0.46 |
| 880.6               | 920.6       | 1.37                                | 1.13 | 0.92 |
| 961.1               | 1001.1      | 1.39                                | 1.13 | 0.91 |
| 1041.6              | 1081.6      | 1.08                                | 0.76 | 0.57 |
| 1122.1              | 1162.1      | 0.84                                | 0.48 | 0.35 |
| 1202.6              | 1242.6      | 0.83                                | 0.49 | 0.34 |
| 1283.1              | 1323.1      | 0.96                                | 0.71 | 0.51 |
| 1363.6              | 1403.6      | 1.13                                | 0.92 | 0.74 |
| 1444.1              | 1484.1      | 1.38                                | 1.24 | 1.06 |
| 1524.6              | 1564.6      | 1.62                                | 1.50 | 1.31 |
| 1605.1              | 1645.1      | 1.80                                | 1.76 | 1.50 |
| 1685.6              | 1725.6      | 2.00                                | 1.87 | 1.64 |
| 1766.1              | 1806.1      | 2.00                                | 1.87 | 1.60 |
| 1846.6              | 1886.6      | 2.01                                | 1.83 | 1.57 |
| 1927.1              | 1967.1      | 2.08                                | 1.86 | 1.61 |
| 2007.6              | 2047.6      | 1.99                                | 1.79 | 1.54 |
| 2088.2              | 2128.2      | 2.10                                | 1.79 | 1.55 |
| 2168.7              | 2208.7      | 2.08                                | 1.74 | 1.49 |
| 2249.2              | 2289.2      | 2.07                                | 1.71 | 1.43 |
| 2329.7              | 2369.7      | 1.86                                | 1.63 | 1.36 |
| 2410.2              | 2450.2      | 1.77                                | 1.45 | 1.26 |
| 2490.7              | 2530.7      | 1.94                                | 1.54 | 1.28 |
| 2571.2              | 2611.2      | 1.93                                | 1.48 | 1.17 |
| 2651.7              | 2691.7      | 1.96                                | 1.44 | 1.12 |
| 2732.2              | 2772.2      | 1.84                                | 1.36 | 1.03 |
| 2812.7              | 2852.7      | 1.89                                | 1.32 | 1.09 |
| 2893.2              | 2933.2      | 2.11                                | 1.43 | 1.04 |
| 2973.7              | 3013.7      | 2.17                                | 1.38 | 1.00 |
| 3054.2              | 3094.2      | 2.26                                | 1.36 | 0.97 |
| 3134.7              | 3174.7      | 2.41                                | 1.43 | 0.95 |
| 3215.2              | 3255.2      | 2.39                                | 1.39 | 0.91 |
| 3295.7              | 3335.7      | 2.46                                | 1.34 | 0.86 |
| 3376.2              | 3416.2      | 2.64                                | 1.35 | 0.78 |
| 3456.7              | 3496.7      | 2.69                                | 1.37 | 0.72 |
| 3537.2              | 3577.2      | 2.62                                | 1.27 | 0.62 |
| 3637.8              | 3677.8      | 2.59                                | 1.28 | 0.48 |
| 3718.3              | 3758.3      | 2.73                                | 1.49 | 0.61 |
| 3819.0              | 3859.0      | 2.16                                | 1.49 | 0.58 |
| 3899.5              | 3939.5      | 1.53                                | 1.55 | 0.63 |
| 4000.1              | 4040.1      | 0.60                                | 1.28 | 0.57 |

