Keysight U1832A/B/C and U1833A/B/C/D USB Noise Sources

KEYSIGHT TECHNOLOGIES

User's Guide

Notices

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Regulatory Information

Electromagnetic compatibility

The U1832A/B/C and U1833A/B/C/D USB Noise Sources comply with the following Electromagnetic Compatibility (EMC) compliances:

- IEC 61326-1/EN 61326-1
- Canada: ICES/NMB-001
- Australia/New Zealand: AS/NZS CISPR11

In order to preserve the EMC performance of the product, any cable which becomes worn or damaged must be replaced with the same type and specification.

CAUTION

CLEAN WITH SLIGHTLY DAMPENED CLOTH

Clean the outside of the instrument with a soft, lint-free, slightly dampened cloth. Do not use detergent, volatile liquids, or chemical solvents.

Regulatory Markings

CE CAN ICES/NMB-001(A) ISM GRP 1-A	The CE mark is a registered trademark of the European Community. The CE mark shows that the product complies with all the relevant European Legal Directives. CAN ICES/NMB-001(A) indicates that this ISM device complies with the Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB-001 du Canada. ISM GRP1 Class A indicates that this is an Industrial Scientific and Medical Group 1 Class A product.	ccr.keysight@keysight.com	This Keysight CCR (Customer Compliance Response) email ID is for manufacturer identification and indicates that the product complies with all the relevant European Legal Directives.
UK CA	The UKCA (UK Conformity Assessed) marking is a UK product marking that is used for goods being placed on the market in Great Britain (England, Wales, and Scotland)		The RCM mark is a registered trademark of the Australian Communications and Media Authority.
40	This symbol 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.		
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South Korean Class A EMC Declaration

Information to the user:

This instrument has been conformity assessed for use in business environments. In a residential environment, this equipment may cause radio interference.

This EMC statement applies to the equipment only for use in business environment.

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- www.keysight.com/find/noisesources
  (product-specific information and support, software and documentation updates)
- www.keysight.com/find/assist
  (worldwide contact information for repair and service)

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List of Tables

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1 Introduction

This chapter provides an overview of the Keysight U1832A/B/C and U1833A/B/C/D USB Noise Sources.

Product Overview

The Keysight U1832A/B/C and U1833A/B/C/D USB Noise Sources operate up to 60 GHz and provide a smart broadband noise figure measurement solutions, covering both bench-top and modular solution. The Keysight USB Noise Source connectivity provides coverage for using noise source across multiple measurement platforms, as follows:

- Bench-top X-Series Signal Analyzers
- Noise Figure Analyzers (N897xB)

The USB Noise Source connectivity comes with smart features of automatic download of electronically stored calibration data and temperature sensing. These capabilities significantly reduce the setup complexity and the operation time.

Figure 1-1 Keysight USB Noise Source

Key features of the U1832A/B/C and U1833A/B/C/D USB Noise Sources

- Automatic download of ENR data to the analyzers significantly speeds up the overall setup time.
- Electronic storage of Excess Noise Ratio (ENR) calibration data decreases opportunity for user error.
- Temperature sensing improves measurement accuracy, leading to tighter specification of device performance.

Product Model Description

Table 1-1 Product Model Description

Model	Description	ENR Value	Connector Type
U1832A	USB Smart Noise Source, 10 MHz to 18 GHz	5 dB	N-Type
U1832B	USB Smart Noise Source, 10 MHz to 26.5 GHz	5 dB	3.5 mm
U1832C	USB Smart Noise Source, 500 MHz to 50 GHz	5 dB	2.4 mm
U1833A	USB Smart Noise Source, 10 MHz to 18 GHz	15 dB	N-Type
U1833B	USB Smart Noise Source, 10 MHz to 26.5 GHz	15 dB	3.5 mm
U1833C	USB Smart Noise Source, 500 MHz to 50 GHz	15 dB	2.4 mm
U1833D	USB Smart Noise Source, 500 MHz to 60 GHz	10 dB	1.85 mm

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2 Installation

This chapter provides you important information on how to check and prepare your instrument for operation.

