

Plug-in

Diplexer

DPLC-8510A01+

75Ω 5 to 1225 MHz
(5-85, 102-1225 MHz)



Generic photo used for illustration purposes only
CASE STYLE: QB2223

The Big Deal

- Plug-in design
- Field replaceable
- Low insertion loss
- Excellent return loss, 24 dB typ.
- High cross over isolation
- Low group delay variation in passband
- Mirrored version available for ease of routing
- DOCSIS 3.1 standard

Product Overview

DPLC-8510A01+ is a high performance field replaceable plug-in diplexer with the lowpass port at 5-85 MHz and highpass port at 102-1225 MHz. Excellent return loss combined with high out of channel rejection makes it an ideal part in cable TV and multiband radio systems

Key Features

| Feature | Advantages |
|--|---|
| Low passband insertion loss | Ensures low signal loss through both the channels. |
| Excellent Stopband rejection | Co-channel rejection of 50dB typical ensures unwanted spurious are eliminated. |
| Excellent return loss at 5-85 and 102-1225 MHz | This makes signal transmission with very less reflection and well-matched with the adjacent component used in the system. |

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



Plug-in Diplexer

DPLC-8510A01+

75Ω 5 to 1225 MHz (5-85, 102-1225 MHz)

Maximum Ratings

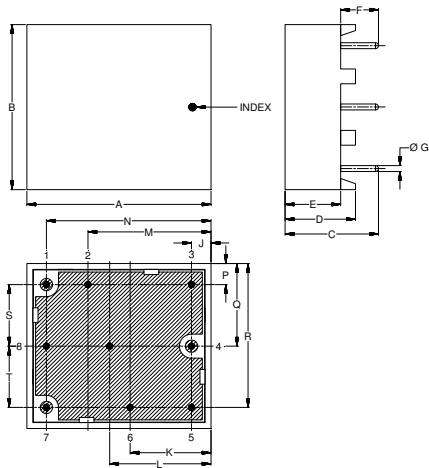
| | |
|-----------------------|----------------|
| Operating Temperature | -40° to 85°C |
| Storage Temperature | -55°C to 100°C |
| RF Power Input | 30dBm Max. |

Permanent damage may occur if any of these limits are exceeded. These ratings are not intended for continuous normal operation

Pin Connections

| | |
|----------------|-------------|
| HIGH PASS PORT | 7 |
| LOW PASS PORT | 1 |
| COMMON PORT | 4 |
| GROUND | 2,3,5,6,8,9 |

Outline Drawing



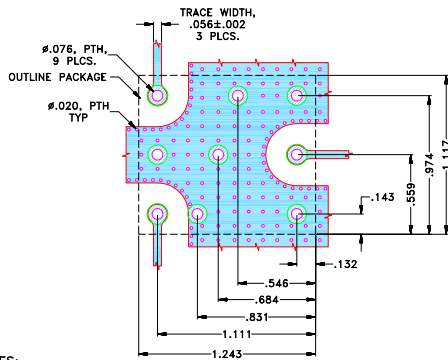
Outline Dimensions (inch/mm)

| | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| A | B | C | D | E | F | G | H | J | K |
| 1.243 | 1.117 | .630 | .475 | .375 | .255 | .040 | -- | .132 | .546 |
| 31.56 | 28.36 | 16.00 | 12.07 | 9.53 | 6.48 | 1.02 | -- | 3.35 | 13.87 |
| L | M | N | P | Q | R | S | T | Wt. | |
| .684 | .831 | 1.111 | .143 | .559 | .974 | .417 | .415 | grams | |
| 17.37 | 21.10 | 28.22 | 3.63 | 14.21 | 24.74 | 10.58 | 10.53 | | 7 |

Note: Please refer to case style drawing for details

Demo Board MCL P/N: TB-897+ Suggested PCB Layout (PL-485)

SUGGESTED MOUNTING CONFIGURATION FOR
QB2223 CASE STYLE



NOTES:

- TRACE WIDTH IS SHOWN FOR IT180, WITH DIELECTRIC THICKNESS .059"±.005", COPPER: 1/2 Oz EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
- DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

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Features

- Low insertion loss
- 75Ω Impedance
- Excellent return loss 24 dB typ.
- Low group delay variation
- High cross isolation
- High rejection

Applications

- Cable TV systems (DOCSIS 3.1 standard)
- Multiband radio systems



Generic photo used for illustration purposes only
CASE STYLE: QB2223

+RoHS Compliant

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

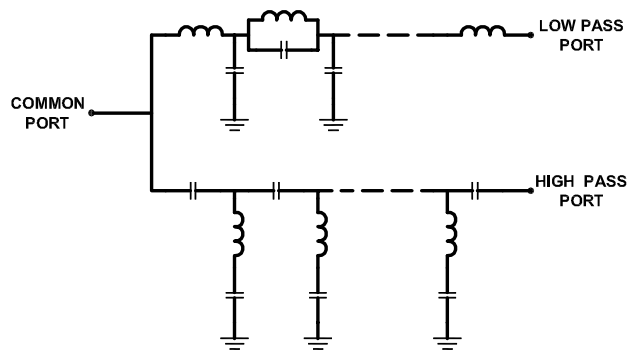


CAUTION NOTE: Not designed for reflow process.