# Frequency Mixer

# TUF-11ALH

## Typical Performance Data

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=1650.1MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=1400.1MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=1900.1MHz<br>(dB) |
|----------------------|-------------|------------------------------------------------------------------|----------------------|-------------|------------------------------------------------------------------|----------------------|-------------|------------------------------------------------------------------|
|                      |             | @LO (dBm)                                                        |                      |             | @LO (dBm)                                                        |                      |             | @LO (dBm)                                                        |
|                      |             | +10                                                              |                      |             | +10                                                              |                      |             | +10                                                              |
| 250.0                | 1400.1      | 6.74                                                             | 40.0                 | 1440.1      | 7.71                                                             | 500.0                | 1400.1      | 6.20                                                             |
| 237.4                | 1412.7      | 6.81                                                             | 51.8                 | 1451.9      | 7.69                                                             | 488.2                | 1411.9      | 6.22                                                             |
| 224.7                | 1425.4      | 6.82                                                             | 63.6                 | 1463.7      | 7.75                                                             | 476.4                | 1423.7      | 6.20                                                             |
| 212.1                | 1438.0      | 6.77                                                             | 75.4                 | 1475.5      | 7.70                                                             | 464.6                | 1435.5      | 6.23                                                             |
| 199.5                | 1450.6      | 6.84                                                             | 87.2                 | 1487.3      | 7.75                                                             | 452.8                | 1447.3      | 6.22                                                             |
| 186.8                | 1463.3      | 6.81                                                             | 99.0                 | 1499.1      | 7.82                                                             | 441.0                | 1459.1      | 6.23                                                             |
| 174.2                | 1475.9      | 6.82                                                             | 110.8                | 1510.9      | 7.77                                                             | 429.2                | 1470.9      | 6.27                                                             |
| 161.6                | 1488.5      | 6.86                                                             | 122.6                | 1522.7      | 7.76                                                             | 417.4                | 1482.7      | 6.29                                                             |
| 148.9                | 1501.2      | 6.82                                                             | 134.4                | 1534.5      | 7.81                                                             | 405.6                | 1494.5      | 6.28                                                             |
| 136.3                | 1513.8      | 6.87                                                             | 146.2                | 1546.3      | 7.76                                                             | 393.8                | 1506.3      | 6.31                                                             |
| 123.7                | 1526.4      | 6.90                                                             | 157.9                | 1558.0      | 7.84                                                             | 382.1                | 1518.0      | 6.29                                                             |
| 111.1                | 1539.0      | 6.86                                                             | 169.7                | 1569.8      | 7.90                                                             | 370.3                | 1529.8      | 6.29                                                             |
| 98.4                 | 1551.7      | 6.93                                                             | 181.5                | 1581.6      | 7.85                                                             | 358.5                | 1541.6      | 6.34                                                             |
| 85.8                 | 1564.3      | 6.94                                                             | 193.3                | 1593.4      | 7.90                                                             | 346.7                | 1553.4      | 6.33                                                             |
| 73.2                 | 1576.9      | 6.91                                                             | 205.1                | 1605.2      | 7.94                                                             | 334.9                | 1565.2      | 6.35                                                             |
| 60.5                 | 1589.6      | 7.02                                                             | 216.9                | 1617.0      | 7.88                                                             | 323.1                | 1577.0      | 6.40                                                             |
| 47.9                 | 1602.2      | 7.03                                                             | 228.7                | 1628.8      | 7.91                                                             | 311.3                | 1588.8      | 6.39                                                             |
| 35.3                 | 1614.8      | 7.10                                                             | 240.5                | 1640.6      | 7.89                                                             | 299.5                | 1600.6      | 6.39                                                             |
| 22.6                 | 1627.5      | 7.32                                                             | 252.3                | 1652.4      | 7.81                                                             | 287.7                | 1612.4      | 6.45                                                             |
| 10.0                 | 1640.1      | 7.79                                                             | 264.1                | 1664.2      | 7.86                                                             | 275.9                | 1624.2      | 6.42                                                             |
| 10.0                 | 1660.1      | 7.67                                                             | 275.9                | 1676.0      | 7.86                                                             | 264.1                | 1636.0      | 6.42                                                             |
| 22.6                 | 1672.7      | 7.09                                                             | 287.7                | 1687.8      | 7.80                                                             | 252.3                | 1647.8      | 6.47                                                             |
| 35.3                 | 1685.4      | 7.08                                                             | 299.5                | 1699.6      | 7.82                                                             | 240.5                | 1659.6      | 6.46                                                             |
| 47.9                 | 1698.0      | 7.05                                                             | 311.3                | 1711.4      | 7.80                                                             | 228.7                | 1671.4      | 6.50                                                             |
| 60.5                 | 1710.6      | 7.03                                                             | 323.1                | 1723.2      | 7.76                                                             | 216.9                | 1683.2      | 6.58                                                             |
| 73.2                 | 1723.3      | 7.09                                                             | 334.9                | 1735.0      | 7.78                                                             | 205.1                | 1695.0      | 6.54                                                             |
| 85.8                 | 1735.9      | 7.04                                                             | 346.7                | 1746.8      | 7.75                                                             | 193.3                | 1706.8      | 6.60                                                             |
| 98.4                 | 1748.5      | 7.04                                                             | 358.5                | 1758.6      | 7.73                                                             | 181.5                | 1718.6      | 6.66                                                             |
| 111.1                | 1761.2      | 7.08                                                             | 370.3                | 1770.4      | 7.79                                                             | 169.7                | 1730.4      | 6.59                                                             |
| 123.7                | 1773.8      | 7.03                                                             | 382.1                | 1782.2      | 7.79                                                             | 157.9                | 1742.2      | 6.64                                                             |
| 136.3                | 1786.4      | 7.06                                                             | 393.8                | 1793.9      | 7.80                                                             | 146.2                | 1753.9      | 6.66                                                             |
| 148.9                | 1799.0      | 7.06                                                             | 405.6                | 1805.7      | 7.82                                                             | 134.4                | 1765.7      | 6.65                                                             |
| 161.6                | 1811.7      | 6.99                                                             | 417.4                | 1817.5      | 7.77                                                             | 122.6                | 1777.5      | 6.73                                                             |
| 174.2                | 1824.3      | 7.01                                                             | 429.2                | 1829.3      | 7.75                                                             | 110.8                | 1789.3      | 6.77                                                             |
| 186.8                | 1836.9      | 6.97                                                             | 441.0                | 1841.1      | 7.74                                                             | 99.0                 | 1801.1      | 6.73                                                             |
| 199.5                | 1849.6      | 6.95                                                             | 452.8                | 1852.9      | 7.68                                                             | 87.2                 | 1812.9      | 6.79                                                             |
| 212.1                | 1862.2      | 6.96                                                             | 464.6                | 1864.7      | 7.70                                                             | 75.4                 | 1824.7      | 6.82                                                             |
| 224.7                | 1874.8      | 6.94                                                             | 476.4                | 1876.5      | 7.71                                                             | 63.6                 | 1836.5      | 6.80                                                             |
| 237.4                | 1887.5      | 6.96                                                             | 488.2                | 1888.3      | 7.65                                                             | 51.8                 | 1848.3      | 6.91                                                             |
| 250.0                | 1900.1      | 7.00                                                             | 500.0                | 1900.1      | 7.64                                                             | 40.0                 | 1860.1      | 6.95                                                             |

