

# Frequency Mixer

Level 7 (LO Power +7 dBm) 300 to 4300 MHz

TFM-4300+



Generic photo used for illustration purposes only

CASE STYLE: B13

**+RoHS Compliant**

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

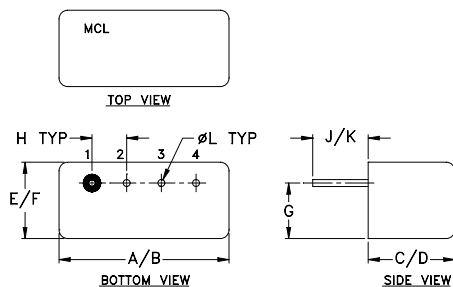
## Maximum Ratings

|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| Operating Temperature                                           | -55°C to 100°C |
| Storage Temperature                                             | -55°C to 100°C |
| RF Power                                                        | 50mW           |
| IF Current                                                      | 40mA           |
| Permanent damage may occur if any of these limits are exceeded. |                |

## Pin Connections

|             |   |
|-------------|---|
| LO          | 1 |
| RF          | 4 |
| IF          | 2 |
| GROUND      | 3 |
| CASE GROUND | 3 |

## Outline Drawing



## Outline Dimensions (inch/mm)

| A     | B     | C    | D     | E    | F     |
|-------|-------|------|-------|------|-------|
| .480  | .500  | .390 | .405  | .210 | .230  |
| 12.19 | 12.70 | 9.91 | 10.29 | 5.33 | 5.84  |
| G     | H     | J    | K     | L    | wt    |
| .16   | .100  | .14  | .20   | .020 | grams |
| 4.06  | 2.54  | 3.56 | 5.08  | 0.51 | 2.3   |

## Features

- low conversion loss, 5.87 dB typ.
- wideband, 300 to 4300 MHz
- rugged welded construction
- hermetically sealed

## Applications

- satellite communications
- cellular
- PCS
- instrumentation

## Electrical Specifications

| FREQUENCY<br>(MHz) |        | CONVERSION LOSS<br>(dB) |          |                        | LO-RF ISOLATION<br>(dB) |      |      |      | LO-IF ISOLATION<br>(dB) |      |      |      |
|--------------------|--------|-------------------------|----------|------------------------|-------------------------|------|------|------|-------------------------|------|------|------|
| LO/RF              | IF     | Mid-Band<br>m           |          | Total<br>Range<br>Max. | L                       |      | U    |      | L                       |      | U    |      |
| $f_L$ - $f_U$      |        | $\overline{X}$          | $\sigma$ |                        | Typ.                    | Min. | Typ. | Min. | Typ.                    | Min. | Typ. | Min. |
| 300-4300           | DC-800 | 5.87                    | 0.13     | 10.5                   | 30                      | 20   | 30   | 17   | 15                      | 7    | 10   | 7    |

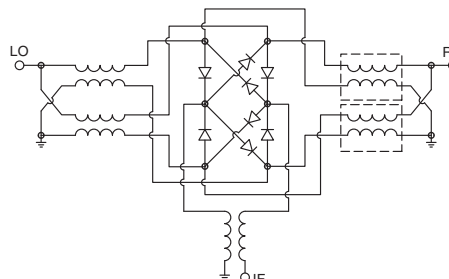
1 dB COMP.: +1 dBm typ.

L = low range [ $f_L$  to  $10 f_L$ ] U = upper range [ $10 f_U$  to  $f_U$ ]  
m = mid band [ $2 f_L$  to  $f_U/2$ ]

## Typical Performance Data

| Frequency (MHz) |         | Conversion Loss (dB) | Isolation L-R (dB) | Isolation L-I (dB) | VSWR RF Port (:1) | VSWR LO Port (:1) |
|-----------------|---------|----------------------|--------------------|--------------------|-------------------|-------------------|
| RF              | LO      | LO +7dBm             | LO +7dBm           | LO +7dBm           | LO +7dBm          | LO +7dBm          |
| 300.00          | 400.00  | 7.36                 | 51.34              | 31.66              | 5.75              | 4.40              |
| 414.29          | 514.29  | 6.29                 | 64.83              | 33.69              | 3.35              | 2.89              |
| 528.57          | 428.57  | 5.08                 | 49.72              | 36.96              | 2.55              | 2.65              |
| 757.14          | 657.14  | 4.96                 | 41.17              | 38.13              | 1.71              | 2.19              |
| 1000.00         | 900.00  | 5.45                 | 37.81              | 30.37              | 2.55              | 2.08              |
| 1214.29         | 1114.29 | 6.11                 | 36.73              | 26.04              | 3.13              | 1.99              |
| 1442.86         | 1342.86 | 6.61                 | 35.66              | 22.90              | 3.50              | 1.85              |
| 1671.43         | 1571.43 | 6.86                 | 34.88              | 19.27              | 4.13              | 1.68              |
| 1900.00         | 1800.00 | 7.03                 | 33.74              | 17.66              | 4.48              | 1.61              |
| 2000.00         | 1900.00 | 7.13                 | 33.54              | 17.52              | 5.06              | 1.57              |
| 2128.57         | 2028.67 | 7.43                 | 33.70              | 17.76              | 5.38              | 1.47              |
| 2471.43         | 2371.43 | 8.04                 | 33.24              | 18.85              | 5.56              | 1.41              |
| 2700.00         | 2000.00 | 8.34                 | 33.45              | 19.52              | 5.51              | 1.37              |
| 2814.29         | 2714.29 | 8.52                 | 34.07              | 19.86              | 5.27              | 1.36              |
| 3000.00         | 2900.00 | 8.85                 | 33.99              | 19.95              | 5.77              | 1.58              |
| 3157.14         | 3057.14 | 9.03                 | 33.55              | 19.48              | 6.97              | 1.60              |
| 3500.00         | 3400.00 | 9.22                 | 32.04              | 18.72              | 8.72              | 2.03              |
| 3728.57         | 3628.57 | 9.04                 | 30.42              | 18.47              | 8.23              | 2.39              |
| 4000.00         | 3900.00 | 8.91                 | 29.46              | 20.82              | 7.47              | 2.43              |
| 4300.00         | 4200.00 | 8.41                 | 33.24              | 24.62              | 6.26              | 2.13              |

