N2862B, N2863B, N2889A, and N2890A Probes

KEYSIGHT

USER GUIDE

Notices

Manual Part Number

N2889-97002

Edition

Fifth Edition, July 2023

Published by:
Keysight Technologies, Inc.
1900 Garden of the Gods Road
Colorado Springs, CO 80907 USA

Warranty

The material contained in this document is provided "as is," and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Keysight disclaims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Keysight shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Keysight and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

U.S. Government Rights

The Software is "commercial computer software," as defined by Federal Acquisition Regulation ("FAR") 2.101. Pursuant to FAR 12.212 and 27.405-3 and Department of Defense FAR Supplement ("DFARS") 227.7202, the U.S. government acquires commercial computer software under the same terms by which the software is customarily provided to the public. Accordingly, Keysight provides the Software to U.S. government customers under its standard commercial license, which is embodied in its End User License Agreement (EULA), a copy of which can be found at http://www.keysight.com/find/sweula. The license set forth in the EULA represents the exclusive authority by which the U.S. government may use, modify, distribute, or disclose the Software. The EULA and the license set forth therein, does not require or permit, among other things, that Keysight: (1) Furnish technical information related to commercial computer software or commercial computer software documentation that is not customarily provided to the public; or (2) Relinquish to, or otherwise provide, the government rights in excess of these rights customarily provided to the public to use, modify, reproduce, release, perform, display, or disclose commercial computer software or commercial computer software documentation. No additional government requirements beyond those set forth in the EULA shall apply, except to the extent that those terms, rights, or licenses are explicitly required from all providers of commercial computer software pursuant to the FAR and the DFARS and are set forth specifically in writing elsewhere in the EULA. Keysight shall be under no obligation to update, revise or otherwise modify the Software. With respect to any technical data as defined by FAR 2.101, pursuant to FAR 12.211 and 27.404.2 and DFARS 227.7102, the U.S. government acquires no greater than Limited Rights as defined in FAR 27.401 or DFAR 227.7103-5 (c), as applicable in any technical data. 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

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.

Contents

Introduction

Inspecting the Probe Shipment

- Inspect the shipping container for any damage.

  Keep the damaged shipping container or cushioning material until the contents of the shipment have been checked for completeness and the probe has been checked mechanically and electrically.
- Check the accessories.
- If the contents are incomplete or damaged, notify your Keysight Technologies Sales Office.
- Inspect the probe. If there is mechanical damage or defect, or if the probe does not operate properly, notify your Keysight Technologies Sales Office.
- If the shipping container is damaged, or the cushioning materials show signs of stress, notify the carrier as well as your Keysight Technologies Sales Office. Keep the shipping materials for the carrier's inspection. The Keysight Technologies office will arrange for repair or replacement at Keysight Technologies' option without waiting for claim settlement.

Oscilloscope Compatibility

These probes are compatible with any Keysight real-time oscilloscope that has a 1 MΩ input resistance.

Cleaning the Probe

Disconnect the probe from the oscilloscope and clean it with a soft cloth dampened with a mild soap/water solution. Do not allow any solution to enter the probe. Make sure the probe is completely dry before reconnecting it to an oscilloscope.

Handling the Probe

Before using the probe, refer to the safety notices (page 11) in this manual.