Electrical Specifications at 25°C

| Parameter | Port | Frequency (MHz) | Min. | Typ. | Max. | Unit | |
|-----------------------|-------------|------------------|-----------|------|------|------|----|
| Pass Band | Low Pass | 5 | - | - | 0.20 | dB | |
| | | 85 | - | - | 1.30 | dB | |
| | | High Pass | 102 | - | - | 1.75 | dB |
| | | | 105 | - | - | 1.30 | dB |
| | | | 130 | - | - | 0.60 | dB |
| | | | 870 | - | - | 0.50 | dB |
| | | | 1000 | - | - | 0.55 | dB |
| | 1218 | - | - | 0.60 | dB | | |
| | 1225 | - | - | 0.65 | dB | | |
| | Return Loss | Low Pass | 5-85 | 22 | 24 | - | dB |
| | | High Pass | 102-104.9 | 20 | 24 | - | dB |
| | | | 105-1225 | 20 | 24 | - | dB |
| | | Common | 5-85 | 22 | 24 | - | dB |
| | | | 102-104.9 | 20 | 24 | - | dB |
| Stop Band Isolation | High Pass | 5-84.9 | 48 | 50 | - | dB | |
| | Cross over | 85-104.9 | 38 | 40 | - | dB | |
| | Low Pass | 105-1225 | 45 | 50 | - | dB | |
| Group Delay Variation | High Pass | 109.275-112.855 | - | 6 | 8 | ns | |
| | | 115.275-118.855 | - | 3 | 6 | ns | |
| | | 121.2625-124.843 | - | 2 | 5 | ns | |
| | Low Pass | 82-83.5 | - | - | 6 | ns | |
| | | 83.5-85 | - | - | 8 | ns | |

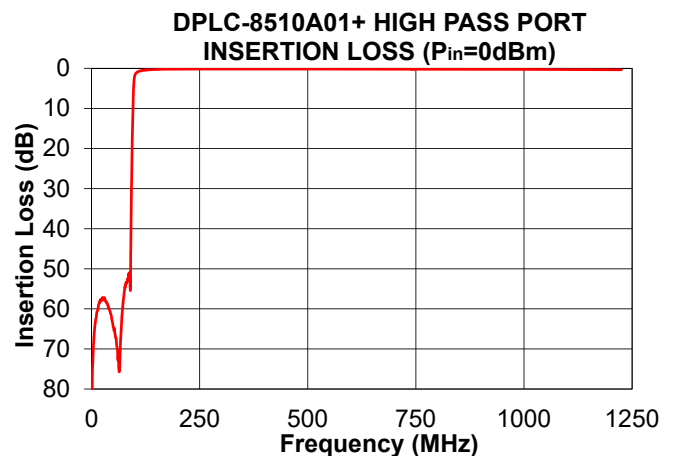
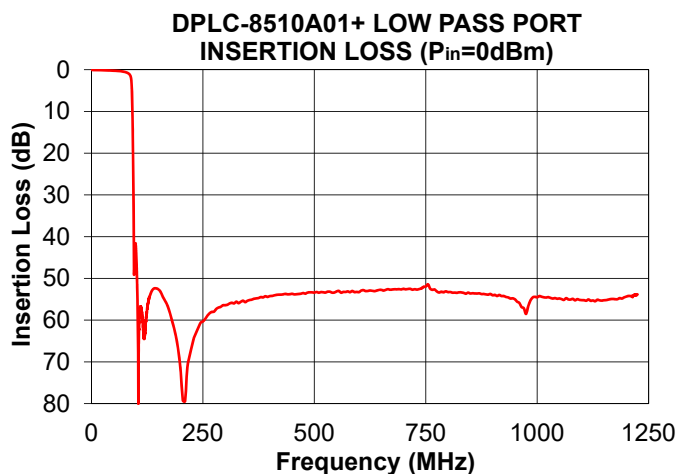
Functional Schematic



Typical Performance Data at 25°C

| FREQUENCY (MHz) | INSERTION LOSS (dB) | | | RETURN LOSS (dB) | |
|--------------------|------------------------|----------------|-------------|---------------------|----------------|
| | Low Pass Port | High Pass Port | Common Port | Low Pass Port | High Pass Port |
| 1.000 | 0.05 | 85.10 | 52.32 | 52.63 | 0.04 |
| 5.000 | 0.08 | 68.49 | 44.84 | 47.51 | 0.04 |
| 82.000 | 0.83 | 53.20 | 32.54 | 31.83 | 0.28 |
| 83.500 | 0.93 | 52.84 | 34.89 | 35.57 | 0.31 |
| 84.900 | 1.07 | 52.28 | 38.71 | 34.59 | 0.35 |
| 85.000 | 1.08 | 52.11 | 39.29 | 34.29 | 0.35 |
| 90.000 | 3.36 | 52.98 | 11.22 | 10.83 | 0.54 |
| 92.400 | 13.59 | 29.55 | 4.01 | 2.68 | 0.76 |
| 93.300 | 20.63 | 23.33 | 3.48 | 1.90 | 0.91 |
| 94.000 | 27.55 | 19.01 | 3.41 | 1.58 | 1.11 |
| 94.300 | 31.11 | 17.27 | 3.46 | 1.47 | 1.22 |
| 98.000 | 42.28 | 3.39 | 11.63 | 0.88 | 8.46 |
| 99.000 | 41.72 | 2.34 | 17.66 | 0.81 | 12.94 |
| 102.000 | 49.49 | 1.33 | 32.26 | 0.66 | 28.73 |
| 104.900 | 72.10 | 1.00 | 29.52 | 0.59 | 29.84 |
| 105.000 | 75.57 | 0.99 | 29.50 | 0.59 | 29.64 |
| 109.275 | 56.94 | 0.76 | 27.42 | 0.53 | 25.98 |
| 112.855 | 58.02 | 0.63 | 26.13 | 0.50 | 26.01 |
| 115.275 | 61.06 | 0.57 | 26.04 | 0.49 | 26.82 |
| 118.855 | 64.39 | 0.50 | 26.76 | 0.47 | 28.52 |
| 120.000 | 62.96 | 0.48 | 27.14 | 0.47 | 29.21 |
| 121.263 | 60.91 | 0.46 | 27.62 | 0.47 | 30.02 |
| 124.843 | 57.39 | 0.42 | 29.19 | 0.46 | 32.63 |
| 130.000 | 54.48 | 0.37 | 31.58 | 0.45 | 36.40 |
| 500.000 | 53.40 | 0.19 | 26.80 | 0.32 | 26.15 |
| 870.000 | 53.58 | 0.25 | 32.56 | 0.40 | 31.23 |
| 1000.000 | 54.53 | 0.28 | 42.10 | 0.46 | 29.23 |
| 1218.000 | 53.86 | 0.36 | 34.38 | 0.58 | 33.97 |
| 1225.000 | 53.85 | 0.37 | 33.95 | 0.59 | 34.37 |