Initial Inspection

1. Unpack and inspect the shipping container and its contents thoroughly to ensure that nothing was damaged during shipment. If the shipping container or cushioning material is damaged, the contents should be checked both mechanically and electrically.
   - Check for mechanical damage such as scratches or dents.
   - Procedures for checking electrical performance are given under "Operator's check" on page 40.
2. If the contents are damaged or defective, contact your nearest Keysight Technologies Service and Support Office. Refer to "Sales and Technical Support" on page 5 of this manual. Keysight Technologies will arrange for repair or replacement of the damaged or defective equipment. Keep the shipping materials for the carrier's inspection.
3. If you are returning the instrument under warranty or for service, repackaging the instrument requires original shipping containers and material or their equivalents. Keysight Technologies can provide packaging materials identical to the original materials. Refer to "Sales and Technical Support" on page 5 of this manual for the Keysight Technologies nearest to you. Attach a tag indicating the type of service required, return address, model number, and serial number. Mark the container ***FRAGILE*** to insure careful handling. In any correspondence, refer to the instrument by model number and serial number.

Verify the U1832A/B/C and U1833A/B/C/D Shipment Contents

Shipment content list

Table 2-1 Shipment content list

Quantity	Description	Part Number
1	Calibration Certificate	5962-0476
1	Quick Startup Poster	U1833-80001
1	USB cable, 1 meter[a]	8121-3776
1	USB cable, 2 meter[b]	8121-3431

[a] This item is available with Option 101.

[b] This item is available with Option 102.

NOTE The USB cable (1 meter/2 meter) is included in each U1832A/B/C and U1833A/B/C/D USB Noise Sources shipment but you can order one of the two cables only.

Service and Recalibration

If your U1832A/B/C and U1833A/B/C/D requires service or repair, contact the nearest Keysight office for information on where to send it. Refer to "Sales and Technical Support" on page 5 of this manual. The performance of the U1832A/B/C and U1833A/B/C/D can only be verified by specially-manufactured equipment and calibration standard from Keysight. The recommended interval for recalibration is 12 months.

Operating and Safety Precautions

Observe the following guidelines before connecting or operating the U1832A/B/C and U1833A/B/C/D USB Noise Sources.

NOTE **Allow the USB Noise Source to warm-up for 60 minutes before making any measurements.**

Handling Precautions

CAUTION **The diode module is static sensitive and can be damaged or the calibration can be altered.**

CAUTION **Do not rotate the body of the USB Noise Source when connecting to the noise figure analyzer, or internal damage may result.**

CAUTION **Do not drop the USB Noise Source. Dropping can damage the unit or alter the calibration.**

Proper connector care is essential. See "Operator's Maintenance" on page 47 for more information.

ESD damage

Protection against electrostatic discharge (ESD) is important while handling and operating the U1832A/B/C and U1833A/B/C/D USB Noise Source.

Static electricity can build up on your body and can easily damage sensitive components when discharged.

Static discharges too small to be felt can cause permanent damage to the unit.

To prevent damage from ESD:

- ***Use*** a grounded anti-static mat in front of your test equipment and wear a grounded wrist strap attached to it when handling or operating the U1832A/B/C and U1833A/B/C/D.
- ***Wear*** a heel strap when working in an area with a conductive floor.
- ***Ground*** yourself before you clean, inspect, or make a connection to the U1832A/B/C and U1833A/B/C/D. You can, for example, grasp the grounded outer shell of the analyzer test port or cable connector briefly.
- ***Avoid*** touching the exposed connector pins.

Connector Care

Since connectors can become defective due to wear during normal use, all connectors should be inspected and maintained to maximize their service life.

- Inspect the mating surface each time a connection is made. Metal particles from connector threads often find their way onto the mating surface when a connection is made or disconnected.
- Clean dirt and contamination from the connector mating surface and threads. This simple step can extend the service life of the connector and improve the quality of your calibration and measurements.
- Gage connectors periodically. This not only provides assurance of proper mechanical tolerances, and thus connector performance, but can also indicate situations where the potential for damage to another connector may exist.

Connector Type	Torque Setting	Keysight Torque Wrench Part Number
3.5 mm	90 N-cm (8 in-lb)	8710-1764
1.85 mm		
2.4 mm	90 N-cm (8 in-lb)	8710-1765
N-Type	135 N-cm (12 in-lb)	8710-1766

CAUTION The U1832A/B/C and U1833A/B/C/D can be damaged if excessive torque is applied to the connector.

Instrument Retrofit Requirements

The Keysight USB Noise Sources works with the X-Series Signal Analyzers (CXA, EXA, MXA, PXA, and UXA), and the Noise Figure Analyzers (N897xB) for noise figure measurement application.