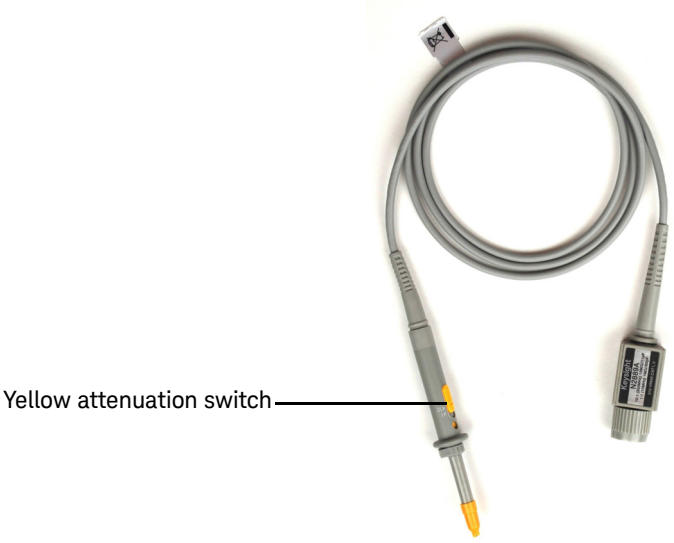
WARNING **The probe tip and ground spring are sharp. Handle these items with care to avoid personal injury.**

CAUTION Note that the probe cable is a sensitive part of the probe and, therefore, you should be careful not to damage it through excessive bending or pulling. You should also avoid any mechanical shocks to this product in order to guarantee accurate performance and protection.

CAUTION Always wear an ESD wrist strap when working with the probe. Not doing so can result in the probe becoming permanently damaged.

Switching the Attenuation Ratio on the N2889A Probe

The N2889A has a switchable attenuation ratio (10:1/1:1). In order to adjust the attenuation, use the yellow switch on the body of the probe as shown in the picture below.



Typical Voltage Derating Curve

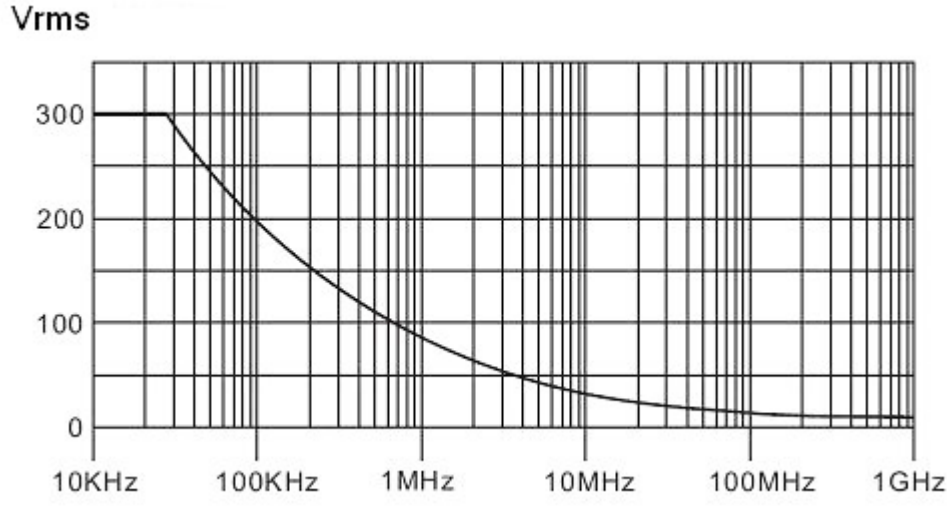


Figure 1 N2862B, N2863B, N2889A, & N2890A Voltage Derating Curve @300Vrms

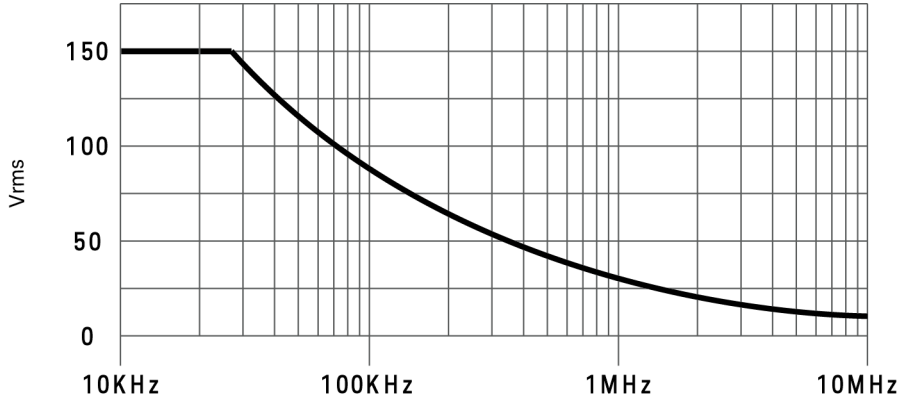


Figure 2 N2889A Voltage Derating Curve @150Vrms (1:1)