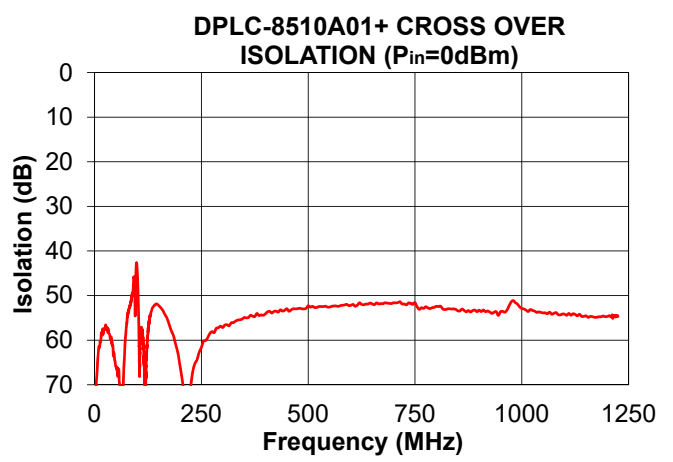
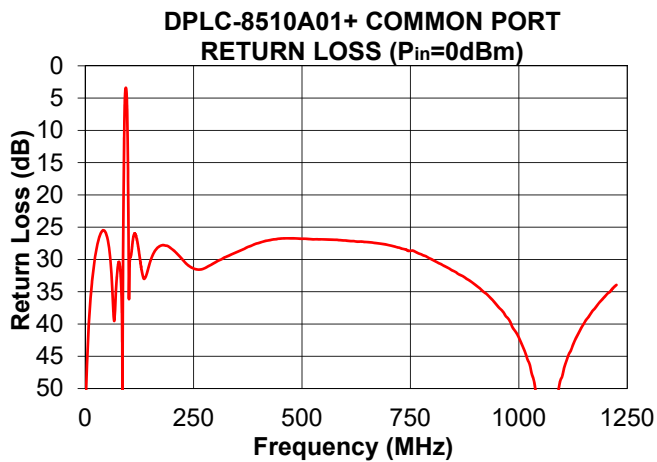
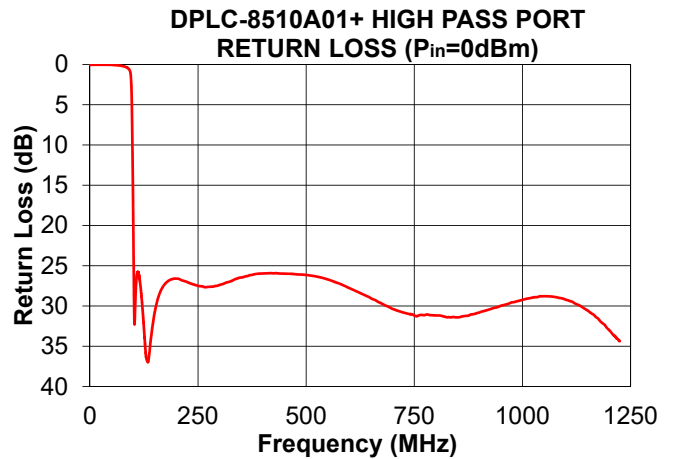
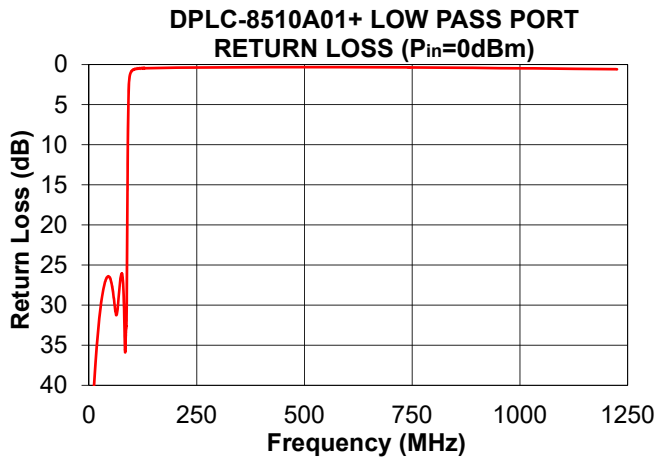
Performance Charts