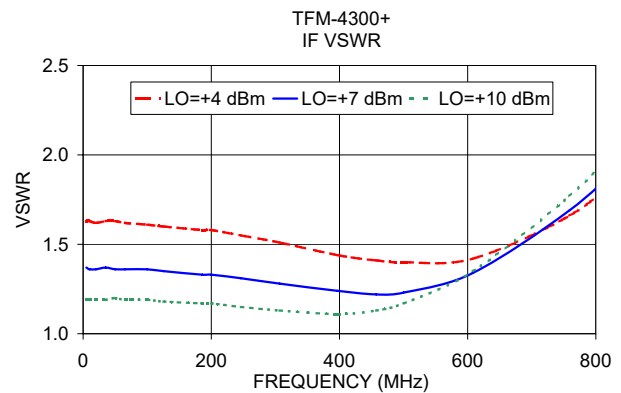
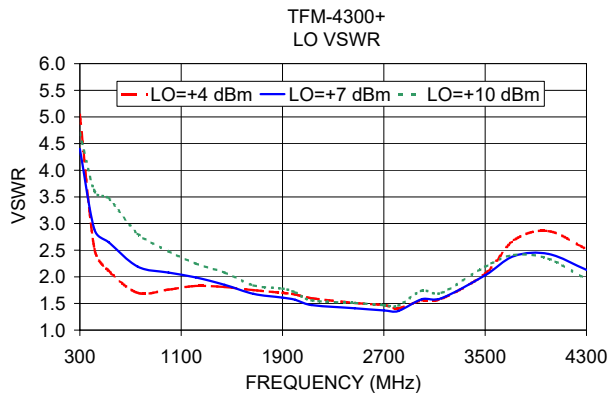
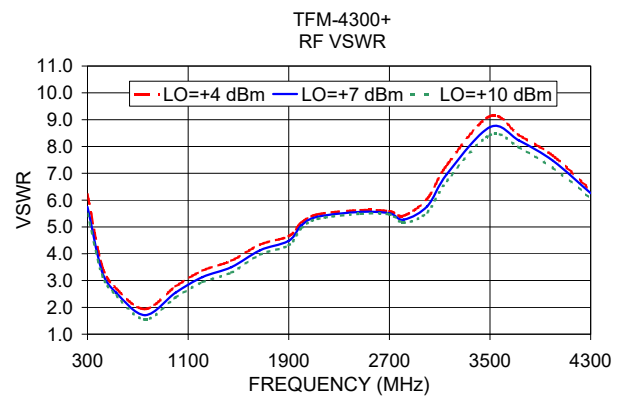
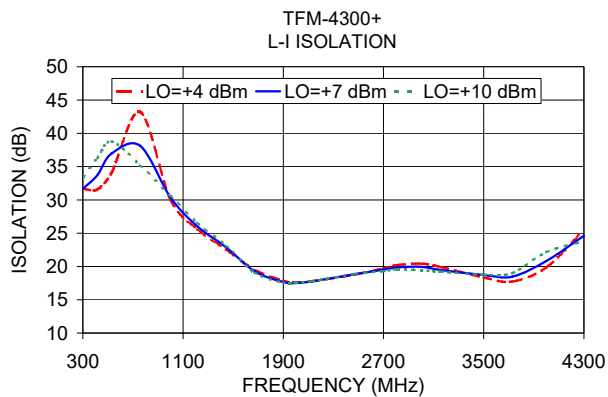
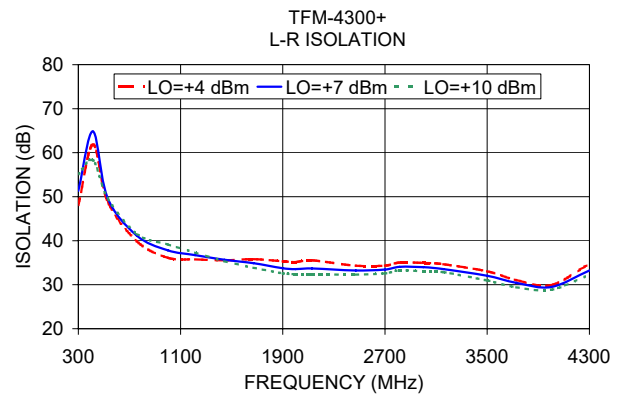
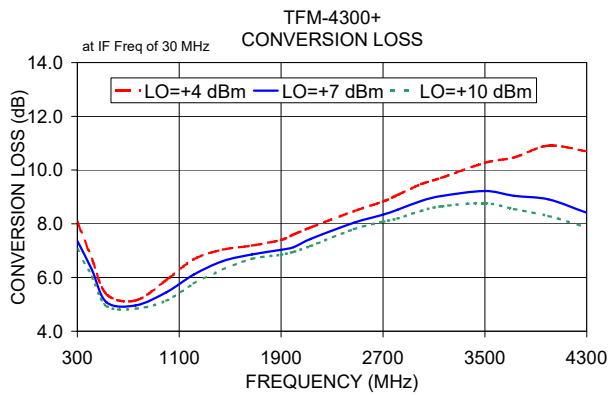
## Electrical Schematic



### Notes

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.  
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.  
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)





## Notes

- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)