Note that the maximum input voltage rating of the probe decreases as the frequency of the applied signal increases.

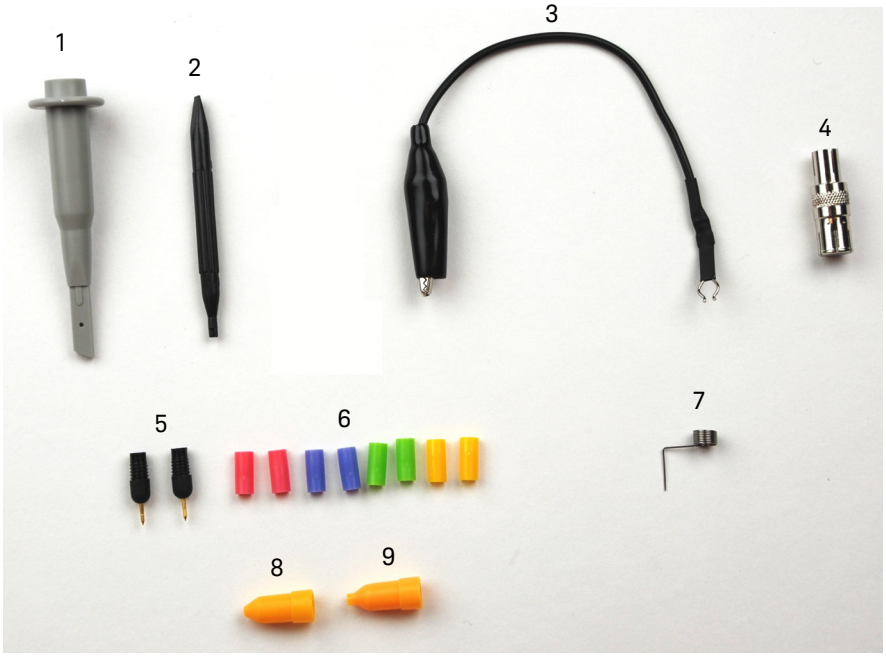
Characteristics

Characteristics for the N2862B, N2863B, N2889A, and N2890A probes are shown below.

	N2862B	N2863B	N2889A	N2890A
Operating temperature			0^{o} to 50^{o} C	
Storage temperature			0^{o} to 50^{o} C	
Humidity			80% RH (non-condensing)	
Altitude			2000 m (indoor use only)	
Pollution Degree			2	
Cable length	1.2 m	1.2 m	1.3 m	1.3 m
Bandwidth	DC to 150 MHz	DC to 300 MHz	DC to 350 MHz (@10:1) DC to 10 MHz (@1:1)	DC to 500 MHz
Risetime (10%-90%)	2.33 ns	1.16 ns	1 ns (@10:1) 35 ns (@1:1)	700 ps
Attenuation ratio	10:1	10:1	1:1/10:1 (switchable)	10:1
Input resistance (when terminated into 1 MΩ)	10 MΩ	10 MΩ	10 MΩ (@10:1) 1 MΩ (@1:1)	10 MΩ
Input capacitance	~ 15 pF	~ 11 pF	11 pF (@10:1) 60 pF (@1:1)	~ 11 pF
Maximum input (when terminated into 1M Ω) 	300 V RMS (or < 400 Vpk) mains isolated and CAT II	300 V RMS (or < 400 Vpk) mains isolated and CAT II	300 V RMS or < 400 Vpk mains isolated and CAT II (@ 10:1) 150 V RMS mains isolated and CAT II (@ 1:1)	300 V RMS or <400 Vpk mains isolated & CAT II
Compensation range (when terminated into 1M Ω)	5-30 pF	5-30 pF	5-30 pF (at 10:1)	5-30 pF
Safety	Conformance to CAN/CSA-C22.2 No. 61010-031:17/A1:20 , ANSI/UL 61010-031, Edition 2 + AMD 1:2020, IEC 61010-031: 2015/AMD1:2018			
Probe ID readout	Yes	Yes	No	Yes