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Notes

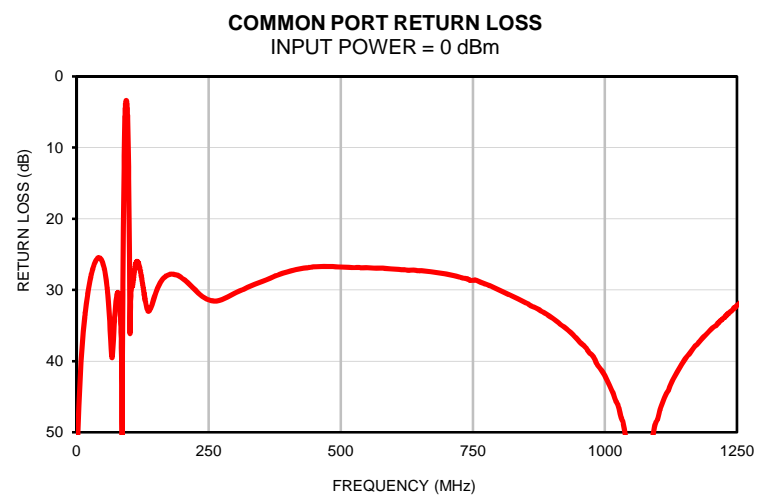
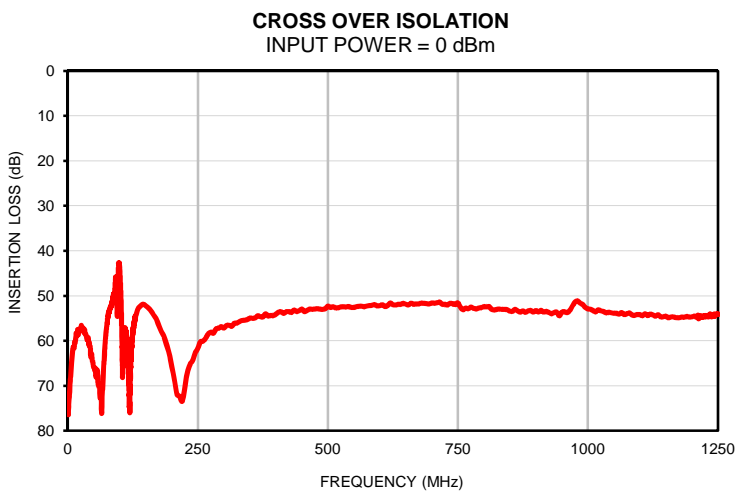
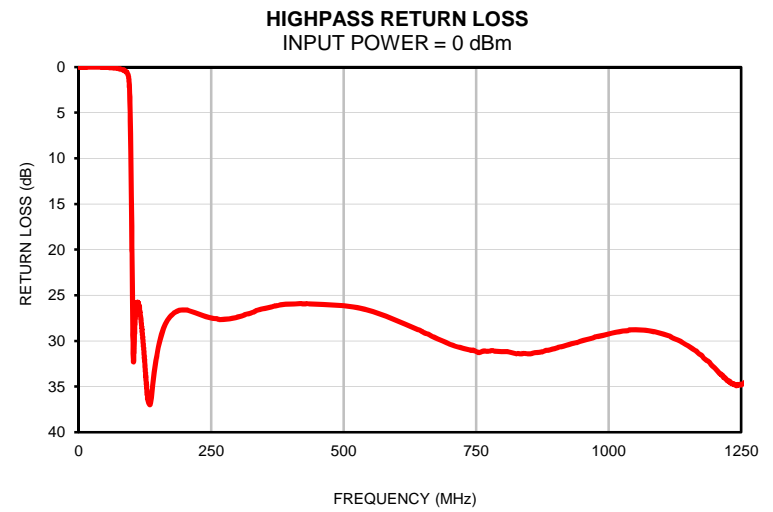
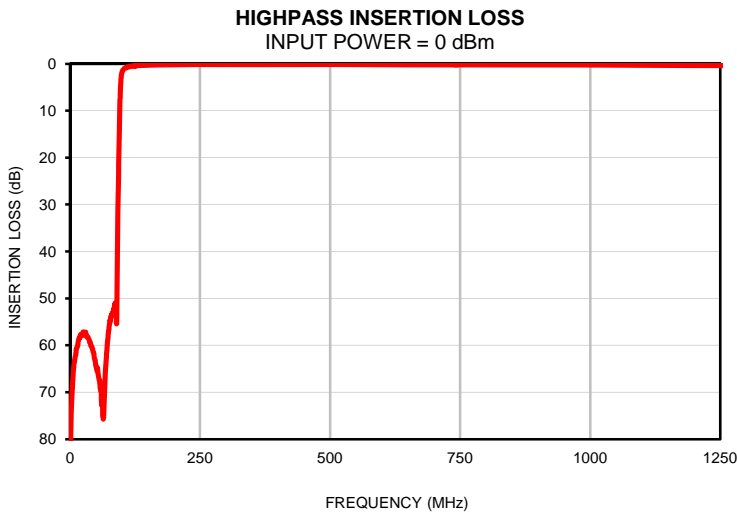
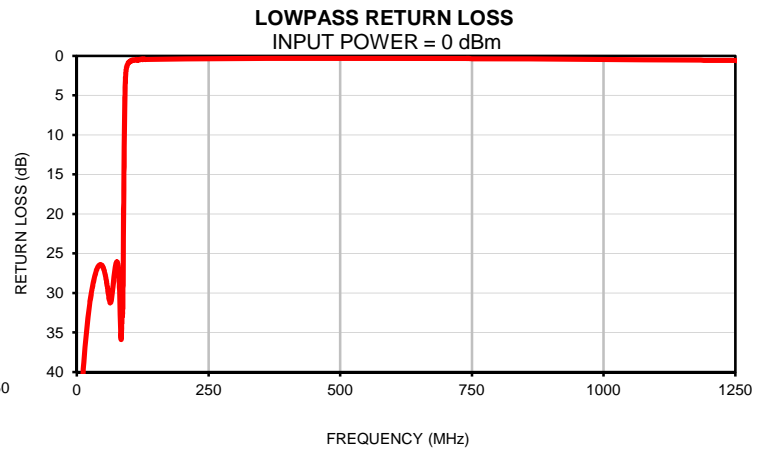
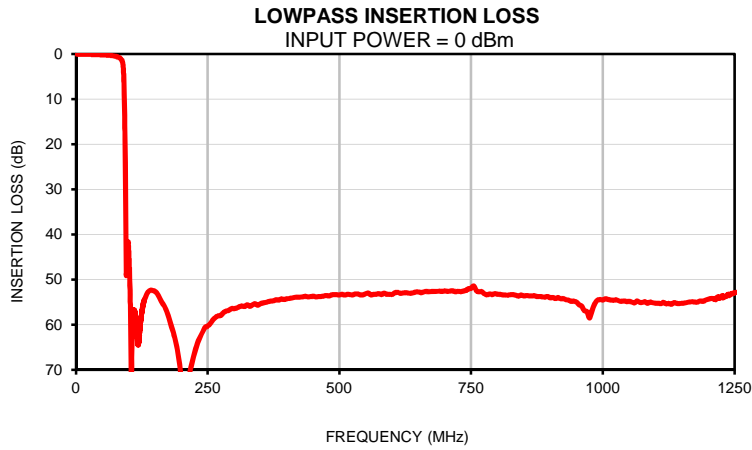
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Typical Performance Data

