

# MDO4000/MDO3000 Pre-Amplifier

## TPA-N-PRE Datasheet



TPA-N-PRE Pre-Amp.

### Features and Benefits

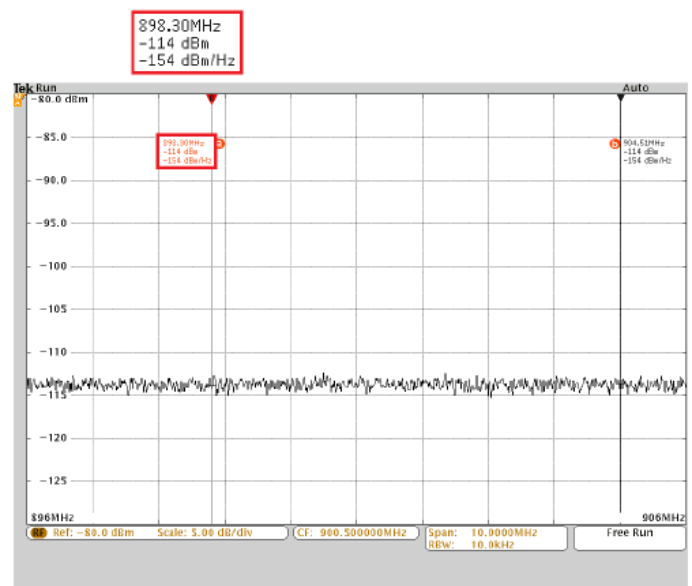
- 9 kHz - 6 GHz frequency range
- 12 dB gain (nominal)
- 10 dB DANL improvement

### Applications

- Measurement of low-power signals

### TPA-N-PRE Preamplifier

The TPA-N-PRE preamplifier accessory for the MDO4000 and MDO3000 Series Mixed Domain Oscilloscopes provides 12 dB nominal gain, further lowering the already low noise floor in the MDO4000 and MDO3000 Series. This allows you to pull very small signals out of the noise in low-amplitude signal applications. For example, in the following screenshot we are measuring a noise floor of -114 dBm (-154 dBm/Hz) without the TPA-N-PRE preamplifier. It appears that there is only noise present.



In the screenshot below, we've turned on the preamplifier. Notice that the noise floor has dropped to -124 dBm (-164 dBm/Hz). As a result of the noise floor dropping significantly, we're now able to see a -116 dBm signal present at 900 MHz that was hidden in the noise without the preamplifier.

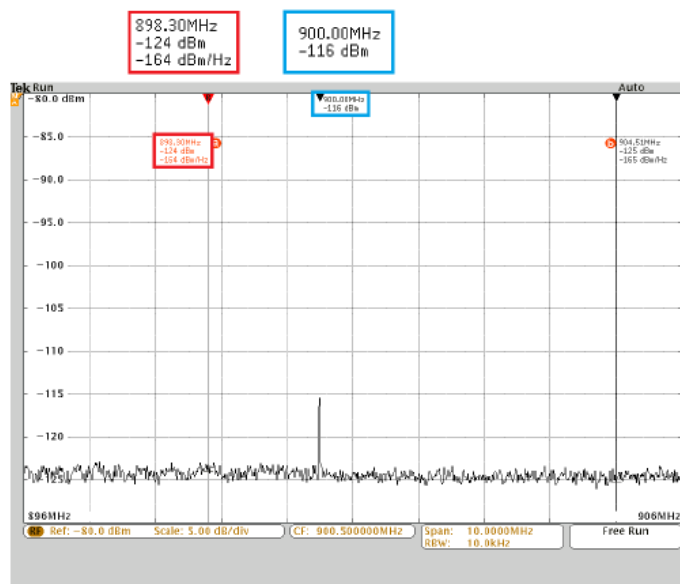
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## Specifications