REV. X2  
TUF-11ALH  
100818  
Page 2 of 5

# Frequency Mixer

# TUF-11ALH

## Typical Performance Data

| LO<br>(MHz) | LO-RF ISOLATION<br>(dB) |       |       | LO-IF ISOLATION<br>(dB) |       |       |
|-------------|-------------------------|-------|-------|-------------------------|-------|-------|
|             | @LO (dBm)               |       |       | @LO (dBm)               |       |       |
|             | +7                      | +10   | +13   | +7                      | +10   | +13   |
| 800.1       | 43.47                   | 46.79 | 49.27 | 23.04                   | 22.27 | 21.88 |
| 880.6       | 40.06                   | 43.90 | 48.13 | 23.06                   | 22.39 | 21.92 |
| 961.1       | 37.68                   | 41.30 | 45.54 | 23.27                   | 22.51 | 22.05 |
| 1041.6      | 37.22                   | 40.58 | 44.01 | 23.59                   | 22.66 | 22.18 |
| 1122.1      | 36.99                   | 39.85 | 42.77 | 24.17                   | 23.09 | 22.53 |
| 1202.6      | 36.51                   | 39.48 | 42.32 | 24.76                   | 23.64 | 22.97 |
| 1283.1      | 35.75                   | 39.04 | 42.32 | 25.51                   | 24.36 | 23.43 |
| 1363.6      | 34.79                   | 38.35 | 42.20 | 26.29                   | 25.00 | 24.06 |
| 1444.1      | 33.95                   | 37.41 | 41.35 | 27.12                   | 25.68 | 24.61 |
| 1524.6      | 32.87                   | 36.36 | 39.92 | 28.23                   | 26.63 | 25.43 |
| 1605.1      | 32.35                   | 35.61 | 38.86 | 29.16                   | 27.65 | 26.25 |
| 1685.6      | 31.97                   | 34.98 | 37.81 | 29.96                   | 28.77 | 27.36 |
| 1766.1      | 31.61                   | 34.18 | 36.71 | 30.69                   | 30.12 | 29.08 |
| 1846.6      | 31.05                   | 33.53 | 35.58 | 31.29                   | 32.24 | 31.63 |
| 1927.1      | 30.71                   | 33.03 | 34.36 | 32.30                   | 35.66 | 35.82 |
| 2007.6      | 30.40                   | 32.61 | 34.04 | 34.03                   | 42.68 | 41.71 |
| 2088.2      | 30.31                   | 32.17 | 33.84 | 38.86                   | 48.12 | 36.52 |
| 2168.7      | 30.17                   | 31.51 | 33.33 | 45.65                   | 34.83 | 31.00 |
| 2249.2      | 29.98                   | 31.10 | 32.64 | 35.00                   | 29.46 | 27.49 |
| 2329.7      | 29.75                   | 31.27 | 32.56 | 29.51                   | 26.41 | 25.04 |
| 2410.2      | 29.48                   | 31.19 | 33.04 | 26.28                   | 24.42 | 23.60 |
| 2490.7      | 29.38                   | 31.14 | 32.66 | 23.67                   | 23.01 | 22.65 |
| 2571.2      | 29.19                   | 31.27 | 32.79 | 21.95                   | 21.79 | 21.80 |
| 2651.7      | 29.29                   | 31.18 | 33.00 | 20.75                   | 20.79 | 21.21 |
| 2732.2      | 29.34                   | 31.34 | 33.12 | 19.81                   | 20.18 | 20.64 |
| 2812.7      | 29.34                   | 31.64 | 33.63 | 19.03                   | 19.66 | 20.18 |
| 2893.2      | 29.47                   | 31.90 | 34.27 | 18.56                   | 19.27 | 19.91 |
| 2973.7      | 29.70                   | 32.15 | 34.57 | 18.14                   | 18.93 | 19.56 |
| 3054.2      | 29.95                   | 32.25 | 34.59 | 17.79                   | 18.54 | 19.25 |
| 3134.7      | 30.31                   | 32.63 | 34.84 | 17.63                   | 18.37 | 18.93 |
| 3215.2      | 30.68                   | 32.94 | 35.31 | 17.56                   | 18.24 | 18.79 |
| 3295.7      | 31.16                   | 33.32 | 34.89 | 17.46                   | 18.14 | 18.59 |
| 3376.2      | 31.60                   | 34.15 | 36.08 | 17.42                   | 17.99 | 18.39 |
| 3456.7      | 32.13                   | 34.65 | 36.46 | 17.37                   | 17.81 | 18.09 |
| 3537.2      | 32.40                   | 34.78 | 36.21 | 17.42                   | 17.74 | 17.96 |
| 3637.8      | 33.18                   | 35.97 | 37.08 | 17.54                   | 17.77 | 17.79 |
| 3718.3      | 33.56                   | 36.35 | 38.01 | 17.63                   | 17.64 | 17.68 |
| 3819.0      | 34.40                   | 36.82 | 38.38 | 17.58                   | 17.62 | 17.50 |
| 3899.5      | 35.39                   | 37.75 | 38.49 | 17.60                   | 17.51 | 17.23 |
| 4000.1      | 37.22                   | 41.23 | 39.55 | 17.54                   | 17.31 | 16.90 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | +7                      | +10   | +13   |
| 800.1               | 840.1       | 22.02                   | 21.65 | 21.47 |
| 880.6               | 920.6       | 22.15                   | 21.94 | 21.83 |
| 961.1               | 1001.1      | 22.55                   | 22.71 | 22.87 |
| 1041.6              | 1081.6      | 23.14                   | 23.47 | 23.75 |
| 1122.1              | 1162.1      | 22.81                   | 23.09 | 23.23 |
| 1202.6              | 1242.6      | 21.99                   | 22.20 | 22.28 |
| 1283.1              | 1323.1      | 21.75                   | 21.97 | 22.10 |
| 1363.6              | 1403.6      | 21.78                   | 22.01 | 22.19 |
| 1444.1              | 1484.1      | 22.60                   | 22.83 | 23.06 |
| 1524.6              | 1564.6      | 24.10                   | 24.34 | 24.58 |
| 1605.1              | 1645.1      | 26.35                   | 26.68 | 26.97 |
| 1685.6              | 1725.6      | 29.33                   | 29.62 | 30.05 |
| 1766.1              | 1806.1      | 33.42                   | 33.81 | 34.15 |
| 1846.6              | 1886.6      | 38.17                   | 38.17 | 38.61 |
| 1927.1              | 1967.1      | 39.04                   | 38.32 | 37.64 |
| 2007.6              | 2047.6      | 36.19                   | 35.13 | 34.02 |
| 2088.2              | 2128.2      | 33.49                   | 32.23 | 30.94 |
| 2168.7              | 2208.7      | 31.91                   | 30.75 | 29.13 |
| 2249.2              | 2289.2      | 30.53                   | 29.16 | 28.06 |
| 2329.7              | 2369.7      | 29.62                   | 27.90 | 26.76 |
| 2410.2              | 2450.2      | 28.97                   | 27.61 | 26.39 |
| 2490.7              | 2530.7      | 28.64                   | 27.20 | 26.27 |
| 2571.2              | 2611.2      | 28.66                   | 27.19 | 26.20 |
| 2651.7              | 2691.7      | 28.28                   | 27.20 | 26.33 |
| 2732.2              | 2772.2      | 27.98                   | 27.07 | 26.04 |
| 2812.7              | 2852.7      | 27.77                   | 27.02 | 26.26 |
| 2893.2              | 2933.2      | 27.61                   | 26.95 | 26.14 |
| 2973.7              | 3013.7      | 27.57                   | 26.97 | 26.39 |
| 3054.2              | 3094.2      | 27.37                   | 26.77 | 26.20 |
| 3134.7              | 3174.7      | 27.04                   | 26.67 | 26.27 |
| 3215.2              | 3255.2      | 26.58                   | 26.47 | 26.33 |
| 3295.7              | 3335.7      | 26.23                   | 25.62 | 25.45 |
| 3376.2              | 3416.2      | 25.91                   | 25.38 | 25.18 |
| 3456.7              | 3496.7      | 25.56                   | 25.04 | 24.86 |
| 3537.2              | 3577.2      | 24.91                   | 24.53 | 24.21 |
| 3637.8              | 3677.8      | 24.17                   | 23.81 | 23.46 |
| 3718.3              | 3758.3      | 23.60                   | 23.49 | 23.00 |
| 3819.0              | 3859.0      | 22.67                   | 22.72 | 22.17 |
| 3899.5              | 3939.5      | 21.88                   | 22.35 | 21.86 |
| 4000.1              | 4040.1      | 20.92                   | 21.89 | 21.58 |