# Frequency Mixer

TFM-4300+

## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>IF FIXED<br>@IF(OUT)=30MHz<br>(dB) |       |      |
|---------------------|-------------|-------------------------------------------------------|-------|------|
|                     |             | @LO (dBm)                                             |       |      |
|                     |             | +4                                                    | +7    | +10  |
| 150.0               | 180.0       | 18.58                                                 | 12.12 | 8.82 |
| 250.0               | 280.0       | 10.08                                                 | 7.22  | 6.30 |
| 350.0               | 380.0       | 7.41                                                  | 6.15  | 5.62 |
| 450.0               | 480.0       | 6.58                                                  | 5.71  | 5.24 |
| 550.0               | 580.0       | 6.33                                                  | 5.63  | 5.24 |
| 650.0               | 680.0       | 6.16                                                  | 5.48  | 5.12 |
| 750.0               | 780.0       | 6.41                                                  | 5.63  | 5.21 |
| 850.0               | 880.0       | 7.41                                                  | 6.36  | 5.69 |
| 970.0               | 1000.0      | 7.50                                                  | 6.69  | 6.12 |
| 1070.0              | 1100.0      | 7.16                                                  | 6.60  | 6.20 |
| 1190.0              | 1220.0      | 6.67                                                  | 6.21  | 5.94 |
| 1290.0              | 1320.0      | 6.52                                                  | 6.15  | 5.90 |
| 1410.0              | 1440.0      | 6.31                                                  | 5.96  | 5.79 |
| 1510.0              | 1540.0      | 6.32                                                  | 5.90  | 5.69 |
| 1630.0              | 1660.0      | 7.72                                                  | 6.90  | 6.37 |
| 1730.0              | 1760.0      | 8.21                                                  | 7.23  | 6.65 |
| 1850.0              | 1880.0      | 7.97                                                  | 7.08  | 6.54 |
| 1950.0              | 1980.0      | 7.64                                                  | 6.83  | 6.38 |
| 2070.0              | 2100.0      | 7.33                                                  | 6.59  | 6.19 |
| 2170.0              | 2200.0      | 7.14                                                  | 6.51  | 6.14 |
| 2290.0              | 2320.0      | 6.90                                                  | 6.29  | 5.98 |
| 2390.0              | 2420.0      | 6.83                                                  | 6.24  | 5.93 |
| 2510.0              | 2540.0      | 6.90                                                  | 6.34  | 6.04 |
| 2610.0              | 2640.0      | 6.94                                                  | 6.39  | 6.10 |
| 2730.0              | 2760.0      | 7.03                                                  | 6.50  | 6.20 |
| 2830.0              | 2860.0      | 7.09                                                  | 6.55  | 6.27 |
| 2950.0              | 2980.0      | 7.10                                                  | 6.61  | 6.36 |
| 3050.0              | 3080.0      | 7.28                                                  | 6.88  | 6.65 |
| 3170.0              | 3200.0      | 7.64                                                  | 7.24  | 7.01 |
| 3270.0              | 3300.0      | 7.77                                                  | 7.34  | 7.09 |
| 3390.0              | 3420.0      | 7.89                                                  | 7.47  | 7.23 |
| 3490.0              | 3520.0      | 7.97                                                  | 7.58  | 7.35 |
| 3610.0              | 3640.0      | 8.01                                                  | 7.61  | 7.40 |
| 3710.0              | 3740.0      | 8.06                                                  | 7.67  | 7.47 |
| 3830.0              | 3860.0      | 8.15                                                  | 7.67  | 7.47 |
| 3930.0              | 3960.0      | 8.31                                                  | 7.70  | 7.45 |
| 4050.0              | 4080.0      | 8.65                                                  | 7.92  | 7.55 |
| 4150.0              | 4180.0      | 8.88                                                  | 7.99  | 7.60 |
| 4270.0              | 4300.0      | 9.01                                                  | 8.03  | 7.61 |
| 4370.0              | 4400.0      | 9.16                                                  | 8.12  | 7.65 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | IP3 INPUT<br>(dBm) |       |       |
|---------------------|-------------|--------------------|-------|-------|
|                     |             | @LO (dBm)          |       |       |
|                     |             | +4                 | +7    | +10   |
| 150.0               | 180.0       | -2.57              | 3.69  | 10.40 |
| 250.0               | 280.0       | 2.96               | 10.38 | 12.86 |
| 350.0               | 380.0       | 6.36               | 8.99  | 12.69 |
| 450.0               | 480.0       | 7.13               | 10.94 | 16.00 |
| 550.0               | 580.0       | 7.79               | 12.05 | 16.78 |
| 650.0               | 680.0       | 7.88               | 12.13 | 19.13 |
| 750.0               | 780.0       | 6.76               | 8.67  | 11.28 |
| 850.0               | 880.0       | 6.03               | 10.41 | 15.17 |
| 970.0               | 1000.0      | 6.08               | 7.90  | 9.61  |
| 1070.0              | 1100.0      | 6.54               | 7.61  | 8.93  |
| 1190.0              | 1220.0      | 8.83               | 10.40 | 11.54 |
| 1290.0              | 1320.0      | 9.49               | 10.70 | 12.38 |
| 1410.0              | 1440.0      | 11.92              | 11.57 | 13.60 |
| 1510.0              | 1540.0      | 11.75              | 15.90 | 18.44 |
| 1630.0              | 1660.0      | 8.13               | 11.27 | 15.79 |
| 1730.0              | 1760.0      | 8.40               | 11.18 | 12.64 |
| 1850.0              | 1880.0      | 6.36               | 8.48  | 10.26 |
| 1950.0              | 1980.0      | 6.25               | 8.40  | 10.54 |
| 2070.0              | 2100.0      | 6.84               | 8.78  | 10.71 |
| 2170.0              | 2200.0      | 7.09               | 7.92  | 9.46  |
| 2290.0              | 2320.0      | 6.82               | 7.50  | 8.47  |
| 2390.0              | 2420.0      | 6.43               | 7.32  | 8.23  |
| 2510.0              | 2540.0      | 6.33               | 7.11  | 7.90  |
| 2610.0              | 2640.0      | 6.53               | 7.56  | 8.29  |
| 2730.0              | 2760.0      | 7.01               | 8.34  | 9.22  |
| 2830.0              | 2860.0      | 7.56               | 9.06  | 10.23 |
| 2950.0              | 2980.0      | 9.04               | 10.21 | 11.18 |
| 3050.0              | 3080.0      | 11.28              | 12.31 | 12.88 |
| 3170.0              | 3200.0      | 12.97              | 14.47 | 15.02 |
| 3270.0              | 3300.0      | 13.40              | 15.96 | 17.05 |
| 3390.0              | 3420.0      | 12.57              | 15.95 | 16.96 |
| 3490.0              | 3520.0      | 11.15              | 14.88 | 17.09 |
| 3610.0              | 3640.0      | 10.51              | 12.15 | 14.85 |
| 3710.0              | 3740.0      | 11.60              | 11.83 | 13.58 |
| 3830.0              | 3860.0      | 12.13              | 12.16 | 13.20 |
| 3930.0              | 3960.0      | 12.75              | 12.70 | 13.16 |
| 4050.0              | 4080.0      | 13.22              | 13.18 | 13.02 |
| 4150.0              | 4180.0      | 12.60              | 13.19 | 12.83 |
| 4270.0              | 4300.0      | 11.03              | 12.53 | 12.76 |
| 4370.0              | 4400.0      | 10.19              | 11.82 | 12.75 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | COMPRESSION<br>@RF IN=+1dBm<br>(dB) |       |       |
|---------------------|-------------|-------------------------------------|-------|-------|
|                     |             | @LO (dBm)                           |       |       |
|                     |             | +4                                  | +7    | +10   |
| 150.0               | 180.0       | -4.96                               | -1.39 | -0.06 |
| 250.0               | 280.0       | 0.35                                | 0.79  | 0.55  |
| 350.0               | 380.0       | 1.73                                | 1.13  | 0.82  |
| 450.0               | 480.0       | 1.96                                | 1.40  | 1.12  |
| 550.0               | 580.0       | 1.95                                | 1.46  | 1.19  |
| 650.0               | 680.0       | 2.02                                | 1.64  | 1.33  |
| 750.0               | 780.0       | 2.01                                | 1.74  | 1.48  |
| 850.0               | 880.0       | 1.43                                | 1.50  | 1.43  |
| 970.0               | 1000.0      | 1.35                                | 1.31  | 1.23  |
| 1070.0              | 1100.0      | 1.51                                | 1.25  | 1.07  |
| 1190.0              | 1220.0      | 1.49                                | 1.20  | 0.97  |
| 1290.0              | 1320.0      | 1.22                                | 0.92  | 0.75  |
| 1410.0              | 1440.0      | 0.86                                | 0.53  | 0.38  |
| 1510.0              | 1540.0      | 1.01                                | 0.63  | 0.42  |
| 1630.0              | 1660.0      | 0.98                                | 0.91  | 0.79  |
| 1730.0              | 1760.0      | 0.82                                | 0.83  | 0.77  |
| 1850.0              | 1880.0      | 0.98                                | 0.87  | 0.72  |
| 1950.0              | 1980.0      | 1.23                                | 0.98  | 0.78  |
| 2070.0              | 2100.0      | 1.25                                | 0.98  | 0.76  |
| 2170.0              | 2200.0      | 1.25                                | 0.95  | 0.75  |
| 2290.0              | 2320.0      | 1.37                                | 1.07  | 0.85  |
| 2390.0              | 2420.0      | 1.38                                | 1.06  | 0.83  |
| 2510.0              | 2540.0      | 1.38                                | 1.04  | 0.80  |
| 2610.0              | 2640.0      | 1.32                                | 1.02  | 0.76  |
| 2730.0              | 2760.0      | 1.25                                | 0.96  | 0.73  |
| 2830.0              | 2860.0      | 1.24                                | 0.91  | 0.68  |
| 2950.0              | 2980.0      | 1.23                                | 0.90  | 0.68  |
| 3050.0              | 3080.0      | 1.15                                | 0.86  | 0.65  |
| 3170.0              | 3200.0      | 0.96                                | 0.66  | 0.49  |
| 3270.0              | 3300.0      | 0.86                                | 0.57  | 0.42  |
| 3390.0              | 3420.0      | 0.77                                | 0.48  | 0.35  |
| 3490.0              | 3520.0      | 0.72                                | 0.43  | 0.31  |
| 3610.0              | 3640.0      | 0.78                                | 0.40  | 0.29  |
| 3710.0              | 3740.0      | 0.80                                | 0.40  | 0.28  |
| 3830.0              | 3860.0      | 0.91                                | 0.42  | 0.29  |
| 3930.0              | 3960.0      | 0.91                                | 0.43  | 0.29  |
| 4050.0              | 4080.0      | 0.86                                | 0.41  | 0.26  |
| 4150.0              | 4180.0      | 0.88                                | 0.40  | 0.26  |
| 4270.0              | 4300.0      | 0.92                                | 0.45  | 0.29  |
| 4370.0              | 4400.0      | 1.06                                | 0.57  | 0.35  |