Accessories

The following accessories are available with the N2862B, N2863B, N2889A, and N2890A probes.



Item	Description	Usage	Quantity
1	Retractable hook	To make quick connections for hands-free probing.	1
2	Adjustment tool	To adjust the LF compensation to an optimum square wave response.	1
3	Ground lead (black 12 cm)	To reach circuit grounding points that are farther away from the probing location than can be reached by the ground spring.	1
4	BNC adapter	To connect the probe tip to a BNC (female) connector.	1

Item	Description	Usage	Quantity
5	Probe tip	To use as replacements to the probe tip screwed onto the end of the probe barrel.	2
6	Identification tags (pink, purple, green, and yellow) 2 of each color	To quickly identify a probe tip with the associated channel input, use the colored channel ID tags.	2 of each color
7	Ground spring	To improve measurement performance by providing a short ground connection.	1
8	Insulating cap	To fit over the probe tip and cover the grounding band of the probe barrel.	1
9	IC insulating cap	To fit over the probe tip and provide a convenient self-aligning connection to an IC's pins.	1

NOTE When using an accessory, the probe assembly-accessory combination is only rated for measurements on mains isolated circuits, not CAT II, III, or IV circuits.

Safety Information

WARNING **If the probe assembly is used in a manner not specified by the manufacturer, the protection provided by the probe assembly may be impaired.**

WARNING **This probe has a cable with a built-in wear indicator. When the insulation of the cable deteriorates, the wear indicator becomes visible. Do not use the probe, when the contrasting color is visible through the cable jacket. Using a product with a worn cable may result in electric shock, fire, or equipment failure.**

WARNING **Indoor Use Only. Do not operate in wet/damp environments. Keep product surfaces dry and clean.**

WARNING **Observe Probe Ratings. Do not apply any electrical potential to the probe input which exceeds the maximum rating of the probe. Make sure to comply with the voltage versus frequency derating curve (Figure 1 and Figure 2).**

WARNING **Use Only Grounded Instruments. Do not connect the probe's ground lead to a potential other than earth ground. Always make sure the probe and the oscilloscope are grounded properly.**

WARNING

Connect and Disconnect Properly.
The probe assembly does not provide protection at the BNC when not mated to a grounded oscilloscope. If proper connecting and disconnecting procedures (as described below) are not observed, hazardous voltages may be present at the probe assembly BNC.
-> Connect the probe to the oscilloscope and connect the ground lead to earth ground before connecting the probe to the circuit under test.

-> Disconnect the probe input and the probe ground lead from the circuit under test before disconnecting the probe from the oscilloscope.

CAUTION

Inspect the probe regularly to check for any damage. Do Not Operate With Suspected Failures. If you suspect there is damage to this probe, have it inspected by a qualified service personnel.

Instrument Markings and Symbols

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

Returning the Probe for Service

For all repair, service, or calibration needs, you can send the probe to an authorized service center. Visit http://www.keysight.com/find/assist to find a service location.

Contacting Keysight Technologies

For technical assistance, contact your local Keysight Call Center.

- In the Americas, call 1 (800) 829-4444
- In other regions, visit http://www.keysight.com/find/assist
- Before returning an instrument for service, you must first call the Call Center at 1 (800) 829-4444.