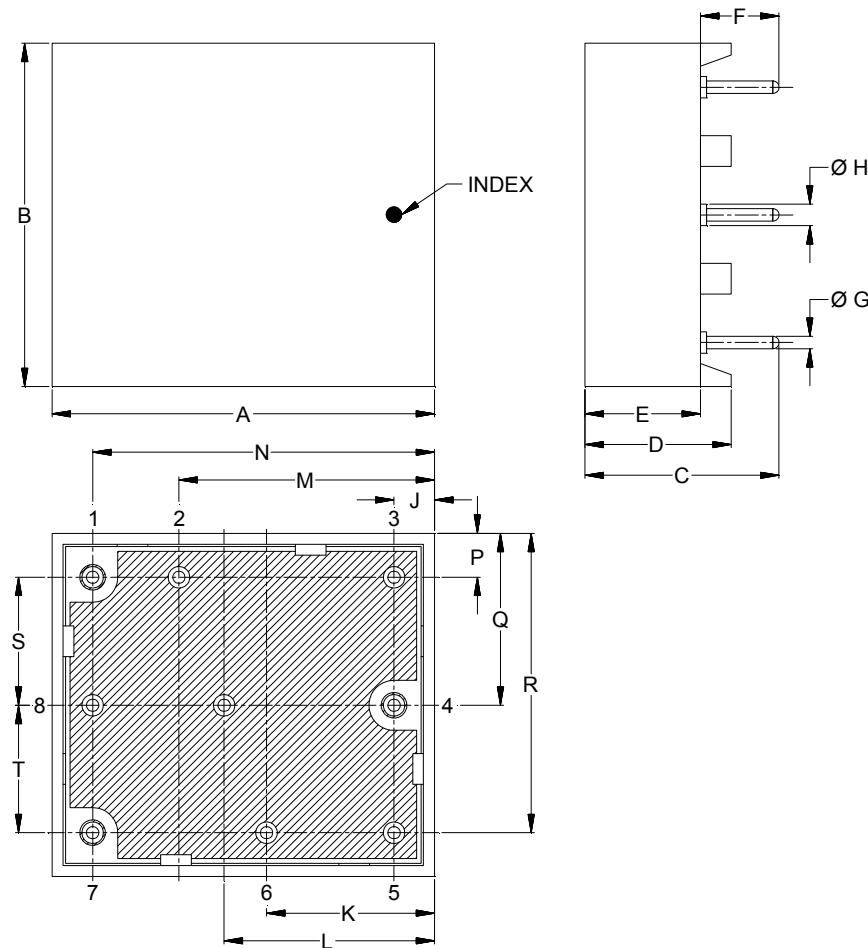
| FREQUENCY (MHz) | INSERTION LOSS (dB) | | Cross over isolation (dB) (between LPF and HPF) | RETURN LOSS (dB) | | |
|--------------------|---------------------------|---------------|---|------------------------|--------------|---------------|
| | Lowpass port | Highpass port | | Common port | Lowpass port | Highpass port |
| 1.000 | 0.05 | 85.10 | 76.44 | 52.32 | 52.63 | 0.04 |
| 5.000 | 0.08 | 68.49 | 68.25 | 44.84 | 47.51 | 0.04 |
| 10.000 | 0.09 | 62.41 | 61.47 | 38.14 | 41.46 | 0.03 |
| 15.000 | 0.10 | 59.92 | 59.58 | 34.08 | 37.22 | 0.03 |
| 20.000 | 0.11 | 57.77 | 58.65 | 31.03 | 33.75 | 0.03 |
| 30.000 | 0.15 | 57.20 | 57.31 | 27.18 | 29.05 | 0.03 |
| 40.000 | 0.19 | 60.01 | 60.81 | 25.55 | 26.72 | 0.03 |
| 50.000 | 0.24 | 64.51 | 65.90 | 26.37 | 26.78 | 0.05 |
| 60.000 | 0.30 | 70.07 | 70.15 | 31.55 | 30.22 | 0.08 |
| 70.000 | 0.43 | 62.11 | 63.92 | 36.44 | 28.28 | 0.14 |
| 80.000 | 0.72 | 53.57 | 53.57 | 30.91 | 28.23 | 0.25 |
| 82.000 | 0.83 | 53.20 | 52.69 | 32.54 | 31.83 | 0.28 |
| 82.500 | 0.86 | 53.05 | 52.40 | 33.18 | 33.16 | 0.29 |
| 83.000 | 0.89 | 52.96 | 52.08 | 33.95 | 34.50 | 0.30 |
| 84.000 | 0.98 | 52.60 | 52.18 | 35.76 | 35.89 | 0.32 |
| 84.500 | 1.02 | 52.33 | 51.87 | 37.22 | 35.29 | 0.34 |
| 84.900 | 1.07 | 52.28 | 51.44 | 38.71 | 34.59 | 0.35 |
| 85.000 | 1.08 | 52.11 | 51.63 | 39.29 | 34.29 | 0.35 |
| 85.500 | 1.14 | 51.87 | 51.14 | 42.68 | 33.42 | 0.36 |
| 86.000 | 1.21 | 51.57 | 50.86 | 50.51 | 32.91 | 0.38 |
| 87.000 | 1.39 | 51.21 | 50.21 | 35.48 | 32.07 | 0.41 |
| 87.500 | 1.51 | 51.11 | 50.01 | 29.65 | 30.11 | 0.43 |
| 88.000 | 1.66 | 51.57 | 49.79 | 25.00 | 26.26 | 0.45 |
| 89.000 | 2.18 | 53.75 | 49.50 | 17.37 | 17.79 | 0.49 |
| 90.000 | 3.36 | 52.98 | 49.10 | 11.22 | 10.83 | 0.54 |
| 92.000 | 11.00 | 32.67 | 45.93 | 4.49 | 3.27 | 0.71 |
| 92.400 | 13.59 | 29.55 | 45.85 | 4.01 | 2.68 | 0.76 |