# Frequency Mixer

TFM-4300+

## Typical Performance Data

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=2160.1MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=289.9MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=4310.1MHz<br>(dB) |
|----------------------|-------------|------------------------------------------------------------------|----------------------|-------------|-----------------------------------------------------------------|----------------------|-------------|------------------------------------------------------------------|
|                      |             | @LO (dBm)                                                        |                      |             | @LO (dBm)                                                       |                      |             | @LO (dBm)                                                        |
|                      |             | +7                                                               |                      |             | +7                                                              |                      |             | +7                                                               |
| 1630.1               | 530.0       | 10.50                                                            | 10.1                 | 300.0       | 6.58                                                            | 1530.1               | 2780.0      | 10.48                                                            |
| 1590.1               | 570.0       | 9.82                                                             | 50.1                 | 340.0       | 6.37                                                            | 1489.6               | 2820.5      | 10.12                                                            |
| 1550.1               | 610.0       | 9.35                                                             | 90.1                 | 380.0       | 6.29                                                            | 1449.0               | 2861.1      | 9.82                                                             |
| 1510.1               | 650.0       | 8.91                                                             | 130.1                | 420.0       | 6.08                                                            | 1408.5               | 2901.6      | 9.63                                                             |
| 1470.1               | 690.0       | 8.53                                                             | 170.1                | 460.0       | 6.04                                                            | 1368.0               | 2942.1      | 9.52                                                             |
| 1430.1               | 730.0       | 8.24                                                             | 210.1                | 500.0       | 5.97                                                            | 1327.4               | 2982.7      | 9.29                                                             |
| 1390.1               | 770.0       | 7.98                                                             | 250.1                | 540.0       | 5.97                                                            | 1286.9               | 3023.2      | 9.08                                                             |
| 1350.1               | 810.0       | 7.93                                                             | 290.1                | 580.0       | 5.93                                                            | 1246.4               | 3063.7      | 8.97                                                             |
| 1310.1               | 850.0       | 7.80                                                             | 330.1                | 620.0       | 5.89                                                            | 1205.8               | 3104.3      | 8.86                                                             |
| 1270.1               | 890.0       | 7.81                                                             | 370.1                | 660.0       | 5.78                                                            | 1165.3               | 3144.8      | 8.78                                                             |
| 1230.1               | 930.0       | 7.87                                                             | 410.1                | 700.0       | 5.61                                                            | 1124.8               | 3185.3      | 8.76                                                             |
| 1190.1               | 970.0       | 7.90                                                             | 450.1                | 740.0       | 5.54                                                            | 1084.2               | 3225.9      | 8.70                                                             |
| 1150.1               | 1010.0      | 7.89                                                             | 490.1                | 780.0       | 5.54                                                            | 1043.7               | 3266.4      | 8.66                                                             |
| 1110.1               | 1050.0      | 7.71                                                             | 530.1                | 820.0       | 5.53                                                            | 1003.2               | 3306.9      | 8.61                                                             |
| 1070.1               | 1090.0      | 7.47                                                             | 570.1                | 860.0       | 5.55                                                            | 962.6                | 3347.5      | 8.53                                                             |
| 1030.1               | 1130.0      | 7.57                                                             | 610.1                | 900.0       | 5.55                                                            | 922.1                | 3388.0      | 8.48                                                             |
| 990.1                | 1170.0      | 7.72                                                             | 650.1                | 940.0       | 5.71                                                            | 881.6                | 3428.5      | 8.37                                                             |
| 950.1                | 1210.0      | 7.89                                                             | 690.1                | 980.0       | 5.94                                                            | 841.0                | 3469.1      | 8.30                                                             |
| 910.1                | 1250.0      | 7.99                                                             | 730.1                | 1020.0      | 6.10                                                            | 800.5                | 3509.6      | 8.16                                                             |
| 870.1                | 1290.0      | 8.09                                                             | 770.1                | 1060.0      | 6.23                                                            | 760.0                | 3550.1      | 8.07                                                             |
| 830.1                | 1330.0      | 8.01                                                             | 810.1                | 1100.0      | 6.37                                                            | 719.4                | 3590.7      | 8.01                                                             |
| 790.1                | 1370.0      | 7.82                                                             | 850.1                | 1140.0      | 6.34                                                            | 678.9                | 3631.2      | 7.93                                                             |
| 750.1                | 1410.0      | 7.72                                                             | 890.1                | 1180.0      | 6.19                                                            | 638.4                | 3671.7      | 7.91                                                             |
| 710.1                | 1450.0      | 7.61                                                             | 930.1                | 1220.0      | 6.20                                                            | 597.8                | 3712.3      | 7.84                                                             |
| 670.1                | 1490.0      | 7.59                                                             | 970.1                | 1260.0      | 6.29                                                            | 557.3                | 3752.8      | 7.88                                                             |
| 630.1                | 1530.0      | 7.55                                                             | 1010.1               | 1300.0      | 6.45                                                            | 516.8                | 3793.3      | 7.89                                                             |
| 590.1                | 1570.0      | 7.50                                                             | 1050.1               | 1340.0      | 6.57                                                            | 476.2                | 3833.9      | 7.92                                                             |
| 550.1                | 1610.0      | 7.46                                                             | 1110.1               | 1400.0      | 6.89                                                            | 435.7                | 3874.4      | 7.90                                                             |
| 510.1                | 1650.0      | 7.45                                                             | 1150.1               | 1440.0      | 7.07                                                            | 395.2                | 3914.9      | 7.96                                                             |
| 470.1                | 1690.0      | 7.44                                                             | 1210.1               | 1500.0      | 7.33                                                            | 354.6                | 3955.5      | 7.98                                                             |
| 430.1                | 1730.0      | 7.27                                                             | 1250.1               | 1540.0      | 7.47                                                            | 314.1                | 3996.0      | 7.98                                                             |
| 390.1                | 1770.0      | 7.18                                                             | 1310.1               | 1600.0      | 7.58                                                            | 273.6                | 4036.5      | 8.01                                                             |
| 350.1                | 1810.0      | 7.03                                                             | 1350.1               | 1640.0      | 7.76                                                            | 233.0                | 4077.1      | 8.02                                                             |
| 310.1                | 1850.0      | 6.97                                                             | 1410.1               | 1700.0      | 7.72                                                            | 192.5                | 4117.6      | 8.01                                                             |
| 270.1                | 1890.0      | 6.91                                                             | 1450.1               | 1740.0      | 7.72                                                            | 152.0                | 4158.1      | 8.04                                                             |
| 210.1                | 1950.0      | 6.76                                                             | 1510.1               | 1800.0      | 7.98                                                            | 131.7                | 4178.4      | 7.98                                                             |
| 170.1                | 1990.0      | 6.69                                                             | 1550.1               | 1840.0      | 8.24                                                            | 91.2                 | 4218.9      | 8.00                                                             |
| 110.1                | 2050.0      | 6.60                                                             | 1610.1               | 1900.0      | 8.90                                                            | 70.9                 | 4239.2      | 8.03                                                             |
| 70.1                 | 2090.0      | 6.57                                                             | 1650.1               | 1940.0      | 9.42                                                            | 30.4                 | 4279.7      | 8.03                                                             |
| 10.1                 | 2150.0      | 6.78                                                             | 1710.1               | 2000.0      | 10.52                                                           | 10.1                 | 4300.0      | 8.27                                                             |



