

# Microwave Precision Fixed Attenuator

## YAT-SERIES

50Ω Up to 2W DC to 18 GHz

### The Big Deal

- Exceptional Power Handling, Up to 2W
- Wide bandwidth, DC - 18 GHz
- Small Size, 2 mm x 2 mm



CASE STYLE: MC1630

### Product Overview

YAT attenuators (ROHS compliant) are fixed value, absorptive attenuators fabricated using highly repetitive MMIC processing including thin film resistors on Silicon substrates. YAT attenuator die contain through-wafer Cu metallization vias to realize low thermal resistance and wideband operation. YATs are available with nominal attenuation values of 0 to 10 dB (in 1 dB steps), and 12, 15, 20, and 30 dB. Packaged in tiny 2 mm x 2 mm MCLP™ package fits into tiny spaces.

### Key Features

| Feature                                                                                        | Advantages                                                                                                                                                               |
|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wideband operation, DC to 18 GHz                                                               | Supports a wide array of applications including wireless cellular, microwave communications, satellite, defense and aerospace, medical broadband and optic applications. |
| Small Size and simple to use (2 mm x 2 mm)                                                     | As a single chip solution, the YAT series occupies less board space than a "T" or "Pi" pad configuration, and ensures repeatable performance over wide frequency ranges. |
| High Power, Up to 2W                                                                           | High power handling in a small size package.                                                                                                                             |
| Wide range of nominal attenuation values 0 to 10 dB (in 1 dB steps), and 12, 15, 20, and 30 dB | Small increment offering enables circuit designer to change attenuation values without motherboard redesign making the YAT series ideal for select at test application.  |
| MCLP™ Package                                                                                  | Low Inductance, repeatable transitions, excellent thermal path make the YAT series an ideal solution as an alternative to "do it yourself" resistor based attenuators.   |

#### 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)



# Microwave Precision Fixed Attenuator

## YAT-4+

50Ω 2W 4dB DC to 18 GHz

### Product Features

- miniature package MCLP™ 2 x 2 mm
- wide bandwidth, DC-18 GHz
- excellent attenuation accuracy & flatness



CASE STYLE: MC1630

### +RoHS Compliant

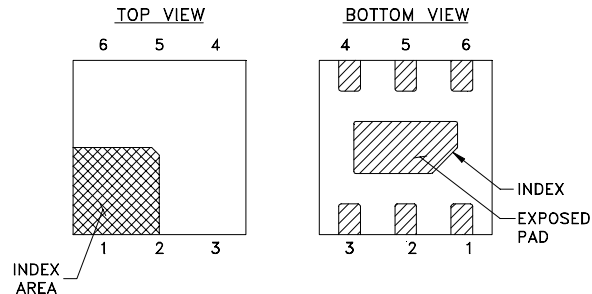
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

### Typical Applications

- Cellular
- PCS
- communications
- radar
- defense

### General Description

YAT-4+ is a 4-dB absorptive attenuator fabricated using highly repetitive MMIC process including thin film resistors on GaAs substrate. YAT-4+ attenuator die contains through-wafer Cu metallization vias to realize low thermal resistance and wideband operation. Packaged in tiny 2 mm x 2 mm MCLP™ package fits into tiny spaces.



### Pad Description

| Function | Pad Number                    | Description                    |
|----------|-------------------------------|--------------------------------|
| RF IN    | 2                             | RF input pad                   |
| RF-OUT   | 5                             | RF output pad                  |
| GND      | 1,3,4,6<br>Bottom Exposed pad | Connected to ground externally |

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[www.minicircuits.com](http://www.minicircuits.com) P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 [sales@minicircuits.com](mailto:sales@minicircuits.com)

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YAT-4+  
RS/CP/AM  
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Page 2 of 2

Electrical Specifications<sup>1</sup> at 25°C, 50Ω (CPW)

| Parameter                | Condition (GHz) | Min. | Typ. | Max. | Unit |
|--------------------------|-----------------|------|------|------|------|
| Frequency Range          |                 | DC   | —    | 18   | GHz  |
| Attenuation              | 0.01            | —    | 4    | —    | dB   |
|                          | DC - 5          | 3.7  | 4.0  | 4.3  |      |
|                          | 5 - 15          | 3.8  | 4.3  | 5.0  |      |
|                          | 15 - 18         | 4.0  | 4.5  | 5.0  |      |
| VSWR                     | DC - 5          | —    | 1.04 | 1.32 | :1   |
|                          | 5 - 15          | —    | 1.29 | 1.90 |      |
|                          | 15 - 18         | —    | 1.40 | 1.96 |      |
| Input Power <sup>2</sup> | DC - 18         | —    | —    | 2.0  | W    |

1. Tested on Mini-Circuits test board TB-621-4+ using coplanar wave guide (CPW) input and output traces (see suggested PCB layout on page 4 of this data sheet)

2. RF Power at 25°C case temperature: 2.0 Watt. Derate linearly to 1.0 W at 85°C.

## Absolute Maximum Ratings

|                                         |                |
|-----------------------------------------|----------------|
| Operating Case Temperature <sup>3</sup> | -40°C to 85°C  |
| Storage Temperature                     | -65°C to 150°C |
| RF Input Power                          | 2W             |

3. Case is defined as ground lead.

Permanent damage may occur if any of these limits are exceeded.

