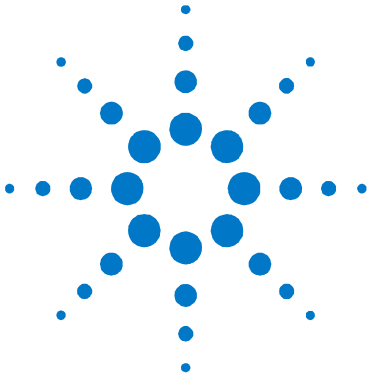

Agilent N4984A

Clock Divider

User Guide

Agilent Technologies

Notices

Manual Part Number

N4984-91021

Edition

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Agilent Technologies, Deutschland GmbH

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For Assistance and Support

http://www.agilent.com/find/assist

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Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

NOTE

A **NOTE** provides important or special information.

Safety Summary

General Safety Precautions

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument.

Agilent Technologies Inc. assumes no liability for the customer's failure to comply with these requirements.

Before operation, review the instrument and manual for safety markings and instructions. You must follow these to ensure safe operation and to maintain the instrument in safe condition.

Initial Inspection

Inspect the shipping container for damage. If there is damage to the container or cushioning, keep them until you have checked the contents of the shipment for completeness and verified the instrument both mechanically and electrically. The Performance Tests give procedures for checking the operation of the instrument. If the contents are incomplete, mechanical damage or defect is apparent, or if an instrument does not pass the operator's checks, notify the nearest Agilent Technologies Sales/Service Office.

WARNING To avoid hazardous electrical shock, do not perform electrical tests when there are signs of shipping damage to any portion of the outer enclosure (covers, panels, etc.).

General

This product is a Safety Class 1 product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor, inside or outside of the instrument, will make the instrument dangerous. Intentional interruption is prohibited.

Environment Conditions

This instrument is intended for indoor use in an installation category II, pollution degree 2 environment per IEC 61010 Second Edition and 664 respectively. It is designed to operate within a temperature range of 10 to 40 °C at a maximum relative humidity of 80% for temperatures up to 31 °C, decreasing linearly to 50% relative humidity at 40 °C at an altitude of 2000 meters.

This module can be stored or shipped at temperatures between -40°C and +70°C. Protect the module from temperature extremes that may cause condensation within it.

Before Applying Power

Verify that all safety precautions are taken. The power cable inlet of the instrument serves as a device to disconnect from the mains in case of hazard. The instrument must be positioned so that the operator can easily access the power cable inlet. When the instrument is rack mounted the rack must be provided with an easily accessible mains switch.

Ground the Instrument

Install the instrument so that the ON / OFF switch is readily identifiable and is easily reached by the operator. The ON / OFF switch is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. Or the detachable power cord can be removed from the electrical supply. Alternately, an externally installed switch or circuit breaker which is readily identifiable and is easily reached by the operator may be used as a disconnecting device.

Do Not Operate in an Explosive Atmosphere

Do not operate the instrument in the presence of flammable gases or fumes.

Do Not Remove the Instrument Cover

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made only by qualified personnel.

Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

Symbols on Instruments

The instruction documentation symbol. The product is marked with this symbol when it is necessary for the user to refer to the instruction in the documentation.

C-Tick Conformity Mark of the Australian ACA for EMC compliance.

Indicates that protective earthing ground is incorporated in the power cord.

ICES/NMB-001

This mark indicates compliance with the Canadian EMC regulations.

ISM 1-A

This text denotes the instrument is an Industrial Scientific and Medical Group 1 Class A product.

CE Marking to state compliance within the European Community: This product is in conformity with the relevant European Directives: EMC Directive 2004/108/EC and Low Voltage Directive 2006/95/EC.

This symbol indicates that internal circuits can be damaged by electrostatic discharge (ESD), therefore, avoid applying static discharges to the panel input connectors.

China RoHS regulations include requirements related to packaging, and require compliance to China standard GB18455-2001. This symbol indicates compliance with the China RoHS regulations for paper/fiberboard packaging.

will not be marking solid wood packaging.

Indicates the time period during which no hazardous or toxic substance elements are expected to leak or deteriorate during normal use. Forty years is the expected useful life of the product.