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS

REV.3

TFM-4300+

08/11/2010

Page 2 of 5

## Typical Performance Data

| LO<br>(MHz) | LO-RF ISOLATION<br>(dB) |       |       | LO-IF ISOLATION<br>(dB) |       |       |
|-------------|-------------------------|-------|-------|-------------------------|-------|-------|
|             | @LO (dBm)               |       |       | @LO (dBm)               |       |       |
|             | +4                      | +7    | +10   | +4                      | +7    | +10   |
| 180.0       | 23.54                   | 23.99 | 25.03 | 32.80                   | 28.82 | 26.03 |
| 280.0       | 22.86                   | 24.51 | 26.59 | 25.76                   | 23.86 | 23.87 |
| 380.0       | 24.36                   | 26.40 | 28.51 | 22.83                   | 22.95 | 24.17 |
| 480.0       | 25.73                   | 27.96 | 30.20 | 22.43                   | 23.65 | 24.99 |
| 580.0       | 27.33                   | 29.83 | 32.28 | 23.58                   | 25.14 | 26.25 |
| 680.0       | 28.51                   | 31.22 | 34.06 | 25.45                   | 27.52 | 28.43 |
| 780.0       | 29.55                   | 32.26 | 35.07 | 27.98                   | 30.08 | 30.75 |
| 880.0       | 30.69                   | 33.52 | 36.49 | 30.78                   | 31.89 | 31.94 |
| 1000.0      | 32.62                   | 36.27 | 40.38 | 30.67                   | 30.53 | 30.42 |
| 1100.0      | 32.94                   | 37.10 | 42.44 | 26.97                   | 26.71 | 26.57 |
| 1220.0      | 33.19                   | 36.95 | 41.44 | 23.35                   | 22.93 | 22.81 |
| 1320.0      | 33.32                   | 36.24 | 39.57 | 20.74                   | 20.27 | 19.93 |
| 1440.0      | 34.02                   | 36.24 | 37.48 | 19.05                   | 18.68 | 18.40 |
| 1540.0      | 31.29                   | 32.50 | 33.15 | 17.51                   | 17.25 | 16.94 |
| 1660.0      | 30.08                   | 31.06 | 31.85 | 16.38                   | 16.21 | 15.94 |
| 1760.0      | 30.23                   | 30.79 | 31.49 | 15.88                   | 15.74 | 15.76 |
| 1880.0      | 29.27                   | 29.90 | 30.43 | 15.54                   | 15.75 | 15.79 |
| 1980.0      | 28.57                   | 29.10 | 29.76 | 15.69                   | 15.92 | 16.17 |
| 2100.0      | 28.41                   | 28.89 | 29.47 | 16.09                   | 16.49 | 16.93 |
| 2200.0      | 28.68                   | 29.39 | 29.93 | 16.61                   | 17.19 | 17.73 |
| 2320.0      | 28.83                   | 29.90 | 30.75 | 17.40                   | 18.13 | 18.79 |
| 2420.0      | 29.02                   | 30.18 | 31.18 | 18.20                   | 19.07 | 19.84 |
| 2540.0      | 29.53                   | 30.76 | 31.75 | 19.13                   | 20.16 | 20.99 |
| 2640.0      | 30.17                   | 31.57 | 32.66 | 19.95                   | 21.14 | 22.05 |
| 2760.0      | 31.21                   | 32.75 | 33.89 | 20.83                   | 22.21 | 23.27 |
| 2860.0      | 32.21                   | 33.88 | 34.43 | 21.46                   | 23.18 | 24.37 |
| 2980.0      | 33.23                   | 35.07 | 34.76 | 22.06                   | 24.19 | 25.79 |
| 3080.0      | 33.94                   | 35.71 | 35.19 | 22.47                   | 24.73 | 26.25 |
| 3200.0      | 34.08                   | 36.28 | 36.94 | 22.75                   | 24.29 | 24.76 |
| 3300.0      | 33.05                   | 35.02 | 36.35 | 22.46                   | 23.04 | 22.87 |
| 3420.0      | 31.78                   | 33.17 | 34.15 | 22.09                   | 21.75 | 21.08 |
| 3520.0      | 31.22                   | 32.13 | 32.61 | 21.88                   | 20.91 | 19.76 |
| 3640.0      | 30.47                   | 31.01 | 31.06 | 21.24                   | 19.91 | 18.53 |
| 3740.0      | 29.62                   | 30.01 | 29.78 | 20.43                   | 18.83 | 17.44 |
| 3860.0      | 28.43                   | 28.47 | 28.31 | 19.33                   | 17.38 | 16.27 |
| 3960.0      | 27.34                   | 27.23 | 27.05 | 18.33                   | 16.37 | 15.27 |
| 4080.0      | 26.13                   | 25.93 | 25.78 | 16.82                   | 15.14 | 14.18 |
| 4180.0      | 25.08                   | 24.96 | 24.85 | 15.64                   | 14.35 | 13.53 |
| 4300.0      | 24.08                   | 24.01 | 24.00 | 14.56                   | 13.57 | 12.86 |
| 4400.0      | 23.08                   | 23.38 | 23.22 | 13.57                   | 13.14 | 12.26 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | +4                      | +7    | +10   |
| 150.0               | 180.0       | 33.45                   | 32.98 | 36.12 |
| 250.0               | 280.0       | 33.95                   | 33.77 | 34.75 |
| 350.0               | 380.0       | 34.70                   | 36.18 | 37.12 |
| 450.0               | 480.0       | 38.25                   | 37.47 | 35.72 |
| 550.0               | 580.0       | 47.91                   | 38.72 | 35.34 |
| 650.0               | 680.0       | 37.25                   | 32.96 | 30.89 |
| 750.0               | 780.0       | 36.63                   | 33.26 | 31.23 |
| 850.0               | 880.0       | 28.44                   | 28.93 | 29.03 |
| 970.0               | 1000.0      | 21.31                   | 21.34 | 21.50 |
| 1070.0              | 1100.0      | 19.46                   | 18.99 | 18.77 |
| 1190.0              | 1220.0      | 17.80                   | 17.38 | 17.16 |
| 1290.0              | 1320.0      | 16.40                   | 16.05 | 15.79 |
| 1410.0              | 1440.0      | 15.20                   | 14.73 | 14.47 |
| 1510.0              | 1540.0      | 15.98                   | 15.66 | 15.59 |
| 1630.0              | 1660.0      | 18.03                   | 17.95 | 17.89 |
| 1730.0              | 1760.0      | 16.91                   | 17.06 | 17.10 |
| 1850.0              | 1880.0      | 16.45                   | 16.76 | 16.81 |
| 1950.0              | 1980.0      | 16.87                   | 17.12 | 17.25 |
| 2070.0              | 2100.0      | 17.40                   | 17.61 | 17.69 |
| 2170.0              | 2200.0      | 18.04                   | 18.25 | 18.33 |
| 2290.0              | 2320.0      | 18.75                   | 18.98 | 19.11 |
| 2390.0              | 2420.0      | 19.40                   | 19.60 | 19.74 |
| 2510.0              | 2540.0      | 19.86                   | 19.96 | 20.15 |
| 2610.0              | 2640.0      | 20.38                   | 20.51 | 20.61 |
| 2730.0              | 2760.0      | 20.74                   | 20.80 | 20.85 |
| 2830.0              | 2860.0      | 20.81                   | 20.83 | 20.68 |
| 2950.0              | 2980.0      | 20.91                   | 20.47 | 20.18 |
| 3050.0              | 3080.0      | 21.13                   | 20.52 | 19.99 |
| 3170.0              | 3200.0      | 21.88                   | 21.38 | 21.05 |
| 3270.0              | 3300.0      | 22.93                   | 22.70 | 22.53 |
| 3390.0              | 3420.0      | 23.62                   | 23.62 | 23.80 |
| 3490.0              | 3520.0      | 23.99                   | 23.99 | 24.01 |
| 3610.0              | 3640.0      | 24.04                   | 23.94 | 23.96 |
| 3710.0              | 3740.0      | 23.97                   | 23.75 | 23.75 |
| 3830.0              | 3860.0      | 23.72                   | 23.49 | 23.33 |
| 3930.0              | 3960.0      | 23.38                   | 23.08 | 22.94 |
| 4050.0              | 4080.0      | 22.68                   | 22.41 | 22.21 |
| 4150.0              | 4180.0      | 22.17                   | 21.98 | 21.76 |
| 4270.0              | 4300.0      | 21.46                   | 21.35 | 21.16 |
| 4370.0              | 4400.0      | 21.18                   | 21.16 | 21.00 |

