

### Maximum Ratings

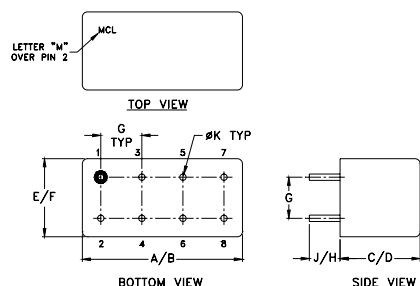
|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| Operating Temperature                                           | -55°C to 100°C |
| Storage Temperature                        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

### Pin Connections

|              |       |
|--------------|-------|
| LO (carrier) | 1     |
| RF (signal)  | 8     |
| I (0°)(ref.) | 7     |
| Q (90°)*     | 4     |
| NOT USED     | 2     |
| GROUND       | 3,5,6 |
| CASE GROUND  | 3,5,6 |

\* Q=I+90° for LO<RF  
Q=I-90° for LO>RF

### Outline Drawing



### Outline Dimensions (inch/mm)

| A     | B     | C    | D    | E     | F     |
|-------|-------|------|------|-------|-------|
| .770  | .800  | .285 | .310 | .370  | .400  |
| 19.56 | 20.32 | 7.24 | 7.87 | 9.40  | 10.16 |
| G     | H     | J    | K    | wt    |       |
| .200  | .20   | .14  | .031 | grams |       |
| 5.08  | 5.08  | 3.56 | 0.79 | 5.2   |       |

### Features

- hermetically sealed metal case
- excellent 3rd and 5th order harmonic suppression
- good amplitude and phase unbalance

### Applications

- radar and communication systems
- military, hi-rel applications

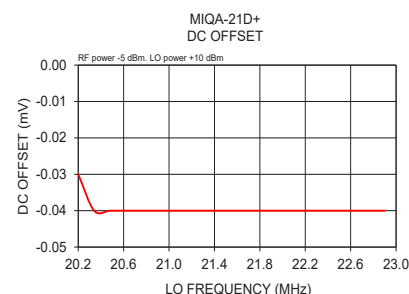
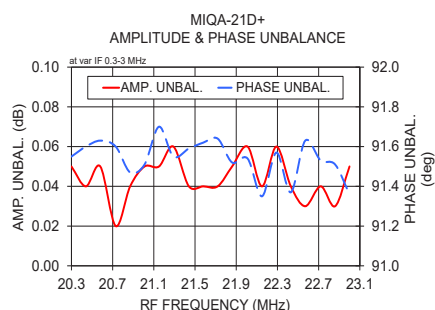
### Demodulator Electrical Specifications

| FREQUENCY<br>(MHz)          |                |      |      | CONVERSION<br>LOSS<br>(dB) |          |      | AMPLITUDE<br>UNBALANCE<br>(dB) |      | PHASE<br>UNBALANCE<br>(Deg.)<br>with reference<br>to 90° |      | HARMONIC<br>SUPPRESSION<br>(dBc) |       |      |       |      |
|-----------------------------|----------------|------|------|----------------------------|----------|------|--------------------------------|------|----------------------------------------------------------|------|----------------------------------|-------|------|-------|------|
| RF (SIGNAL)<br>LO (CARRIER) |                | I&Q  |      |                            |          |      |                                |      |                                                          |      |                                  | 3XI/Q |      | 5XI/Q |      |
| f <sub>L</sub>              | f <sub>U</sub> | Min. | Max. | $\bar{x}$                  | $\sigma$ | Max. | Typ.                           | Max. | Typ.                                                     | Max. | Typ.                             | Min.  | Typ. | Min.  | Typ. |
| 20                          | 23             | DC   | 3    | 6.1                        | 0.15     | 7.0  | 0.15                           | 0.6  | 0.7                                                      | 3.0  | 64                               | 35    | 67   | 50    |      |

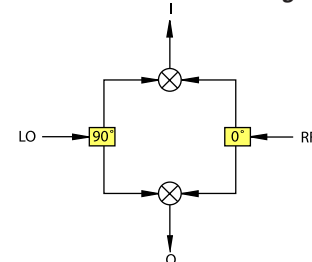
Notes:  
1. Operating LO Power: 10±0.5 dBm  
2. 1 dB Compression at +4 dBm RF input  
3. DC offset 1mV typ.  
4. Conversion Loss=RF power, dBm - (I+Q) power, dBm