### General

Specification	Description
Frequency range	Preamp alone: 9 kHz to 6 GHz Preamp and MDO: Frequency range specified by the MDO's frequency range
Preamp gain	Amplifying state: +12 dB (nominal) Bypass state: -1.5 dB (nominal)
Displayed average noise level (DANL) with the preamp attached to the MDO RF input	With the preamp mode set to "Auto" and the reference level set to -40 dBm (MDO4000 Series) or -30 dBm (MDO3000 Series): MDO4000C with SA6 option: 9 kHz to 50 kHz: < -119 dBm/Hz (-123 dBm/Hz typical) 50 kHz to 5 MHz: < -140 dBm/Hz (-144 dBm/Hz typical) 5 MHz to 400 MHz: < -156 dBm/Hz (-158 dBm/Hz typical) 400 MHz to 3 GHz: < -157 dBm/Hz (-159 dBm/Hz typical) 3 GHz to 4 GHz: < -158 dBm/Hz (-162 dBm/Hz typical) 4 GHz to 6 GHz: < -150 dBm/Hz (-154 dBm/Hz typical) MDO4000C with SA3 option: 9 kHz to 50 kHz: < -119 dBm/Hz (-123 dBm/Hz typical) 50 kHz to 5 MHz: < -140 dBm/Hz (-144 dBm/Hz typical) 5 MHz to 400 MHz: < -156 dBm/Hz (-158 dBm/Hz typical) 400 MHz to 3 GHz: < -157 dBm/Hz (-159 dBm/Hz typical) MDO3000 with MDO3SA option: 9 kHz to 50 kHz: < -117 dBm/Hz (-121 dBm/Hz typical) 50 kHz to 5 MHz: < -138 dBm/Hz (-142 dBm/Hz typical) 5 MHz to 2 GHz: < -148 dBm/Hz (-152 dBm/Hz typical) 2 GHz to 3 GHz: < -138 dBm/Hz (-142 dBm/Hz typical)
Level measurement uncertainty with the preamp attached to the MDO RF input	Preamp mode set to "Auto". Reference Level 10 dBm to -40 dBm. Input level ranging from reference level to 30 dB below reference level. Specifications exclude mismatch error. < ±1.5 dB typical, 18-28°C temperature range, either preamp state. < ±2.3 dB typical, over full operating range (temperature and humidity), either preamp state.
Maximum operating input level with preamp attached to the MDO RF input	Average continuous power: +30 dBm (1 W) (MDO4000 Series), +20 dBm (100 mW) (MDO3000 Series) DC maximum before damage: ±20 V DC Maximum power before damage (CW): +30 dBm (1 W) Maximum power before damage (pulse): +45 dBm (32 W) (<10 µs pulse width, <1% duty cycle, and reference level of ≥ +10 dBm)
Reference level range with preamp attached to MDO RF input	Amplifying state: -30 dBm to DANL (MDO4000 Series), -20 dBm to DANL (MDO3000 Series) Bypass state: +30 dBm to DANL (MDO4000 Series), +20 dBm to DANL (MDO3000 Series)
Connector type	SMA – female (outside threads)

## Environmental

Specification	Description
Temperature	
Operating	0 °C to +50 °C
Nonoperating	-20 °C to +60 °C
Humidity	
Operating	High: 40 °C to 50 °C (104 °F to 122 °F), 10% to 60% RH Low: 0 °C to 40 °C (32 °F to 104 °F) 10% to 90% RH
Nonoperating	High: 40 °C to 60 °C (104 °F to 122 °F), 10% to 60% RH Low: 0 °C to 40 °C (32 °F to 104 °F) 5% to 90% RH
Attitude	
Operating	Up to 3,000 meters
Nonoperating	Up to 12,000 meters

## Power Requirements

The TPA-N-PRE is powered directly from the RF input on MDO4000 and MDO3000 Series oscilloscopes.

## Regulatory

Compliance labeling: WEEE (European Union).

## Recommended Oscilloscopes

MDO4000 and MDO3000 Mixed Domain Oscilloscopes

## Warranty information

One year parts and labor.

## Ordering Information

### TPA-N-PRE

MDO4000 and MDO3000 Pre-Amplifier. Includes Instruction Manual (English) (071-3058-XX)

### Service Options

Opt. C3 –	Calibration Service 3 years (initial certification, plus 2 calibrations).
Opt. C5 –	Calibration Service 5 years (initial certification, plus 4 calibrations).
Opt. R3 –	Repair Service. Repair warranty extended to cover 3 years.
Opt. R5 –	Repair Service. Repair warranty extended to cover 3 years.

### Additional Service Products Available During Warranty (DW)

TPA-N-PRE R3DW –	Repair Service Coverage 3 Years (includes product warranty period). 3-year period starts at time of customer instrument purchase
TPA-N-PRE R5DW –	Repair Service Coverage 5 Years (includes product warranty period). 5-year period starts at time of customer instrument purchase

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