# Frequency Mixer

TFM-4300+

## 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=2400MHz<br>(:1) |      |      |
|---------------------|-------------|-----------------|------|------|-------------|-----------------|------|------|----------------------|--------------------------------|------|------|
|                     |             | @LO (dBm)       |      |      |             | @LO (dBm)       |      |      |                      | @LO (dBm)                      |      |      |
|                     |             | +4              | +7   | +10  |             | +4              | +7   | +10  |                      | +4                             | +7   | +10  |
| 150.0               | 180.0       | 14.26           | 8.35 | 5.75 | 180.0       | 10.31           | 9.58 | 8.16 | 10.0                 | 1.35                           | 1.11 | 1.04 |
| 250.0               | 280.0       | 4.29            | 3.01 | 2.65 | 280.0       | 5.10            | 4.54 | 4.30 | 70.0                 | 1.36                           | 1.14 | 1.09 |
| 350.0               | 380.0       | 2.40            | 1.99 | 1.86 | 380.0       | 3.11            | 2.97 | 3.26 | 130.0                | 1.37                           | 1.16 | 1.12 |
| 450.0               | 480.0       | 1.93            | 1.66 | 1.54 | 480.0       | 2.21            | 2.39 | 2.85 | 190.0                | 1.42                           | 1.23 | 1.20 |
| 550.0               | 580.0       | 1.85            | 1.62 | 1.50 | 580.0       | 1.77            | 2.11 | 2.61 | 250.0                | 1.41                           | 1.26 | 1.26 |
| 650.0               | 680.0       | 1.97            | 1.74 | 1.59 | 680.0       | 1.55            | 1.96 | 2.45 | 310.0                | 1.43                           | 1.29 | 1.28 |
| 750.0               | 780.0       | 2.33            | 2.05 | 1.88 | 780.0       | 1.44            | 1.86 | 2.31 | 370.0                | 1.48                           | 1.38 | 1.39 |
| 850.0               | 880.0       | 3.18            | 2.85 | 2.61 | 880.0       | 1.41            | 1.79 | 2.18 | 430.0                | 1.47                           | 1.40 | 1.43 |
| 970.0               | 1000.0      | 3.65            | 3.36 | 3.13 | 1000.0      | 1.42            | 1.72 | 2.04 | 490.0                | 1.48                           | 1.41 | 1.43 |
| 1070.0              | 1100.0      | 3.45            | 3.26 | 3.10 | 1100.0      | 1.46            | 1.67 | 1.93 | 550.0                | 1.51                           | 1.48 | 1.52 |
| 1190.0              | 1220.0      | 3.00            | 2.85 | 2.74 | 1220.0      | 1.54            | 1.63 | 1.82 | 610.0                | 1.47                           | 1.45 | 1.51 |
| 1290.0              | 1320.0      | 2.68            | 2.55 | 2.45 | 1320.0      | 1.61            | 1.61 | 1.75 | 670.0                | 1.47                           | 1.45 | 1.50 |
| 1410.0              | 1440.0      | 2.20            | 2.03 | 1.93 | 1440.0      | 1.64            | 1.57 | 1.66 | 730.0                | 1.44                           | 1.46 | 1.54 |
| 1510.0              | 1540.0      | 2.06            | 1.85 | 1.69 | 1540.0      | 1.65            | 1.53 | 1.59 | 790.0                | 1.38                           | 1.41 | 1.49 |
| 1630.0              | 1660.0      | 3.02            | 2.79 | 2.60 | 1660.0      | 1.66            | 1.48 | 1.51 | 850.0                | 1.36                           | 1.40 | 1.50 |
| 1730.0              | 1760.0      | 3.21            | 2.98 | 2.80 | 1760.0      | 1.65            | 1.44 | 1.45 | 910.0                | 1.30                           | 1.40 | 1.55 |
| 1850.0              | 1880.0      | 2.91            | 2.76 | 2.61 | 1880.0      | 1.64            | 1.38 | 1.38 | 970.0                | 1.25                           | 1.38 | 1.54 |
| 1950.0              | 1980.0      | 2.63            | 2.50 | 2.39 | 1980.0      | 1.63            | 1.33 | 1.32 | 1030.0               | 1.25                           | 1.41 | 1.59 |
| 2070.0              | 2100.0      | 2.37            | 2.25 | 2.17 | 2100.0      | 1.63            | 1.33 | 1.29 | 1090.0               | 1.23                           | 1.43 | 1.62 |
| 2170.0              | 2200.0      | 2.20            | 2.10 | 2.03 | 2200.0      | 1.60            | 1.31 | 1.28 | 1150.0               | 1.22                           | 1.42 | 1.61 |
| 2290.0              | 2320.0      | 2.07            | 1.95 | 1.88 | 2320.0      | 1.58            | 1.27 | 1.23 | 1210.0               | 1.24                           | 1.45 | 1.64 |
| 2390.0              | 2420.0      | 2.02            | 1.91 | 1.84 | 2420.0      | 1.55            | 1.24 | 1.19 | 1270.0               | 1.25                           | 1.45 | 1.64 |
| 2510.0              | 2540.0      | 1.99            | 1.90 | 1.84 | 2540.0      | 1.53            | 1.20 | 1.14 | 1330.0               | 1.26                           | 1.44 | 1.60 |
| 2610.0              | 2640.0      | 2.01            | 1.93 | 1.88 | 2640.0      | 1.48            | 1.14 | 1.11 | 1390.0               | 1.31                           | 1.50 | 1.66 |
| 2730.0              | 2760.0      | 2.08            | 2.02 | 1.99 | 2760.0      | 1.43            | 1.10 | 1.13 | 1450.0               | 1.30                           | 1.47 | 1.60 |
| 2830.0              | 2860.0      | 2.19            | 2.14 | 2.12 | 2860.0      | 1.37            | 1.08 | 1.19 | 1510.0               | 1.30                           | 1.45 | 1.57 |
| 2950.0              | 2980.0      | 2.37            | 2.34 | 2.33 | 2980.0      | 1.26            | 1.10 | 1.29 | 1570.0               | 1.32                           | 1.45 | 1.54 |
| 3050.0              | 3080.0      | 2.52            | 2.49 | 2.48 | 3080.0      | 1.17            | 1.17 | 1.39 | 1630.0               | 1.33                           | 1.42 | 1.49 |
| 3170.0              | 3200.0      | 2.76            | 2.73 | 2.72 | 3200.0      | 1.12            | 1.28 | 1.53 | 1690.0               | 1.40                           | 1.47 | 1.53 |
| 3270.0              | 3300.0      | 2.85            | 2.83 | 2.80 | 3300.0      | 1.11            | 1.35 | 1.61 | 1750.0               | 1.49                           | 1.55 | 1.59 |
| 3390.0              | 3420.0      | 2.96            | 2.95 | 2.93 | 3420.0      | 1.15            | 1.43 | 1.72 | 1810.0               | 1.61                           | 1.65 | 1.68 |
| 3490.0              | 3520.0      | 2.98            | 2.97 | 2.96 | 3520.0      | 1.26            | 1.51 | 1.79 | 1870.0               | 1.77                           | 1.80 | 1.82 |
| 3610.0              | 3640.0      | 3.00            | 2.97 | 2.96 | 3640.0      | 1.42            | 1.62 | 1.86 | 1930.0               | 1.95                           | 1.97 | 1.98 |
| 3710.0              | 3740.0      | 2.99            | 2.92 | 2.90 | 3740.0      | 1.56            | 1.70 | 1.92 | 1990.0               | 2.14                           | 2.15 | 2.16 |
| 3830.0              | 3860.0      | 2.96            | 2.82 | 2.77 | 3860.0      | 1.72            | 1.78 | 1.94 | 2050.0               | 2.36                           | 2.36 | 2.36 |
| 3930.0              | 3960.0      | 2.92            | 2.74 | 2.66 | 3960.0      | 1.84            | 1.84 | 1.93 | 2110.0               | 2.57                           | 2.57 | 2.57 |
| 4050.0              | 4080.0      | 2.86            | 2.67 | 2.55 | 4080.0      | 1.95            | 1.87 | 1.89 | 2150.0               | 2.70                           | 2.70 | 2.70 |
| 4150.0              | 4180.0      | 2.77            | 2.56 | 2.45 | 4180.0      | 2.01            | 1.85 | 1.82 | 2210.0               | 2.92                           | 2.92 | 2.91 |
| 4270.0              | 4300.0      | 2.56            | 2.37 | 2.28 | 4300.0      | 2.03            | 1.81 | 1.73 | 2250.0               | 3.06                           | 3.06 | 3.05 |
| 4370.0              | 4400.0      | 2.38            | 2.21 | 2.13 | 4400.0      | 1.97            | 1.74 | 1.61 | 2310.0               | 3.26                           | 3.26 | 3.26 |



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS

REV.3

TFM-4300+

08/11/2010

Page 4 of 5

## Harmonics Tables

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -      | +9  | 28  | 23  | 37  | 24  | 41  | 41  | 58  | 53  | >70 |
| 1      | -      | 13     | +0  | 31  | 29  | 34  | 39  | 40  | 47  | 56  | 65  | 66  |
| 2      | 89     | 50     | 59  | 49  | 56  | 59  | 65  | 66  | 56  | 64  | 69  | >70 |
| 3      | >90    | >70    | >70 | >70 | 57  | >70 | >70 | 68  | 67  | >70 | >70 | >70 |
| 4      | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 5      | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 6      | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 7      | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 8      | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 9      | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 10     | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

### LO HARMONICS ORDER

Test conditions: RF IN: 2300 MHz; -14.00 dBm.  
LO IN: 2330 MHz; +7.00 dBm  
IF OUT: 30 MHz; -20.28 dBm