### Typical Performance Data

| Frequency (MHz) |        | Conversion Loss (dB) | Amplitude Unbalance (dB) | Phase (I&Q) (deg.) | Frequency (MHz) |       | DC Offset (mV) |
|-----------------|--------|----------------------|--------------------------|--------------------|-----------------|-------|----------------|
| LO=20MHz        | RF I&Q |                      |                          |                    | LO              | RF    |                |
| 20.30           | 0.30   | 5.91                 | 0.05                     | 91.55              | 20.20           | 20.30 | -0.03          |
| 20.44           | 0.44   | 5.91                 | 0.04                     | 91.60              | 20.34           | 20.44 | -0.04          |
| 20.58           | 0.58   | 5.94                 | 0.05                     | 91.63              | 20.48           | 20.58 | -0.04          |
| 20.73           | 0.73   | 5.95                 | 0.02                     | 91.60              | 20.63           | 20.73 | -0.04          |
| 20.87           | 0.87   | 5.94                 | 0.04                     | 91.47              | 20.77           | 20.87 | -0.04          |
| 21.01           | 1.01   | 5.89                 | 0.05                     | 91.51              | 20.91           | 21.01 | -0.04          |
| 21.15           | 1.15   | 5.91                 | 0.05                     | 91.70              | 21.05           | 21.15 | -0.04          |
| 21.29           | 1.29   | 5.93                 | 0.06                     | 91.55              | 21.19           | 21.29 | -0.04          |
| 21.44           | 1.44   | 5.95                 | 0.04                     | 91.59              | 21.34           | 21.44 | -0.04          |
| 21.58           | 1.58   | 5.94                 | 0.04                     | 91.62              | 21.48           | 21.58 | -0.04          |
| 21.72           | 1.72   | 5.91                 | 0.04                     | 91.64              | 21.62           | 21.72 | -0.04          |
| 21.86           | 1.86   | 5.91                 | 0.05                     | 91.52              | 21.76           | 21.86 | -0.04          |
| 22.01           | 2.01   | 5.90                 | 0.06                     | 91.54              | 21.91           | 22.01 | -0.04          |
| 22.15           | 2.15   | 5.91                 | 0.04                     | 91.35              | 22.05           | 22.15 | -0.04          |
| 22.29           | 2.29   | 5.92                 | 0.06                     | 91.57              | 22.19           | 22.29 | -0.04          |
| 22.43           | 2.43   | 5.92                 | 0.04                     | 91.37              | 22.33           | 22.43 | -0.04          |
| 22.57           | 2.57   | 5.94                 | 0.03                     | 91.63              | 22.47           | 22.57 | -0.04          |
| 22.72           | 2.72   | 5.95                 | 0.04                     | 91.53              | 22.62           | 22.72 | -0.04          |
| 22.86           | 2.86   | 5.92                 | 0.03                     | 91.51              | 22.76           | 22.86 | -0.04          |
| 23.00           | 3.00   | 5.92                 | 0.05                     | 91.36              | 22.90           | 23.00 | -0.04          |



### I&Q demodulation block diagram



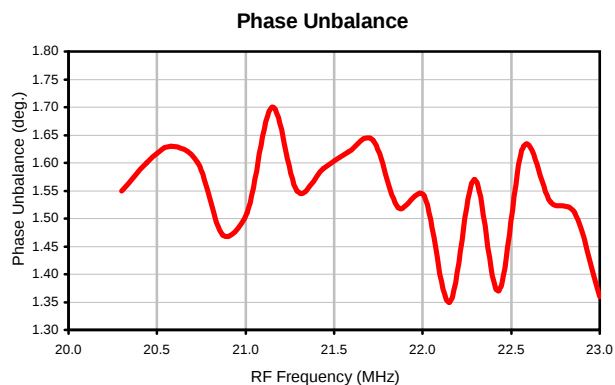
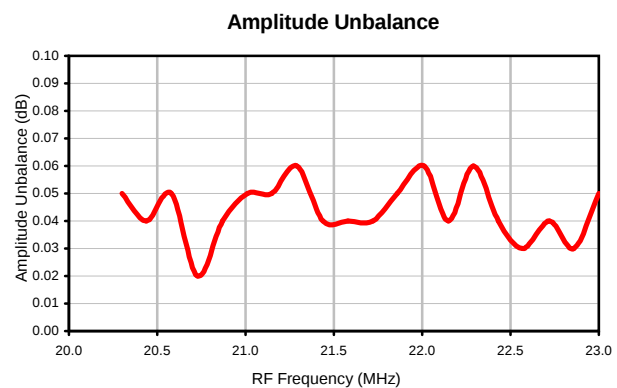
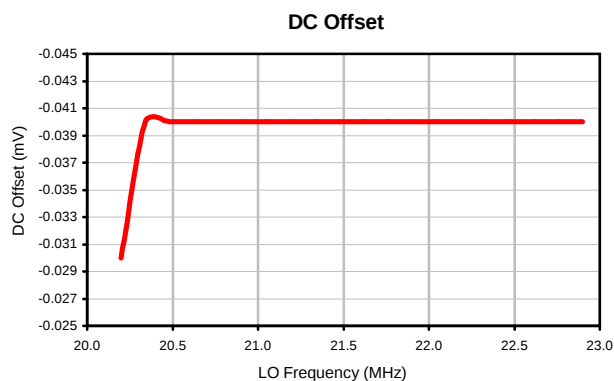
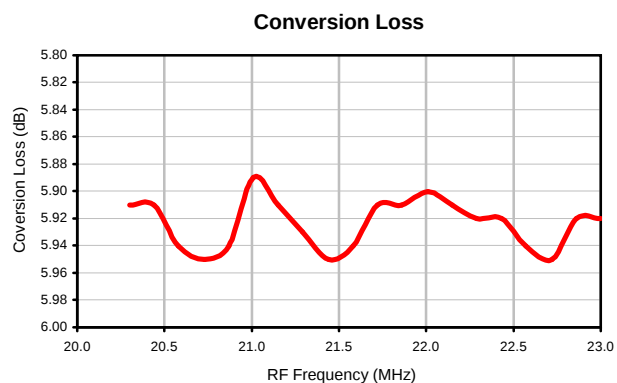
### Notes