The Korean Certification (KC) mark is required for products that are subject to legally compulsory certification.

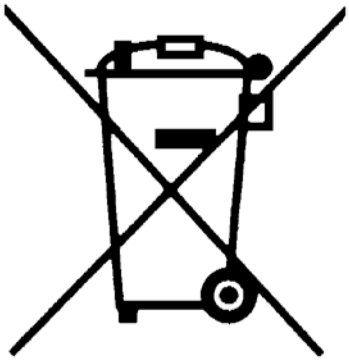
The KC mark includes the marking's identifier code that has up to 26 digits and follows this format: KCC-VWX-YYY-ZZZZZZZZZZZZ.

This symbol indicates that the instrument requires alternating current (AC) input.

This symbol indicates that the power line switch is in the ON position.

This symbol indicates that the power line switch is in the OFF position.

Environmental Information



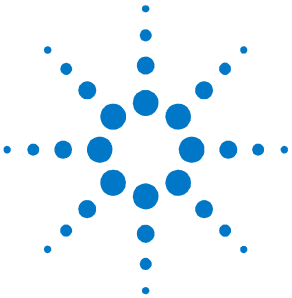
This product complies with the WEEE Directive (2002/96/EC) marketing requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste.

Product category: With reference to the equipment types in the WEEE Directive Annexure I, this product is classed as a "Monitoring and Control instrumentation" product.

Do not dispose in domestic household waste.

To return unwanted products, contact your local Agilent office, or see **www.agilent.com/environment/product/** for more information.

Contents



1 Getting Started

1.1 Unpacking and Installation

The N4984A clock divider is shipped with all the accessories required for the self-test mode and verification. The package includes:

- N4984A clock divider
- AC power converter module
- CD containing the N4984A user guide and N4984A data sheet

WARNING **If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.**

CAUTION Before switching on this instrument, make sure the supply voltage is in the specified range.

CAUTION This instrument has auto ranging line voltage input. Be sure the supply voltage is within the specified range.

CAUTION To prevent damage to the instrument, make all RF connections between the N4984A and the DUT or test equipment BEFORE applying AC power to the N4984A. Also, remove AC power from the N4984A instrument before disconnecting any RF connections.

In an ESD-safe environment, carefully remove the N4984A from the box. Install on a flat surface with unobstructed air flow to the back panel. Plug the AC power cord into the power converter module and a wall socket, then plug the converter module into the N4984A.

1.2 Important Notes

- Use ESD protection at all times when using the system.
- Review min/max specifications before applying input signals.
- Use only high quality RF-connectors on the RF ports.
- Use dust jackets on unused back panel connectors.
- Situate the instrument away from heat sources.

1.3 Performance Recommendations

1. When using differential-mode connections, ensure the cables are phase balanced.
2. Differential connectors may be used single-ended if second end terminated in 50 Ω.
3. Use high quality cables and connector savers (or adaptors).
4. Keep cable lengths short and minimize number of cable bends.
5. Use a 7 to 10 in-lbs torque wrench when attaching connectors.

2 System Overview

The N4984A is a general purpose test accessory designed for microwave, communications, and test equipment. The N4984A is available in two options, operating up to either 20 GHz (option -020) or 40 GHz (option -040).

The N4984A is self contained and plugs into standard AC power sources.

2.1 N4984A-020

The N4984A-020 is a 20 GHz clock divider. It provides divide-by-1, divide-by-2, divide-by-4, or divide-by-8 outputs selected with a jumper on the rear panel.

The N4984A-020 has a differential input accessed from the rear via SMA connectors while the outputs are provided at the front panel via SMA connectors. The inputs and outputs are AC coupled.

Apply a 0.2 to 20 GHz signal to the rear panel input connectors. The input signal power level should fall within the sensitivity window shown in Figure 1.