| 93.000 | 18.09 | 25.32 | 46.30 | 3.59 | 2.10 | 0.85 |
| 94.000 | 27.55 | 19.01 | 48.93 | 3.41 | 1.58 | 1.11 |
| 94.300 | 31.11 | 17.27 | 50.30 | 3.46 | 1.47 | 1.22 |
| 95.000 | 41.83 | 13.48 | 54.03 | 3.77 | 1.29 | 1.63 |
| 96.000 | 48.15 | 8.83 | 49.59 | 4.92 | 1.11 | 2.75 |
| 98.000 | 42.28 | 3.39 | 42.81 | 11.63 | 0.88 | 8.46 |
| 99.000 | 41.72 | 2.34 | 43.07 | 17.66 | 0.81 | 12.94 |
| 100.000 | 43.24 | 1.82 | 44.59 | 26.03 | 0.75 | 17.97 |
| 102.000 | 49.49 | 1.33 | 50.17 | 32.26 | 0.66 | 28.73 |
| 103.000 | 54.21 | 1.18 | 54.16 | 30.14 | 0.63 | 32.13 |
| 104.000 | 60.72 | 1.08 | 59.32 | 29.61 | 0.61 | 31.43 |
| 104.500 | 65.70 | 1.03 | 63.13 | 29.55 | 0.60 | 30.53 |
| 104.900 | 72.10 | 1.00 | 65.51 | 29.52 | 0.59 | 29.84 |
| 105.000 | 75.57 | 0.99 | 65.34 | 29.50 | 0.59 | 29.64 |
| 109.275 | 56.94 | 0.76 | 58.24 | 27.42 | 0.53 | 25.98 |
| 112.855 | 58.02 | 0.63 | 58.76 | 26.13 | 0.50 | 26.01 |
| 115.275 | 61.06 | 0.57 | 64.08 | 26.04 | 0.49 | 26.82 |
| 118.855 | 64.39 | 0.50 | 73.52 | 26.76 | 0.47 | 28.52 |
| 120.000 | 62.96 | 0.48 | 68.13 | 27.14 | 0.47 | 29.21 |
| 121.263 | 60.91 | 0.46 | 63.93 | 27.62 | 0.47 | 30.02 |
| 124.843 | 57.39 | 0.42 | 58.49 | 29.19 | 0.46 | 32.63 |
| 130.000 | 54.48 | 0.37 | 54.60 | 31.58 | 0.45 | 36.40 |
| 250.000 | 60.31 | 0.18 | 61.66 | 31.41 | 0.36 | 27.49 |
| 500.000 | 53.40 | 0.19 | 52.29 | 26.80 | 0.32 | 26.15 |
| 750.000 | 51.95 | 0.23 | 51.58 | 28.67 | 0.36 | 31.17 |
| 870.000 | 53.58 | 0.25 | 53.63 | 32.56 | 0.40 | 31.23 |
| 900.000 | 54.05 | 0.25 | 53.28 | 33.94 | 0.41 | 30.81 |
| 1000.000 | 54.53 | 0.28 | 52.90 | 42.10 | 0.46 | 29.23 |
| 1100.000 | 55.22 | 0.31 | 54.17 | 48.09 | 0.51 | 29.22 |
| 1150.000 | 55.23 | 0.33 | 54.54 | 39.93 | 0.54 | 30.54 |
| 1200.000 | 54.36 | 0.35 | 54.69 | 35.61 | 0.57 | 32.96 |
| 1218.000 | 53.86 | 0.36 | 54.48 | 34.38 | 0.58 | 33.97 |
| 1225.000 | 53.85 | 0.37 | 54.66 | 33.95 | 0.59 | 34.37 |