# Frequency Mixer

# TUF-11ALH

## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF VSWR<br>(:1) |      |      | LO<br>(MHz) | LO VSWR<br>(:1) |      |      | IF<br>(OUT)<br>(MHz) | IF VSWR<br>@LO=1900.1MHz<br>(:1) |      |      |
|---------------------|-------------|-----------------|------|------|-------------|-----------------|------|------|----------------------|----------------------------------|------|------|
|                     |             | @LO (dBm)       |      |      |             | @LO (dBm)       |      |      |                      | @LO (dBm)                        |      |      |
|                     |             | +7              | +10  | +13  |             | +7              | +10  | +13  |                      | +7                               | +10  | +13  |
| 800.1               | 840.1       | 7.28            | 6.89 | 6.66 | 800.1       | 1.46            | 1.90 | 2.44 | 40.0                 | 1.44                             | 1.27 | 1.20 |
| 880.6               | 920.6       | 4.99            | 4.73 | 4.56 | 880.6       | 1.49            | 1.87 | 2.37 | 51.8                 | 1.39                             | 1.20 | 1.13 |
| 961.1               | 1001.1      | 3.52            | 3.30 | 3.19 | 961.1       | 1.53            | 1.86 | 2.34 | 63.6                 | 1.34                             | 1.16 | 1.09 |
| 1041.6              | 1081.6      | 2.83            | 2.69 | 2.63 | 1041.6      | 1.58            | 1.86 | 2.31 | 75.4                 | 1.33                             | 1.13 | 1.07 |
| 1122.1              | 1162.1      | 2.57            | 2.49 | 2.47 | 1122.1      | 1.62            | 1.84 | 2.26 | 87.2                 | 1.36                             | 1.16 | 1.06 |
| 1202.6              | 1242.6      | 2.41            | 2.37 | 2.37 | 1202.6      | 1.68            | 1.82 | 2.21 | 99.0                 | 1.40                             | 1.19 | 1.08 |
| 1283.1              | 1323.1      | 2.25            | 2.21 | 2.22 | 1283.1      | 1.75            | 1.83 | 2.17 | 110.8                | 1.41                             | 1.20 | 1.08 |
| 1363.6              | 1403.6      | 2.01            | 1.95 | 1.94 | 1363.6      | 1.81            | 1.85 | 2.16 | 122.6                | 1.40                             | 1.19 | 1.08 |
| 1444.1              | 1484.1      | 1.74            | 1.64 | 1.62 | 1444.1      | 1.84            | 1.85 | 2.14 | 134.4                | 1.39                             | 1.18 | 1.08 |
| 1524.6              | 1564.6      | 1.55            | 1.43 | 1.39 | 1524.6      | 1.90            | 1.83 | 2.08 | 146.2                | 1.37                             | 1.17 | 1.09 |
| 1605.1              | 1645.1      | 1.41            | 1.25 | 1.21 | 1605.1      | 1.94            | 1.81 | 2.00 | 157.9                | 1.37                             | 1.16 | 1.08 |
| 1685.6              | 1725.6      | 1.30            | 1.12 | 1.06 | 1685.6      | 1.99            | 1.80 | 1.92 | 169.7                | 1.36                             | 1.16 | 1.06 |
| 1766.1              | 1806.1      | 1.25            | 1.10 | 1.09 | 1766.1      | 2.02            | 1.79 | 1.84 | 181.5                | 1.35                             | 1.15 | 1.04 |
| 1846.6              | 1886.6      | 1.31            | 1.22 | 1.23 | 1846.6      | 2.09            | 1.77 | 1.75 | 193.3                | 1.35                             | 1.14 | 1.04 |
| 1927.1              | 1967.1      | 1.39            | 1.33 | 1.35 | 1927.1      | 2.15            | 1.75 | 1.65 | 205.1                | 1.36                             | 1.15 | 1.06 |
| 2007.6              | 2047.6      | 1.46            | 1.42 | 1.44 | 2007.6      | 2.25            | 1.75 | 1.57 | 216.9                | 1.38                             | 1.18 | 1.09 |
| 2088.2              | 2128.2      | 1.56            | 1.55 | 1.58 | 2088.2      | 2.27            | 1.75 | 1.49 | 228.7                | 1.39                             | 1.18 | 1.10 |
| 2168.7              | 2208.7      | 1.71            | 1.71 | 1.73 | 2168.7      | 2.28            | 1.74 | 1.44 | 240.5                | 1.37                             | 1.17 | 1.09 |
| 2249.2              | 2289.2      | 1.86            | 1.85 | 1.86 | 2249.2      | 2.26            | 1.73 | 1.41 | 252.3                | 1.34                             | 1.14 | 1.07 |
| 2329.7              | 2369.7      | 1.93            | 1.90 | 1.89 | 2329.7      | 2.27            | 1.74 | 1.42 | 264.1                | 1.32                             | 1.13 | 1.07 |
| 2410.2              | 2450.2      | 1.94            | 1.92 | 1.90 | 2410.2      | 2.27            | 1.75 | 1.44 | 275.9                | 1.32                             | 1.13 | 1.08 |
| 2490.7              | 2530.7      | 1.99            | 1.97 | 1.97 | 2490.7      | 2.23            | 1.76 | 1.48 | 287.7                | 1.33                             | 1.14 | 1.09 |
| 2571.2              | 2611.2      | 2.08            | 2.09 | 2.10 | 2571.2      | 2.22            | 1.78 | 1.54 | 299.5                | 1.34                             | 1.15 | 1.08 |
| 2651.7              | 2691.7      | 2.15            | 2.15 | 2.17 | 2651.7      | 2.15            | 1.81 | 1.62 | 311.3                | 1.34                             | 1.15 | 1.07 |
| 2732.2              | 2772.2      | 2.11            | 2.11 | 2.11 | 2732.2      | 2.12            | 1.84 | 1.70 | 323.1                | 1.33                             | 1.13 | 1.07 |
| 2812.7              | 2852.7      | 2.05            | 2.04 | 2.04 | 2812.7      | 2.09            | 1.88 | 1.79 | 334.9                | 1.32                             | 1.13 | 1.09 |
| 2893.2              | 2933.2      | 2.07            | 2.08 | 2.10 | 2893.2      | 2.04            | 1.90 | 1.87 | 346.7                | 1.31                             | 1.14 | 1.11 |
| 2973.7              | 3013.7      | 2.18            | 2.23 | 2.27 | 2973.7      | 1.98            | 1.93 | 1.94 | 358.5                | 1.31                             | 1.14 | 1.12 |
| 3054.2              | 3094.2      | 2.32            | 2.36 | 2.41 | 3054.2      | 1.94            | 1.97 | 2.04 | 370.3                | 1.31                             | 1.13 | 1.10 |
| 3134.7              | 3174.7      | 2.38            | 2.41 | 2.43 | 3134.7      | 1.90            | 2.00 | 2.11 | 382.1                | 1.29                             | 1.11 | 1.09 |
| 3215.2              | 3255.2      | 2.42            | 2.44 | 2.46 | 3215.2      | 1.86            | 2.02 | 2.17 | 393.8                | 1.27                             | 1.10 | 1.10 |
| 3295.7              | 3335.7      | 2.54            | 2.55 | 2.57 | 3295.7      | 1.87            | 2.07 | 2.25 | 405.6                | 1.26                             | 1.10 | 1.12 |
| 3376.2              | 3416.2      | 2.75            | 2.78 | 2.82 | 3376.2      | 1.96            | 2.19 | 2.40 | 417.4                | 1.26                             | 1.11 | 1.13 |
| 3456.7              | 3496.7      | 2.95            | 2.98 | 3.02 | 3456.7      | 2.05            | 2.30 | 2.52 | 429.2                | 1.26                             | 1.11 | 1.14 |
| 3537.2              | 3577.2      | 3.03            | 3.03 | 3.05 | 3537.2      | 2.11            | 2.36 | 2.60 | 441.0                | 1.25                             | 1.10 | 1.13 |
| 3637.8              | 3677.8      | 3.07            | 2.99 | 3.02 | 3637.8      | 2.28            | 2.53 | 2.76 | 452.8                | 1.23                             | 1.09 | 1.14 |
| 3718.3              | 3758.3      | 3.19            | 3.08 | 3.14 | 3718.3      | 2.44            | 2.66 | 2.90 | 464.6                | 1.21                             | 1.09 | 1.16 |
| 3819.0              | 3859.0      | 3.50            | 3.28 | 3.37 | 3819.0      | 2.66            | 2.82 | 3.05 | 476.4                | 1.20                             | 1.11 | 1.19 |
| 3899.5              | 3939.5      | 3.77            | 3.40 | 3.48 | 3899.5      | 2.89            | 2.99 | 3.19 | 488.2                | 1.21                             | 1.13 | 1.20 |
| 4000.1              | 4040.1      | 4.05            | 3.48 | 3.45 | 4000.1      | 3.18            | 3.22 | 3.37 | 500.0                | 1.21                             | 1.13 | 1.20 |

## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |    |     |     |     |     |    |     |    |    |    |
|----|--------|--------|----|-----|-----|-----|-----|----|-----|----|----|----|
| 0  | -      | -      | 12 | 29  | 19  | 44  | 31  | 45 | 55  | 55 | 57 | 82 |
| 1  | -      | 23     | +0 | 38  | 16  | 42  | 47  | 52 | 61  | 62 | 66 | 74 |
| 2  | >100   | 48     | 43 | 41  | 55  | 61  | 45  | 60 | 52  | 63 | 64 | 69 |
| 3  | >100   | 40     | 37 | 54  | 31  | 59  | 49  | 50 | 63  | 64 | 62 | 81 |
| 4  | >100   | 70     | 65 | 71  | 53  | 49  | 67  | 67 | 67  | 71 | 71 | 67 |
| 5  | >100   | 65     | 70 | 55  | 52  | 58  | 43  | 73 | 51  | 71 | 67 | 76 |
| 6  | >100   | 75     | 75 | 78  | 83  | 71  | 58  | 60 | 75  | 70 | 76 | 78 |
| 7  | >100   | 79     | 87 | 83  | 81  | 74  | 62  | 73 | 56  | 86 | 73 | 74 |
| 8  | >100   | 85     | 84 | 90  | 85  | 87  | 86  | 77 | 67  | 64 | 90 | 81 |
| 9  | >100   | >93    | 84 | >93 | >93 | 85  | 88  | 76 | 72  | 74 | 64 | 87 |
| 10 | >100   | >93    | 92 | 91  | >93 | >93 | >93 | 90 | >93 | 82 | 71 | 73 |
|    | RF CAL | 0      | 1  | 2   | 3   | 4   | 5   | 6  | 7   | 8  | 9  | 10 |

### LO HARMONICS ORDER

Test conditions: RF IN: 1650.1 MHz; 0.00 dBm.  
LO IN: 1690.01 MHz; +10.00 dBm  
IF OUT: 39.91 MHz; -7.25 dBm

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 2   | 20  | 8   | 30  | 17  | 32  | 40  | 43  | 48  | 62  |
| 1  | -      | 24     | +0  | 39  | 15  | 33  | 46  | 43  | 52  | 53  | 49  | 55  |
| 2  | >100   | 58     | 52  | 46  | 59  | 62  | 52  | 67  | 54  | 57  | 66  | 60  |
| 3  | >100   | 64     | 57  | 77  | 49  | >83 | 58  | 74  | 69  | 80  | 73  | >83 |
| 4  | >100   | >83    | >83 | >83 | 80  | 79  | >83 | >83 | >83 | >83 | 81  | >83 |
| 5  | >100   | >83    | >83 | >83 | >83 | >83 | 80  | >83 | >83 | >83 | >83 | >83 |
| 6  | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 7  | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 8  | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 9  | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 10 | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions: RF IN: 1650.1 MHz; -10.00 dBm.  
LO IN: 1690.01 MHz; +10.00 dBm  
IF OUT: 39.91 MHz; -17.15 dBm

- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.  
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.  
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