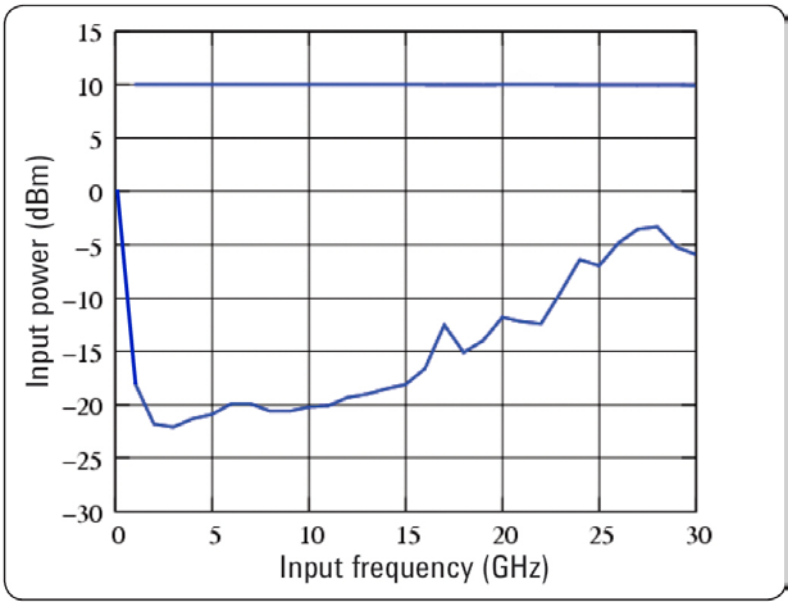


Figure 1. N4984A-020 power input sensitivity

The input signal divided by 1, 2, 4, or 8 is selected by moving the jumper in the Divide Ratio connector on the rear panel to the desired setting.

An AC plug-in power supply is provided and supplies the –5V DC required to power the N4984A. Use only the supplied AC/DC adapter.

2.2 N4984A-040

The N4984A-040 is a 40 GHz clock divider. It simultaneously provides divide-by-2, divide-by-4, and divide-by-8 outputs for use in various applications.

The N4984A-040 has a single-ended input accessed from the rear via a 2.9 mm connector while the outputs are provided at the front panel via SMA connectors. The input and outputs are AC coupled.

Apply a 0.2 to 40 GHz signal to the rear panel input connector. The input signal power level should fall within the sensitivity window shown in Figure 2.

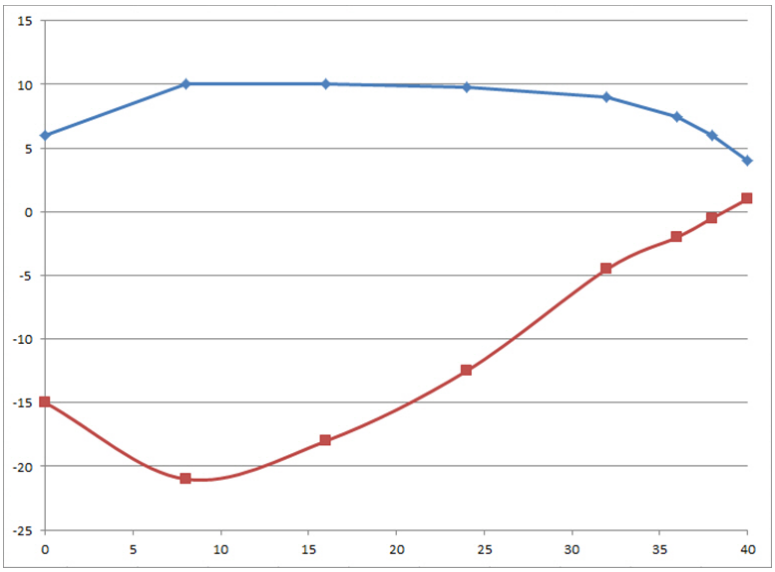


Figure 2. N4984A-040 power input sensitivity

The input signal divided by 2, 4, and 8 is simultaneously available on the front panel output connectors.

A functional block diagram of the N4984A-040 is shown in Figure 3.