- 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)

## Typical Performance Data

| FREQUENCY<br>LO=20MHz<br>(MHz) |      | CONVERSION<br>LOSS<br>(dB) | AMPLITUDE<br>UNBALANCE<br>(dB) | PHASE<br>(I&Q)<br>(deg.) | FREQUENCY<br>(MHz) |       | DC<br>OFFSET<br>(mV) |
|--------------------------------|------|----------------------------|--------------------------------|--------------------------|--------------------|-------|----------------------|
| RF                             | I&Q  |                            |                                |                          | LO                 | RF    |                      |
| 20.30                          | 0.30 | 5.91                       | 0.05                           | 91.55                    | 20.20              | 20.30 | -0.03                |
| 20.44                          | 0.44 | 5.91                       | 0.04                           | 91.60                    | 20.34              | 20.44 | -0.04                |
| 20.58                          | 0.58 | 5.94                       | 0.05                           | 91.63                    | 20.48              | 20.58 | -0.04                |
| 20.73                          | 0.73 | 5.95                       | 0.02                           | 91.60                    | 20.63              | 20.73 | -0.04                |
| 20.87                          | 0.87 | 5.94                       | 0.04                           | 91.47                    | 20.77              | 20.87 | -0.04                |
| 21.01                          | 1.01 | 5.89                       | 0.05                           | 91.51                    | 20.91              | 21.01 | -0.04                |
| 21.15                          | 1.15 | 5.91                       | 0.05                           | 91.70                    | 21.05              | 21.15 | -0.04                |
| 21.29                          | 1.29 | 5.93                       | 0.06                           | 91.55                    | 21.19              | 21.29 | -0.04                |
| 21.44                          | 1.44 | 5.95                       | 0.04                           | 91.59                    | 21.34              | 21.44 | -0.04                |
| 21.58                          | 1.58 | 5.94                       | 0.04                           | 91.62                    | 21.48              | 21.58 | -0.04                |
| 21.72                          | 1.72 | 5.91                       | 0.04                           | 91.64                    | 21.62              | 21.72 | -0.04                |
| 21.86                          | 1.86 | 5.91                       | 0.05                           | 91.52                    | 21.76              | 21.86 | -0.04                |
| 22.01                          | 2.01 | 5.90                       | 0.06                           | 91.54                    | 21.91              | 22.01 | -0.04                |
| 22.15                          | 2.15 | 5.91                       | 0.04                           | 91.35                    | 22.05              | 22.15 | -0.04                |
| 22.29                          | 2.29 | 5.92                       | 0.06                           | 91.57                    | 22.19              | 22.29 | -0.04                |
| 22.43                          | 2.43 | 5.92                       | 0.04                           | 91.37                    | 22.33              | 22.43 | -0.04                |
| 22.57                          | 2.57 | 5.94                       | 0.03                           | 91.63                    | 22.47              | 22.57 | -0.04                |
| 22.72                          | 2.72 | 5.95                       | 0.04                           | 91.53                    | 22.62              | 22.72 | -0.04                |
| 22.86                          | 2.86 | 5.92                       | 0.03                           | 91.51                    | 22.76              | 22.86 | -0.04                |
| 23.00                          | 3.00 | 5.92                       | 0.05                           | 91.36                    | 22.90              | 23.00 | -0.04                |

## Typical Performance Curves



A01  
A04  
A05  
A06

## Outline Dimensions



| CASE# | A               | B               | C              | D               | E              | F               | G              | H             | J             | K             | WT,<br>GRAM |
|-------|-----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|---------------|---------------|---------------|-------------|
| A01   | .770<br>(19.56) | .800<br>(20.32) | .385<br>(9.78) | .400<br>(10.16) | .370<br>(9.40) | .400<br>(10.16) | .200<br>(5.08) | .20<br>(5.08) | .14<br>(3.56) | .031<br>(.79) | 5.2         |
| A04   |                 |                 | .200<br>(5.08) | .210<br>(5.33)  |                |                 |                |               |               |               | 3.7         |
| A05   |                 |                 | .240<br>(6.10) | .250<br>(6.35)  |                |                 |                |               |               |               | 3.7         |
| A06   |                 |                 | .285<br>(7.24) | .310<br>(7.87)  |                |                 |                |               |               |               | 5.2         |

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.
- Insulated spacer available. Request P/N B14-045-01.
- 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.

**Mini-Circuits®**

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

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

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



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 |