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -      | 1   | 39  | 33  | 49  | 38  | 57  | 57  | 72  | 63  | >80 |
| 1      | -      | 13     | +0  | 33  | 30  | 37  | 43  | 47  | 57  | 68  | 75  | >80 |
| 2      | 69     | 41     | 50  | 43  | 49  | 61  | 66  | 58  | 54  | 64  | 72  | >80 |
| 3      | >90    | 52     | 53  | 63  | 37  | 52  | 55  | 52  | 56  | 57  | 68  | 75  |
| 4      | >90    | 75     | >80 | 64  | 72  | 59  | 66  | 62  | 74  | 69  | 69  | 74  |
| 5      | >90    | 70     | 76  | 76  | >80 | 73  | 61  | 68  | 77  | 66  | 69  | 69  |
| 6      | >90    | >80    | >80 | >80 | >80 | 76  | >80 | 78  | >80 | 72  | >80 | >80 |
| 7      | >90    | >80    | >80 | >80 | >80 | >80 | >80 | >80 | 78  | >80 | >80 | >80 |
| 8      | >90    | >80    | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
| 9      | >90    | >80    | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
| 10     | >90    | >80    | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

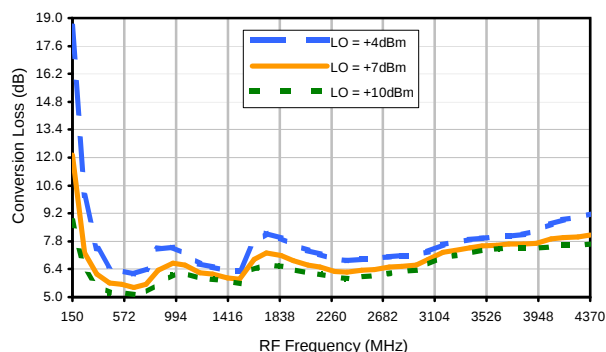
### LO HARMONICS ORDER

Test conditions: RF IN: 2300 MHz; -4.00 dBm.  
LO IN: 2330 MHz; +7.00 dBm  
IF OUT: 30 MHz; -10.45 dBm

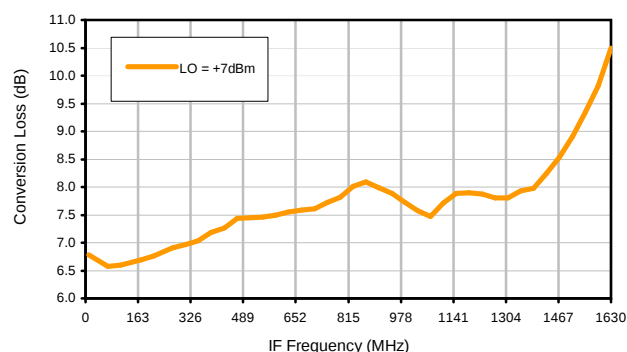
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.  
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.  
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