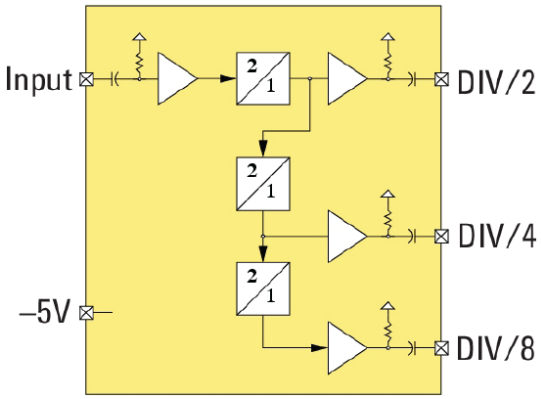


Figure 3. N4984A-040 block diagram

An AC plug-in power supply is provided and supplies the –5 V dc required to power the N4984A. Use only the supplied AC/DC adapter.

2.3 N4984A-020 Front Panel Quick Reference

Figure 4. N4984A-020 front panel

Outputs: The divide-by-1, divide-by-2, divide-by-4, or divide-by-8 output is available on the front panel depending on the position of the jumper on the divide ratio switch on the rear panel.

The N4984A-020 output is a differential signal on the two SMA output connectors.

NOTE If a differential signal is not required, the unused output must be terminated with a 50 Ω termination.

LED indicator: One of the four front panel LED divide ratio indicator lights indicates which divide ratio is selected when the N4984A-020 is powered on.

2.4 N4984A-040 Front Panel Quick Reference

Figure 5. N4984A-040 front panel

Outputs: The divide-by-2, divide-by-4 and divide-by-8 outputs are available on the front panel SMA connectors simultaneously.

LED indicator: One LED indicator light on the front panel indicates the N4984A-040 is powered.

2.5 N4984A-020 Rear Panel Quick Reference

Figure 6. N4984A-020 rear panel

Divide Ratio switch: A jumper is used to select from four divide ratios.

Inputs: SMA connectors are provided to accept a differential signal.

Power: The N4984A-020 is powered from an external AC plug-in power supply (–5 V).

Label: N4984A-020 serial number.

2.6 N4984A-040 Rear Panel Quick Reference

Figure 7. N4984A-040 rear panel

Input: A 2.9 mm input connector is provided for the input signal.

Power: The N4984A-040 is powered from an external AC plug-in power supply (–5 V).

Label: N4984A-040 serial number.

2.7 Safety and Regulatory

This product has been designed and tested in accordance with accepted industry standards, and has been supplied in a safe condition. The documentation contains information and warnings that must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

WARNING **Do not remove instrument covers. There are no user serviceable parts within. Operation of the instrument in a manner not specified by Agilent Technologies may result in personal injury or loss of life.**

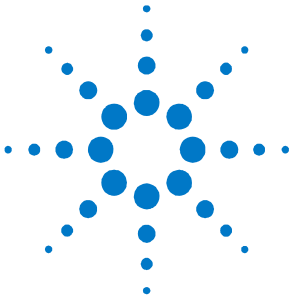
WARNING **To prevent electrical shock, disconnect instrument from mains before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally.**

WARNING **For continued protection against fire hazard, replace fuses, and or circuit breakers only with same type and ratings. The use of other fuses, circuit breakers or materials is prohibited.**

CAUTION The Mains wiring and connectors shall be compatible with the connector used in the premise electrical system. Failure, to ensure adequate earth grounding by not using the correct components may cause product damage, and serious injury.

2.7.1 Declaration of Conformity

A EU declaration of conformity is available at
http://regulations.corporate.agilent.com/doc/search.htm



3 Performance Specifications

Table 1. General and mechanical parameters of N4984A

Operating Temperature	+10 to +40 °C
Storage Temperature	–40 to +70°C
Power Requirements	42 W External AC Adaptor (included) • 100 to 240 VAC, 50 to 60 Hz, 0.6 A
Physical Dimensions (W x H x D) **N4984A-020** **N4984A-040**	 90 x 22 x 90 mm (3.5 x 0.875 x 3.5 in) 90 x 22 x 100 mm (3.5 x 0.875 x 4.0 in)
Weight	0.5 lbs
EMC	Complies with European EMC Directive 2004/108/EC • IEC/EN 61326-1 • CISPR Pub 11 Group 1, class A • AS/NZS CISPR 11 • ICES/NMB-001 This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB-001 du Canada.

