

# Fixed Attenuator

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 GaAs 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-20+

50Ω 1.5W 20dB 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  
PRICE: \$2.99 ea. QTY. (20)

### +RoHS Compliant

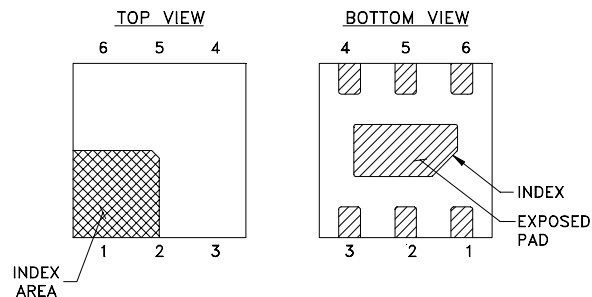
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

### Typical Applications

- Cellular
- PCS
- communications
- radar
- defense

### General Description

YAT-20+ is a 20-dB absorptive attenuator fabricated using highly repetitive MMIC process including thin film resistors on GaAs substrate. YAT-20+ 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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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            | —    | 20   | —    | dB   |
|                          | DC - 5          | 19.0 | 20.0 | 21.2 |      |
|                          | 5 - 15          | 19.2 | 20.6 | 22.3 |      |
| VSWR                     | DC - 5          | —    | 1.10 | 1.5  | :1   |
|                          | 5 - 15          | —    | 1.40 | 2.0  |      |
|                          | 15 - 18         | —    | 1.65 | 2.25 |      |
| Input Power <sup>2</sup> | DC - 18         | —    | —    | 1.5  | W    |

1. Tested on Mini-Circuits test board TB-621-20+ 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: 1.5 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                     | -55°C to 100°C |
| RF Input Power                          | 1.5W           |

3. Case is defined as ground lead.  
 Permanent damage may occur if any of these limits are exceeded.

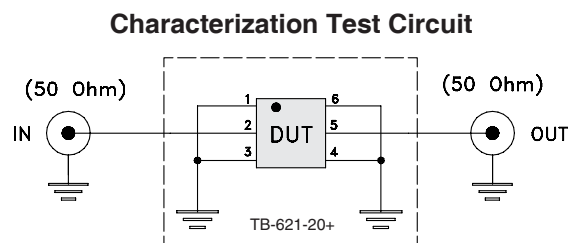
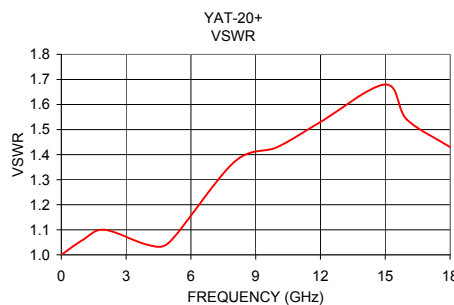
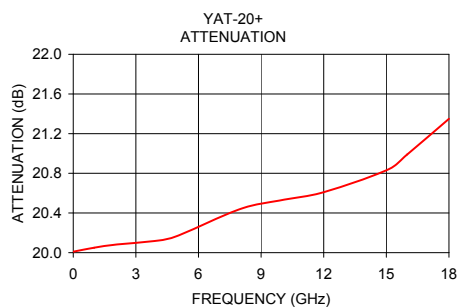


Fig 1. Block diagram of Test Circuit used for characterization, Test board TB-621-20+ Conditions: Attenuation, VSWR: Pin=-10 dBm

Typical Performance Data at 25°C

| Frequency (GHz) | Attenuation (dB) | VSWR (:1) |
|-----------------|------------------|-----------|
| 0.001           | 20.01            | 1.00      |
| 1.0             | 20.05            | 1.06      |
| 2.0             | 20.08            | 1.10      |
| 4.0             | 20.12            | 1.04      |
| 5.0             | 20.17            | 1.05      |
| 8.0             | 20.44            | 1.37      |
| 10.0            | 20.53            | 1.43      |
| 12.0            | 20.61            | 1.53      |
| 15.0            | 20.83            | 1.68      |
| 16.0            | 20.99            | 1.54      |
| 18.0            | 21.35            | 1.43      |

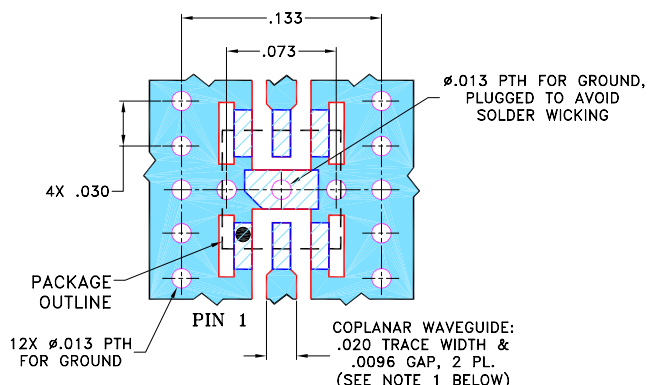


Notes

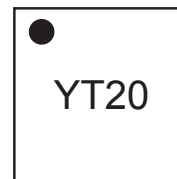
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Suggested PCB Layout (PL-349)



Product Marking



- 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

| Additional Detailed Technical Information   |  |
|---|--|
| <i>additional information is available on our dash board. To access this information <a href="#">click here</a></i> |  |
| <b>Performance Data</b>   | Data Table   |
|   | Swept Graphs   |
| <b>Case Style</b>   | MC1630 Plastic package, Terminal finish: Matte Tin Plate |
| <b>Tape &amp; Reel</b>  | F108   |
| <b>Standard quantities available on reel</b>  | 7" reels with 20, 50, 100, 200, 500, 1K or 2K devices.   |
| <b>Suggested Layout for PCB Design</b>  | PL-349   |
| <b>Evaluation Board</b>   | TB-621-20+   |
| <b>Environmental Ratings</b>  | ENV08T4  |

**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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