REV. X2  
TUF-11ALH  
100818  
Page 5 of 5



**Mini-Circuits®**

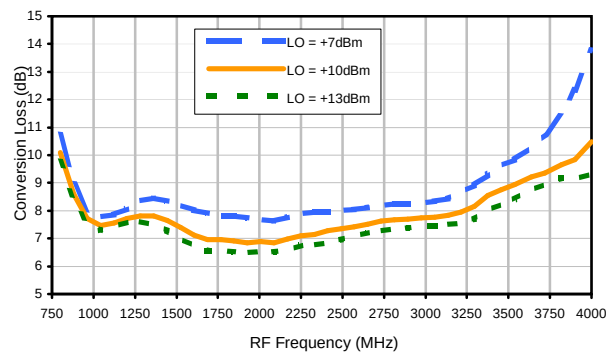
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED • RoHS compliant  
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

The Design Engineers Search Engine finds the model you need, instantly • For detailed performance specs & shopping online see

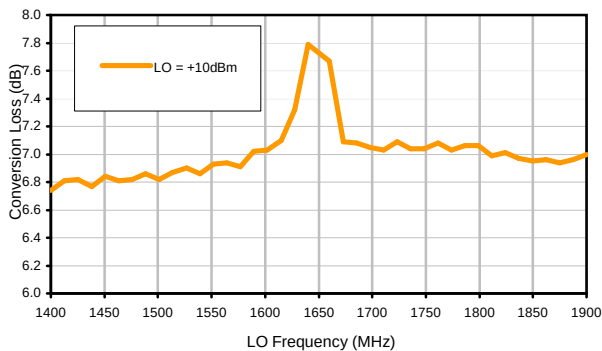


## Typical Performance Curves

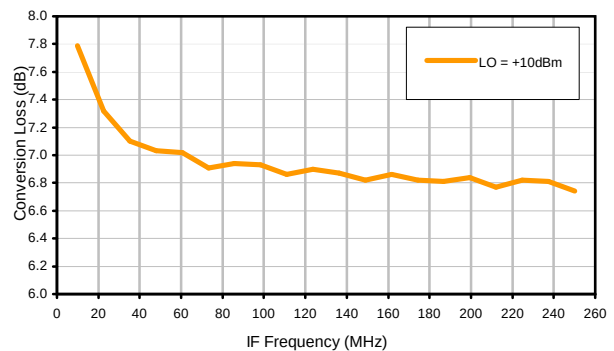
Conversion Loss @ IF=40MHz



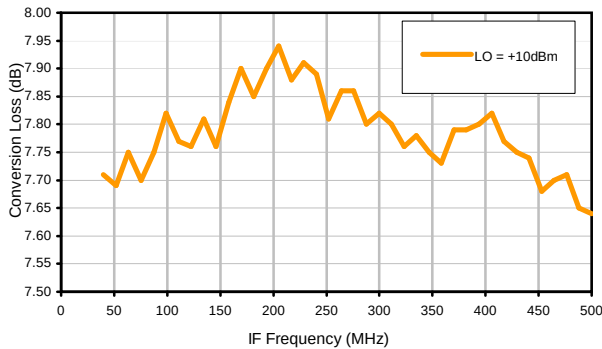
Conversion Loss vs. LO @ RF=1650.1MHz



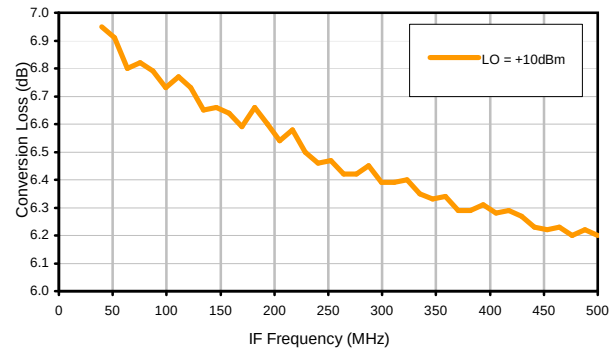
Conversion Loss vs. IF @ RF=1650.1MHz



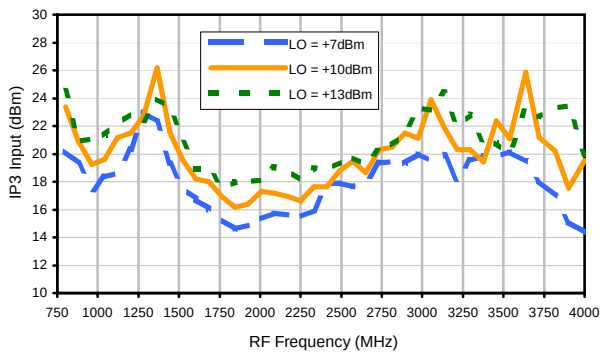
Conversion Loss vs. IF @ RF=1400.1MHz



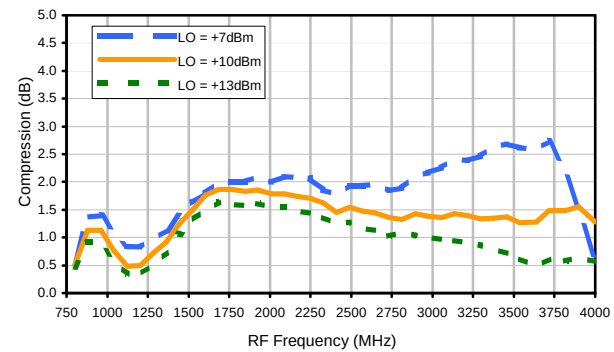
Conversion Loss vs. IF @ RF=1900.1MHz



IP3 Input



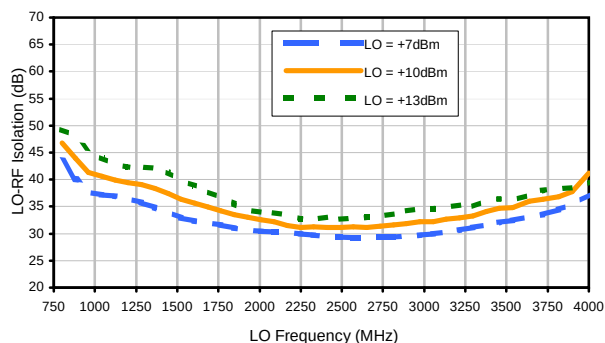
Compression @ RF IN=+5dBm



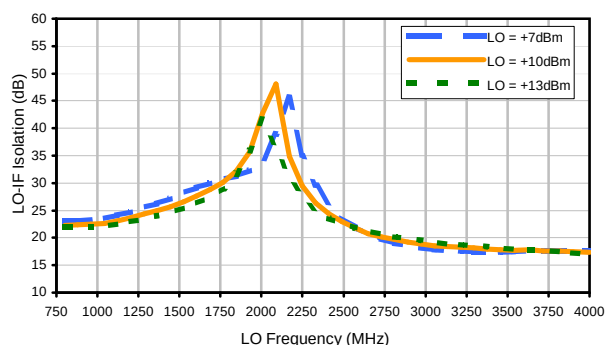


## Typical Performance Curves

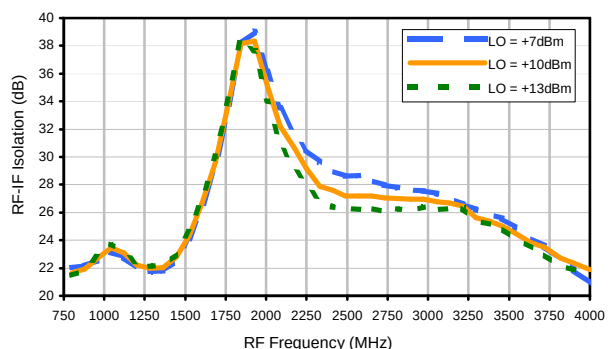
LO-RF Isolation



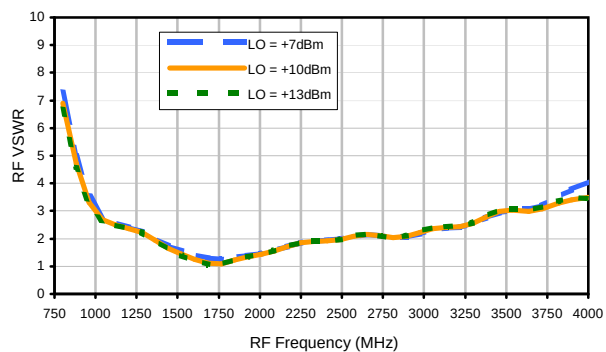
LO-IF Isolation



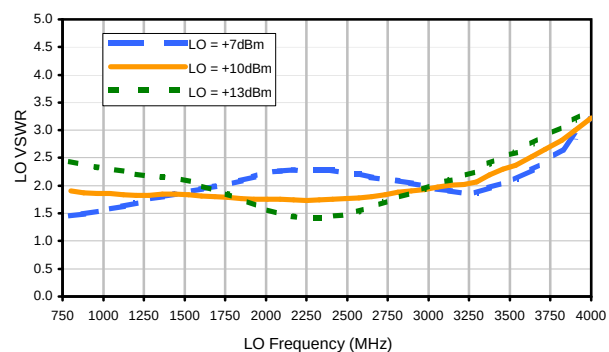
RF-IF Isolation



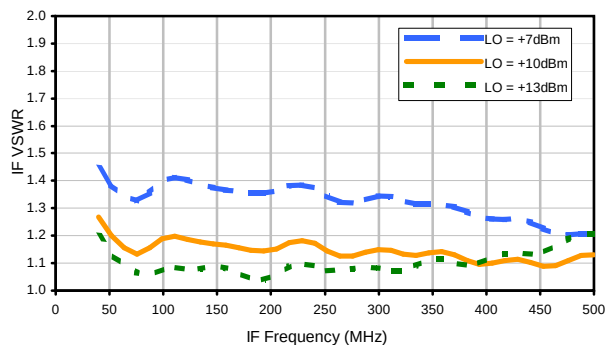
RF VSWR



LO VSWR



IF VSWR





## Harmonics Tables

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |    |     |     |     |     |    |     |    |    |    |
|--------|--------|--------|----|-----|-----|-----|-----|----|-----|----|----|----|
| 0      | -      | -      | 12 | 29  | 19  | 44  | 31  | 45 | 55  | 55 | 57 | 82 |
| 1      | -      | 23     | +0 | 38  | 16  | 42  | 47  | 52 | 61  | 62 | 66 | 74 |
| 2      | >100   | 48     | 43 | 41  | 55  | 61  | 45  | 60 | 52  | 63 | 64 | 69 |
| 3      | >100   | 40     | 37 | 54  | 31  | 59  | 49  | 50 | 63  | 64 | 62 | 81 |