3.1 Performance Specification

Table 2. N4984A-020 Performance specifications

Parameter	Specification
Input frequency range	0.2 to 20 GHz
Input power range	0 to +10 dBm (~0.6 to 2 Vp-p) from 0.2 to 1 GHz –10 to +10 dBm (0.2 to 2 Vp-p) from >1 to 20 GHz
Output power range	>–5 dBm (355 mVp-p) typical
Single sideband phase noise	–153 dBc nominal @ 10 kHz offset

Table 3. N4984A-040 Performance specifications

Parameter	Specification
Input frequency range	0.2 to 40 GHz
Input power range	0 to +6 dBm (~0.6 to 1.2 Vp-p) from 0.2 to 35 GHz +2 dBm (800 mVp-p) nominal with minimum window of 3 dB from >35 to 40 GHz
Output power range	>–6 dBm (315 mVp-p) typical
Single sideband phase noise	–153 dBc nominal @ 10 kHz offset

4 Operation

The following section provides more detailed information regarding the use of the N4984A.

4.1 General Information

The N4984A should be used in accordance with the following:

- Read and follow operating instructions; do not exceed min/max specifications.
- Use ESD protection at all times, but especially when handling RF input/outputs; ground coaxial cable conductor pins before use to remove static buildup.
- Situate the instrument away from heat sources.
- Do not allow foreign material into enclosure.
- Always use provided AC adaptor. Do not power the unit with a different adaptor. Do not modify the power plug or wall outlet to remove the third (ground) pin.
- Do not drop or shake the instrument; minimize vibration; handle with care.
- There are no user-serviceable parts within. Return damaged instruments for factory-authorized repair. Refer to instrument warranty for more information.
- To prevent damage to the instrument, make all RF connections between the N4984A and the DUT or test equipment BEFORE applying AC power to the N4984A. Also remove AC power from the N4984A instrument first before disconnecting any RF connections.

4.1.1 Performance Recommendations

Follow the following recommendations for best performance:

1. When using differential mode connection for OUT/$\overline{\text{OUT}}$, ensure the cables are phase balanced. If the electrical length of one cable is a significant fraction of a unit interval longer than the other, the quality of the differential signal will be degraded.
2. Keep cable lengths short and minimize number of cable bends.
3. When using a single port of differential output channel for single-ended measurements, the complementary port must be terminated with a 50 Ω termination.

4.1.2 Connector Care

The N4984A features high-quality connectors for the front and rear panel Input and Output, RF connections. Connector damage will degrade signal fidelity.

Refer to the N4960-90030 N495xA through N498xA Connector Care Reference Guide at www.agilent.com/find/N4984A.

Agilent Technologies also recommends the following:

- Use a 7 to 10 in-lbs torque wrench when attaching connectors.
- Consider using connector savers to prolong performance and minimize damage.
- Differential connectors may be used single-ended if second end terminated in 50 Ω.

Inspect the connectors for the following:

- Worn or damaged threads
- Scratches to mating surface
- Burrs and loose metal particles
- Dust or foreign material in the space surrounding the center pin
- Ensure that female contacts are straight and aligned

Clean the connectors as described in the following procedure. Cleaning connectors with alcohol shall only be done with the instruments power cord removed, and in a well-ventilated area. Allow all residual alcohol moisture to evaporate, and the fumes to dissipate prior to energizing the instrument.

1. Remove any dust or loose particles using a low-pressure air source.
2. Moisten a lint-free swab with isopropyl alcohol. Do not saturate the swab.
3. Minimize the wicking of the alcohol into the connector structure.
4. Clean the mating plane surfaces and threads.
5. Allow alcohol to evaporate, and then use a low-pressure air source to blow surfaces clean.
6. Make sure no particles or residue remains.
7. Inspect connector for damage.

5 Returning the N4984A to Agilent Technologies

If the N4984A fails system verification and you cannot correct the problem, return it to Agilent Technologies for repair following the steps shown below.

1. Record all symptoms.
2. Contact Agilent Technologies at http://www.agilent.com/find/assist.
3. Use the original packing material or comparable packing material to ship the instrument to Agilent Technologies.

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