## Typical Performance Curves

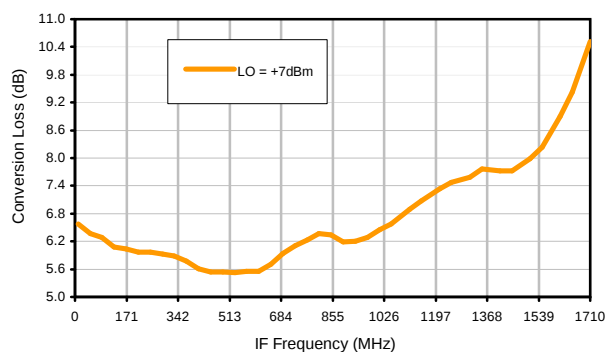
Conversion Loss @ IF=30MHz



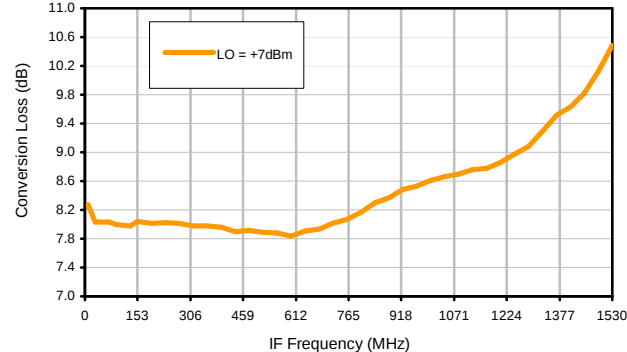
Conversion Loss vs. IF @ RF=2160.1MHz



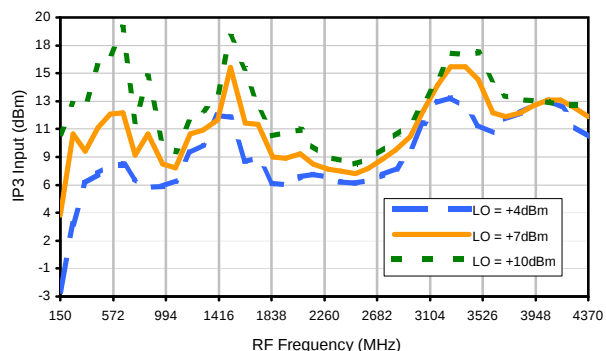
Conversion Loss vs. IF @ RF=289.9MHz



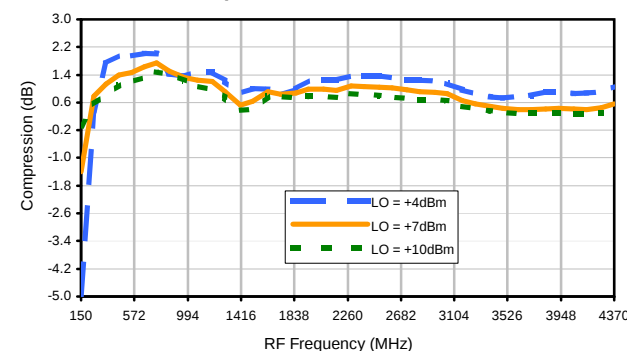
Conversion Loss vs. IF @ RF=4310.1MHz



IP3 Input

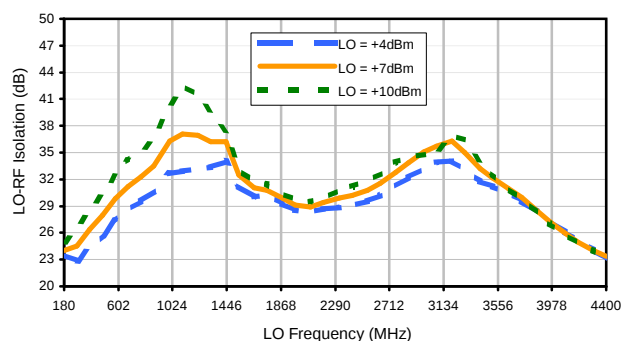


Compression @ RF IN=+1dBm

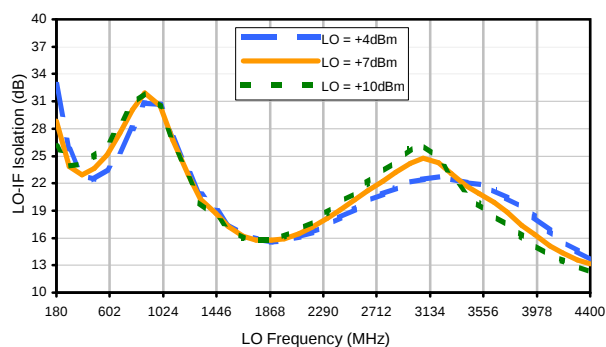


## Typical Performance Curves

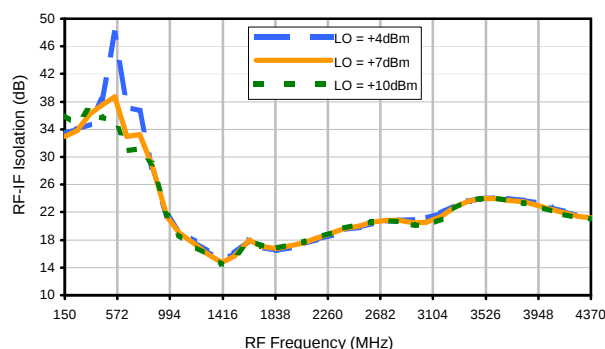
LO-RF Isolation



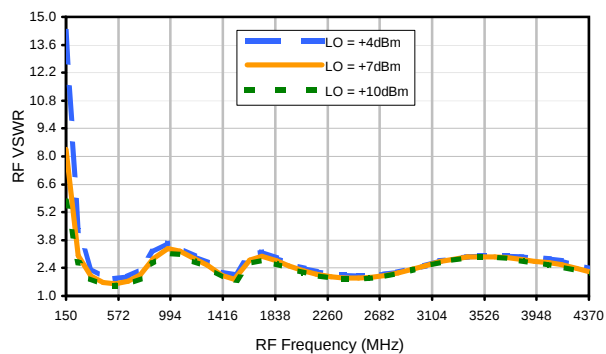
LO-IF Isolation



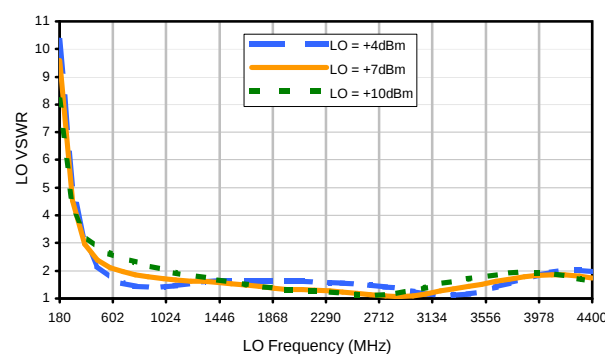
RF-IF Isolation



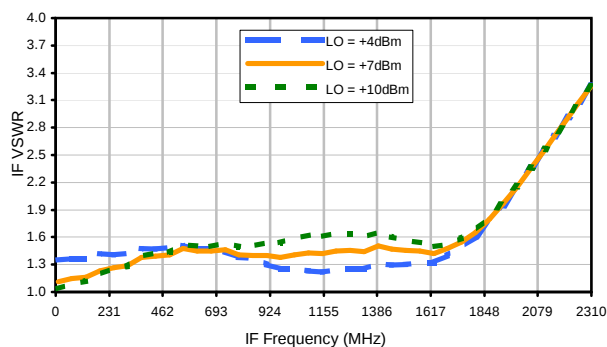
RF VSWR



LO VSWR



IF VSWR



## Harmonics Tables

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -      | +9  | 28  | 23  | 37  | 24  | 41  | 41  | 58  | 53  | >70 |
| 1      | -      | 13     | +0  | 31  | 29  | 34  | 39  | 40  | 47  | 56  | 65  | 66  |
| 2      | 89     | 50     | 59  | 49  | 56  | 59  | 65  | 66  | 56  | 64  | 69  | >70 |
| 3      | >90    | >70    | >70 | >70 | 57  | >70 | >70 | 68  | 67  | >70 | >70 | >70 |
| 4      | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 5      | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 6      | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 7      | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 8      | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 9      | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 10     | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

### LO HARMONICS ORDER

Test conditions: RF IN: 2300 MHz; -14.00 dBm.  
LO IN: 2330 MHz; +7.00 dBm  
IF OUT: 30 MHz; -20.28 dBm

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -      | 1   | 39  | 33  | 49  | 38  | 57  | 57  | 72  | 63  | >80 |
| 1      | -      | 13     | +0  | 33  | 30  | 37  | 43  | 47  | 57  | 68  | 75  | >80 |
| 2      | 69     | 41     | 50  | 43  | 49  | 61  | 66  | 58  | 54  | 64  | 72  | >80 |
| 3      | >90    | 52     | 53  | 63  | 37  | 52  | 55  | 52  | 56  | 57  | 68  | 75  |
| 4      | >90    | 75     | >80 | 64  | 72  | 59  | 66  | 62  | 74  | 69  | 69  | 74  |
| 5      | >90    | 70     | 76  | 76  | >80 | 73  | 61  | 68  | 77  | 66  | 69  | 69  |
| 6      | >90    | >80    | >80 | >80 | >80 | 76  | >80 | 78  | >80 | 72  | >80 | >80 |
| 7      | >90    | >80    | >80 | >80 | >80 | >80 | >80 | >80 | 78  | >80 | >80 | >80 |
| 8      | >90    | >80    | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
| 9      | >90    | >80    | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
| 10     | >90    | >80    | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

### LO HARMONICS ORDER

Test conditions: RF IN: 2300 MHz; -4.00 dBm.  
LO IN: 2330 MHz; +7.00 dBm  
IF OUT: 30 MHz; -10.45 dBm

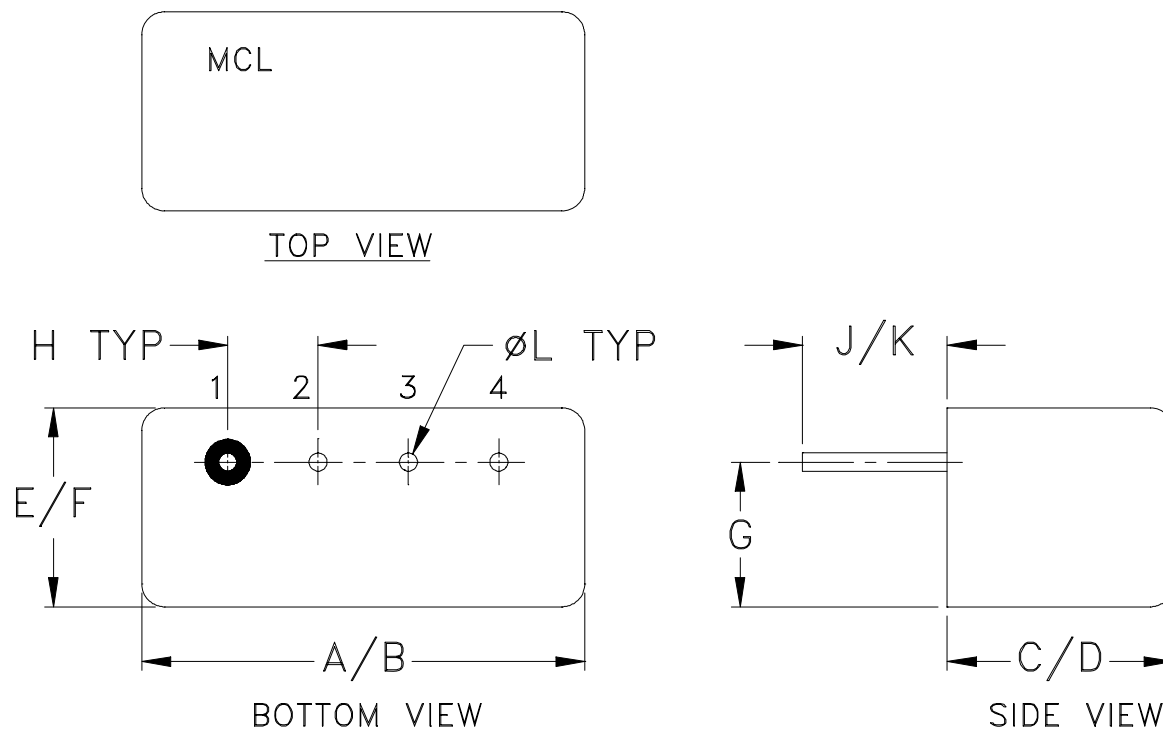
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.  
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.  
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.



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                       |
|---------------------|---------------------------|--------------------------------------|
| Gross Leak          | 125°C Bubble Test         | MIL-STD-202, Method 112, Condition D |
| Barometric Pressure | 100,000 Feet              | MIL-STD-202, Method 105, Condition D |