## Characterization Test Circuit

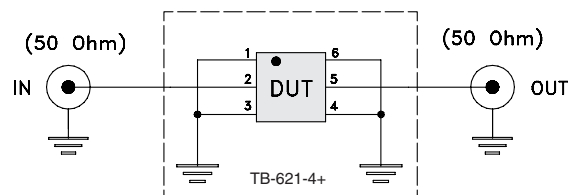
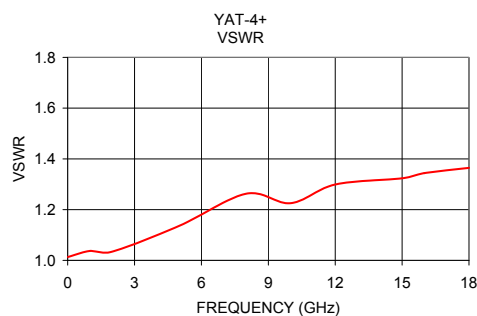
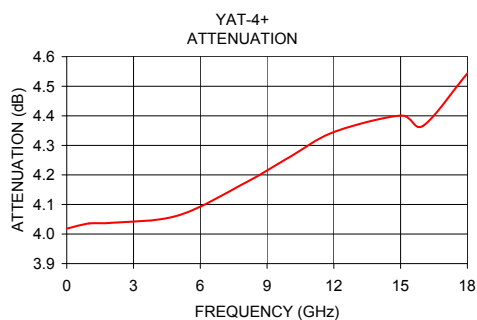


Fig 1. Block diagram of Test Circuit used for characterization, Test board TB-621-4+ Conditions: Attenuation, VSWR: Pin=-10 dBm

## Typical Performance Data at 25°C

| Frequency (GHz) | Attenuation (dB) | VSWR (:1) |
|-----------------|------------------|-----------|
| 0.01            | 4.02             | 1.01      |
| 1               | 4.04             | 1.04      |
| 2               | 4.04             | 1.03      |
| 5               | 4.06             | 1.14      |
| 8               | 4.17             | 1.26      |
| 10              | 4.26             | 1.23      |
| 12              | 4.35             | 1.30      |
| 15              | 4.40             | 1.32      |
| 16              | 4.37             | 1.34      |
| 18              | 4.54             | 1.36      |



## Notes

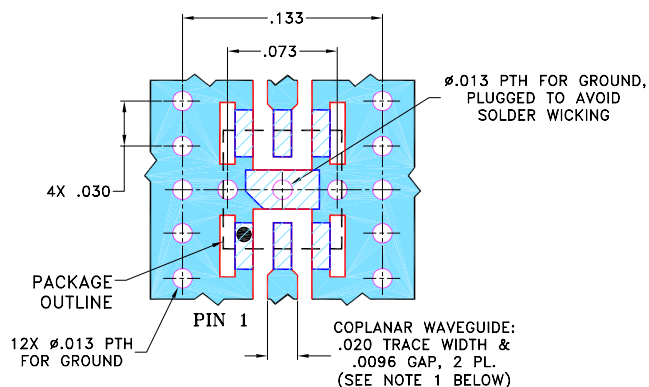
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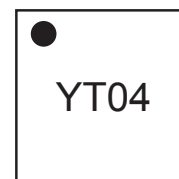
## Suggested PCB Layout (PL-349)



- NOTES: 1. COPLANAR WAVEGUIDE IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS  $.010" \pm .001"$ ; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. 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 SOLDER MASK

## Product Marking



## Additional Detailed Technical Information

additional information is available on our dash board. To access this information [click here](#)

| Performance Data                      | Data Table                                               |
|---------------------------------------|----------------------------------------------------------|
|                                       | Swept Graphs                                             |
| Case Style                            | MC1630 Plastic package, Terminal finish: Matte Tin Plate |
| Tape & Reel                           | F108                                                     |
| Standard quantities available on reel | 7" reels with 20, 50, 100, 200, 500, 1K, 2K devices.     |
| Suggested Layout for PCB Design       | PL-349                                                   |
| Evaluation Board                      | TB-621-4+                                                |
| Environmental Ratings                 | ENV08T1                                                  |

## ESD Rating

Human Body Model (HBM): 250V, Class 1A (JESD22-A114)

Machine Model (MM): 200V, Class B (JESD22-A115)

## MSL Rating

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

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