| 4      | >100   | 70     | 65 | 71  | 53  | 49  | 67  | 67 | 67  | 71 | 71 | 67 |
| 5      | >100   | 65     | 70 | 55  | 52  | 58  | 43  | 73 | 51  | 71 | 67 | 76 |
| 6      | >100   | 75     | 75 | 78  | 83  | 71  | 58  | 60 | 75  | 70 | 76 | 78 |
| 7      | >100   | 79     | 87 | 83  | 81  | 74  | 62  | 73 | 56  | 86 | 73 | 74 |
| 8      | >100   | 85     | 84 | 90  | 85  | 87  | 86  | 77 | 67  | 64 | 90 | 81 |
| 9      | >100   | >93    | 84 | >93 | >93 | 85  | 88  | 76 | 72  | 74 | 64 | 87 |
| 10     | >100   | >93    | 92 | 91  | >93 | >93 | >93 | 90 | >93 | 82 | 71 | 73 |
| RF CAL | 0      | 1      | 2  | 3   | 4   | 5   | 6   | 7  | 8   | 9  | 10 |    |

### LO HARMONICS ORDER

Test conditions:

RF IN: 1650.1 MHz; 0.00 dBm.  
LO IN: 1690.01 MHz; +10.00 dBm  
IF OUT: 39.91 MHz; -7.25 dBm

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -      | 2   | 20  | 8   | 30  | 17  | 32  | 40  | 43  | 48  | 62  |
| 1      | -      | 24     | +0  | 39  | 15  | 33  | 46  | 43  | 52  | 53  | 49  | 55  |
| 2      | >100   | 58     | 52  | 46  | 59  | 62  | 52  | 67  | 54  | 57  | 66  | 60  |
| 3      | >100   | 64     | 57  | 77  | 49  | >83 | 58  | 74  | 69  | 80  | 73  | >83 |
| 4      | >100   | >83    | >83 | >83 | 80  | 79  | >83 | >83 | >83 | >83 | 81  | >83 |
| 5      | >100   | >83    | >83 | >83 | >83 | >83 | 80  | >83 | >83 | >83 | >83 | >83 |
| 6      | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 7      | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 8      | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 9      | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 10     | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

### LO HARMONICS ORDER

Test conditions:

RF IN: 1650.1 MHz; -10.00 dBm.  
LO IN: 1690.01 MHz; +10.00 dBm  
IF OUT: 39.91 MHz; -17.15 dBm

Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.