Typical Performance Curves



Outline Dimensions

QB2223



| CASE# | A | B | C | D | E | F | G | H | J | K |
|--------|------------------|------------------|-----------------|-----------------|----------------|----------------|----------------|----------------|----------------|-----------------|
| QB2223 | 1.243 (31.56) | 1.117 (28.36) | .630 (16.00) | .475 (12.07) | .375 (9.53) | .255 (6.48) | .040 (1.02) | .070 (1.78) | .132 (3.35) | .546 (13.87) |

| CASE# | L | M | N | P | Q | R | S | T | WT.GRAMS |
|--------|-----------------|-----------------|------------------|----------------|-----------------|-----------------|-----------------|-----------------|----------|
| QB2223 | .684 (17.37) | .831 (21.10) | 1.111 (28.22) | .143 (3.63) | .559 (14.21) | .974 (24.74) | .417 (10.58) | .415 (10.53) | 7 |

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .015$; 3 Pl. $\pm .030$

Notes:

1. Cover material: Fortan PPS
2. Pin material: Brass alloy [C3604]
3. Pin finish: Gold flash
4. Tolerance on pin diameter $\pm .001$
5. Base: Printed wiring laminate.



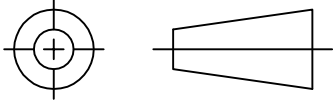
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS

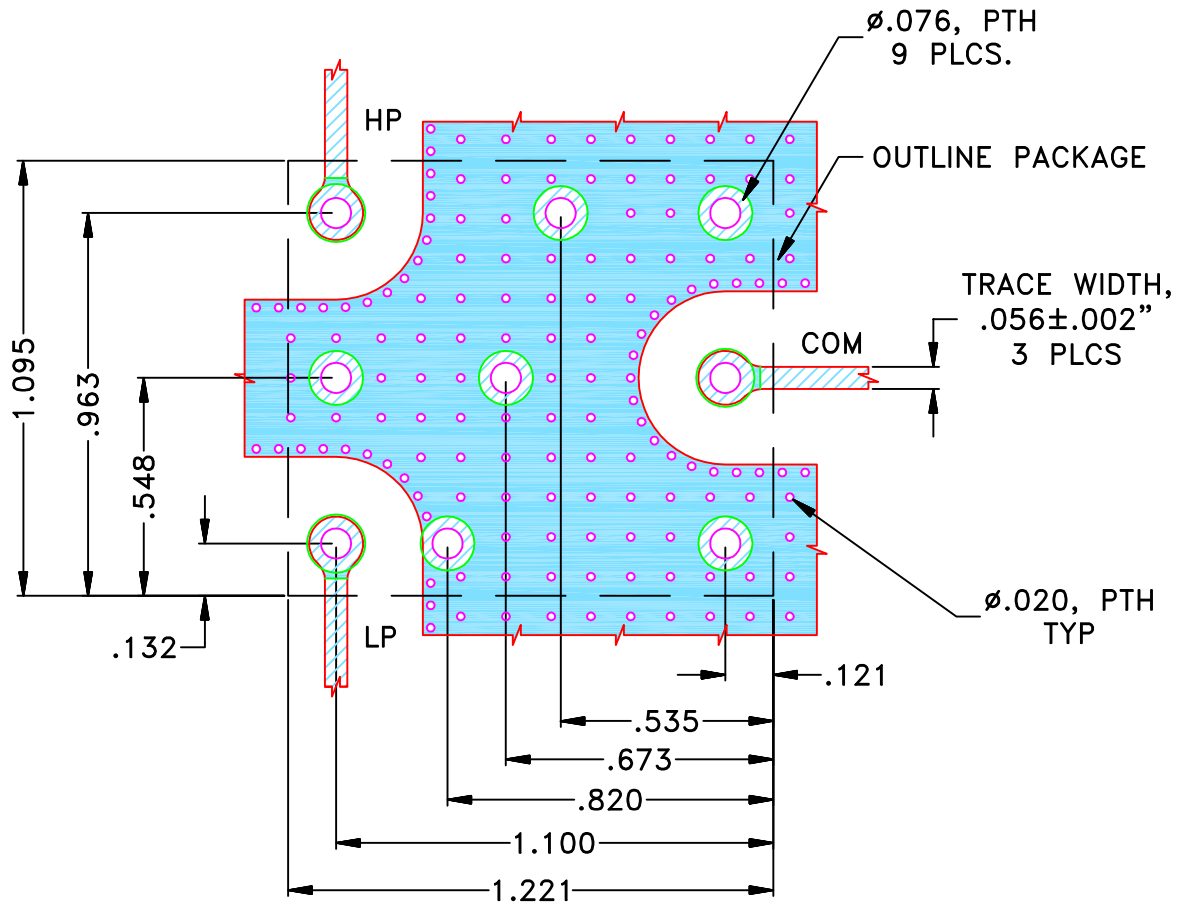
THIRD ANGLE PROJECTION



REVISIONS

| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
|-----|---------|-------------|--------|-----|------|
| OR | M156280 | NEW RELEASE | MAY 16 | SSA | MD |
| | | | | | |
| | | | | | |

**SUGGESTED MOUNTING CONFIGURATION FOR
QB2223 CASE STYLE**



NOTES:

- TRACE WIDTH IS SHOWN FOR IT180, WITH DIELECTRIC THICKNESS .059"±.005". COPPER: 1/2 Oz EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.



DENOTES PCB COPPER LAYOUT WITH SMOBC
(SOLDER MASK OVER BARE COPPER)



DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

| UNLESS OTHERWISE SPECIFIED | INITIALS | DATE |
|----------------------------|----------|-----------|
| DIMENSIONS ARE IN INCHES | SSA | 05 MAY 16 |
| TOLERANCES ON: | MD | 05 MAY 16 |
| 2 PL DECIMALS ± | MD | 05 MAY 16 |
| 3 PL DECIMALS ± .005" | | |
| ANGLES ± | | |
| FRACTIONS ± | | |



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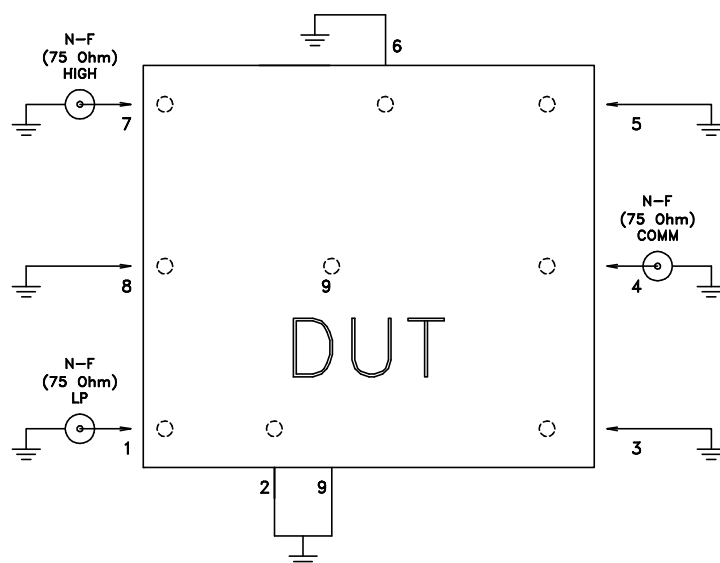
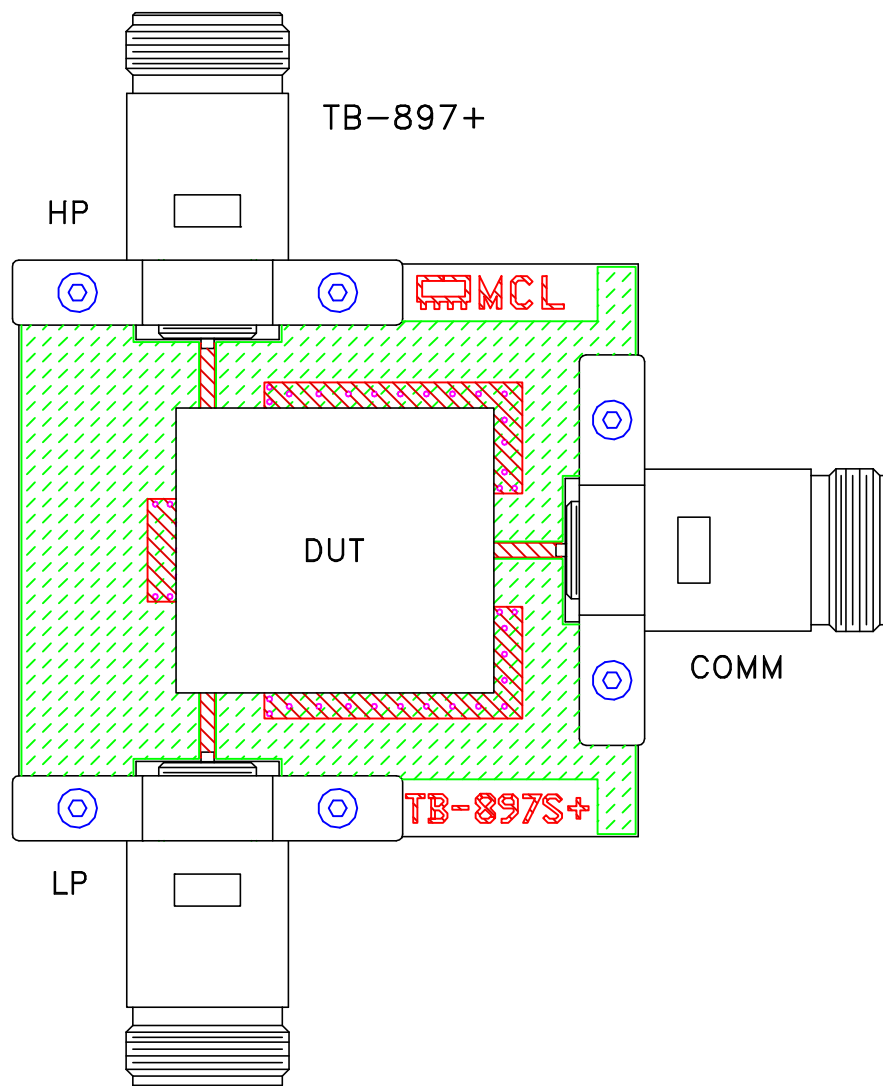
13 Neptune Avenue
Brooklyn NY 11235

**PL, QB2223, DPLC,
75 Ohm**

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| | | | |
|-------------------------|----------------------------|---------------------------------|-------------------|
| SIZE A | CODE IDENT 15542 | DRAWING NO: 98-PL-485 | REV: OR |
| FILE: 98PL485 | SCALE: 3:1 | SHEET: 1 OF 1 | |

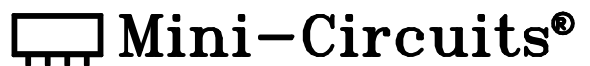
Evaluation Board and Circuit



Schematic Diagram

Notes:

1. PCB Material: FR4, GADE IT-180TC OR Equivalent
Dielectric Constant=4.7, Thickness=.059 inch.





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 | -40° to 85° C Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -55° to 100° C Ambient Environment | Individual Model Data Sheet |
| HAST | 130°C, 85% RH, 96 hours | JESD22-A110 |
| Humidity | 90 to 95% RH, 240 hours, 50°C | MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours |
| Thermal Shock | -55° to 100°C, 100 cycles | MIL-STD-202, Method 107, Condition A-3, except +100°C |