2. + entry denotes harmonics are in (dBc) above IF OUTPUT.

3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

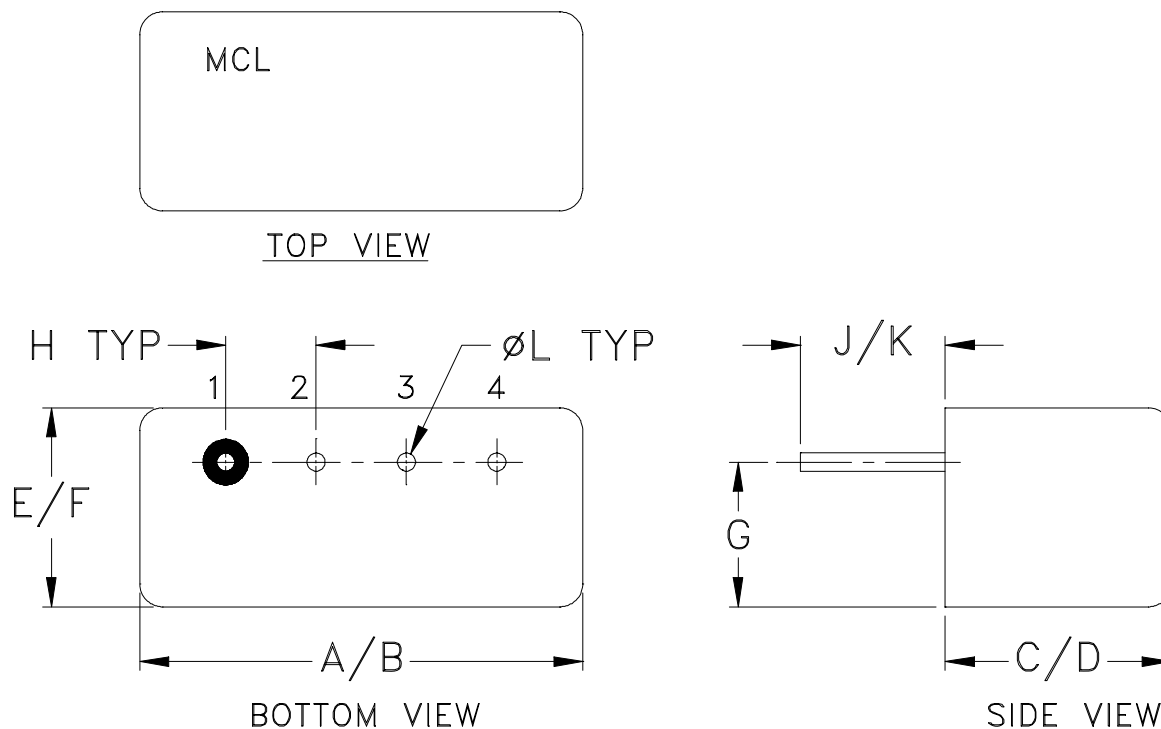
REV. X2  
TUF-11ALH  
100818  
Page 3 of 3



**B02**

**B13**

## Outline Dimensions



| CASE# | A               | B               | C              | D               | E              | F              | G             | H              | J             | K             | L             | WT,<br>GRAM |
|-------|-----------------|-----------------|----------------|-----------------|----------------|----------------|---------------|----------------|---------------|---------------|---------------|-------------|
| B02   | .480<br>(12.19) | .500<br>(12.70) | .240<br>(6.10) | .255<br>(6.48)  | .210<br>(5.33) | .230<br>(5.84) | .16<br>(4.06) | .100<br>(2.54) | .14<br>(3.56) | .20<br>(5.08) | .020<br>(.51) | 1.9         |
| B13   |                 |                 | .390<br>(9.91) | .405<br>(10.29) |                |                |               |                |               |               |               | 2.3         |

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .03$ ; 3 Pl.  $\pm .015$

### Notes:

- Header material: C.R.S.  
Pin material: #52 alloy.  
Cover material: Cupro-Nickel.
- Pin finish: Electro Tin-Silver.
- Tolerance on pin diameter  $\pm .005$  inch.
- Glass meniscus 0.015 inch max.
- Blue bead indicates Pin 1. Pin numbers do not appear on unit, for reference only.



INTERNET <http://www.minicircuits.com>

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

Mini-Circuits ISO 9001 & ISO 14001 Certified



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

| Specification                  | Test/Inspection Condition                                                                                                                                       | Reference/Spec                                                                                       |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Operating Temperature          | -55° to 100°C<br>Ambient Environment                                                                                                                            | Individual Model Data Sheet                                                                          |
| Storage Temperature            | -55° to 100° C<br>Ambient Environment                                                                                                                           | Individual Model Data Sheet                                                                          |
| Thermal Shock                  | -55° to 100°C, 100 cycles                                                                                                                                       | MIL-STD-202, Method 107, Condition A-3, except +100°C                                                |
| Vibration (High Frequency)     | 20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)                                                                             | MIL-STD-202, Method 204, Condition D                                                                 |
| Mechanical Shock               | 50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes                                                                                               | MIL-STD-202, Method 213, Condition A                                                                 |
| Moisture Resistance            | 10 cycles, 24 hours per cycle                                                                                                                                   | MIL-STD-202, Method 106, Condition A, except 50°C and end point electrical test done within 12 hours |
| Solderability                  | 10X Magnification                                                                                                                                               | J-STD-002, 95% Coverage                                                                              |
| Resistance to Solder Heat      | 260°C for 10 seconds                                                                                                                                            | MIL-STD-202, Method 210, Condition B                                                                 |
| Marking Resistance to Solvents | Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C;<br>distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C | MIL-STD-202, Method 215                                                                              |
| Terminal Strength              | 4 1/2 Pound Pull                                                                                                                                                | MIL-STD-202, Method 211, Condition A                                                                 |



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

| Specification       | Test/Inspection Condition | Reference/Spec                       |
|---------------------|---------------------------|--------------------------------------|
| Barometric Pressure | 100,000 Feet              | MIL-STD-202, Method 105, Condition D |