For more information on the instruments operation, refer to the User's Guide at:

- www.keysight.com/find/signalanalyzers, for X-Series Signal Analyzers
- www.keysight.com/find/nfa, for Noise Figure Analyzers

NOTE **For X-Series Signal Analyzers, the instrument firmware version must be A.30.05 or higher, to be used with the U1832A/B/C and U1833A/B/C/D.**

U1832A/B/C and U1833A/B/C/D ENR Format Details

An ENR file:

- Includes all data currently supplied on the printed noise source calibration report.
- Can be viewed and edited using a standard text editor (for example, Wordpad).
- Is simple to create and interpret.
- Is easily printable.
- Is easily imported into Microsoft Excel.

U1832A/B/C and U1833A/B/C/D LED Indication

Figure 2-1 U1832A/B/C and U1833A/B/C/D overview

Table 2-2 LED color and instrument state

LED color	Instrument state
Green	Indicates that the USB Noise Source is turned ON.
Blue	Indicates that the USB Noise Source is turned OFF.
Red	Indicates that the self-test has failed. None of the LEDs will be turned ON during the firmware upgrade mode.

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3 Specifications

This chapter provides information on physical specification, shipping dimensions and reference to the Technical Overview document.

Characteristics and Specifications

For the characteristics and specifications of the U1832A/B/C and U1833A/B/C/D USB Noise Sources, refer to the Technical Overview document at www.keysight.com/find/noisesources.

NOTE These specifications for the U1832A/B/C and U1833A/B/C/D USB Noise Sources are ONLY valid if the analyzer and noise source have been allowed to meet its specified warm-up time of 60 minutes.

Physical Specifications

Table 3-1 Physical specifications

Model	Weight	Dimensions
U1832A	196 grams	129 mm L x 39 mm W x 30 mm H
U1832B	181 grams	113 mm L x 39 mm W x 30 mm H
U1832C	179 grams	124 mm L x 39 mm W x 30 mm H
U1833A	196 grams	129 mm L x 39 mm W x 30 mm H
U1833B	185 grams	117 mm L x 39 mm W x 30 mm H
U1833C	171 grams	116 mm L x 39 mm W x 30 mm H
U1833D	190 grams	126 mm L x 39 mm W x 30 mm H

Mechanical Dimensions

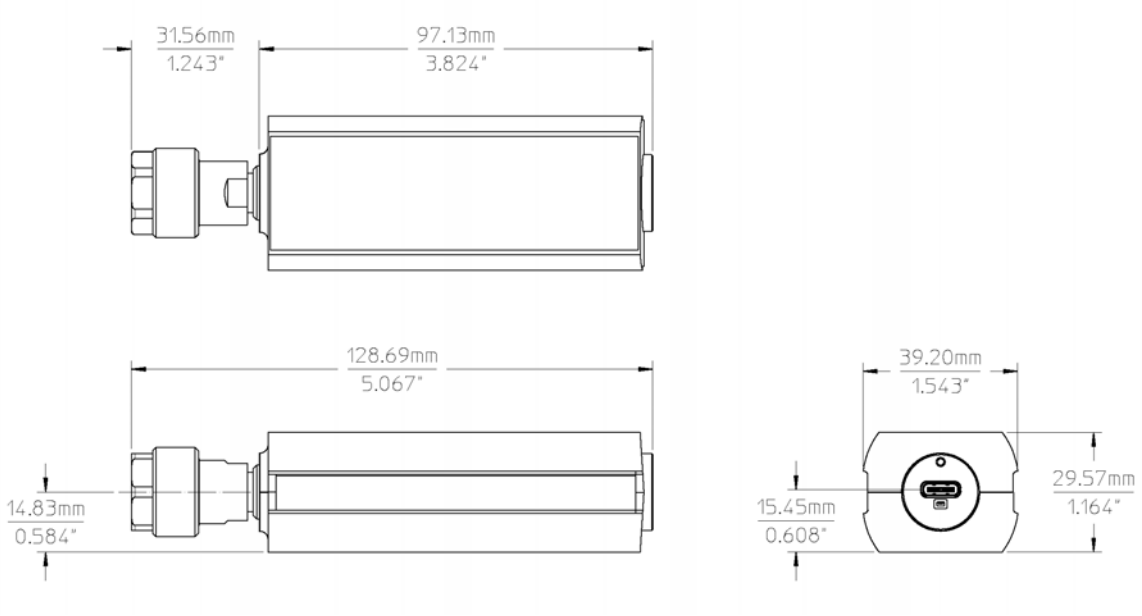

Figure 3-1 U1832A USB Noise Source

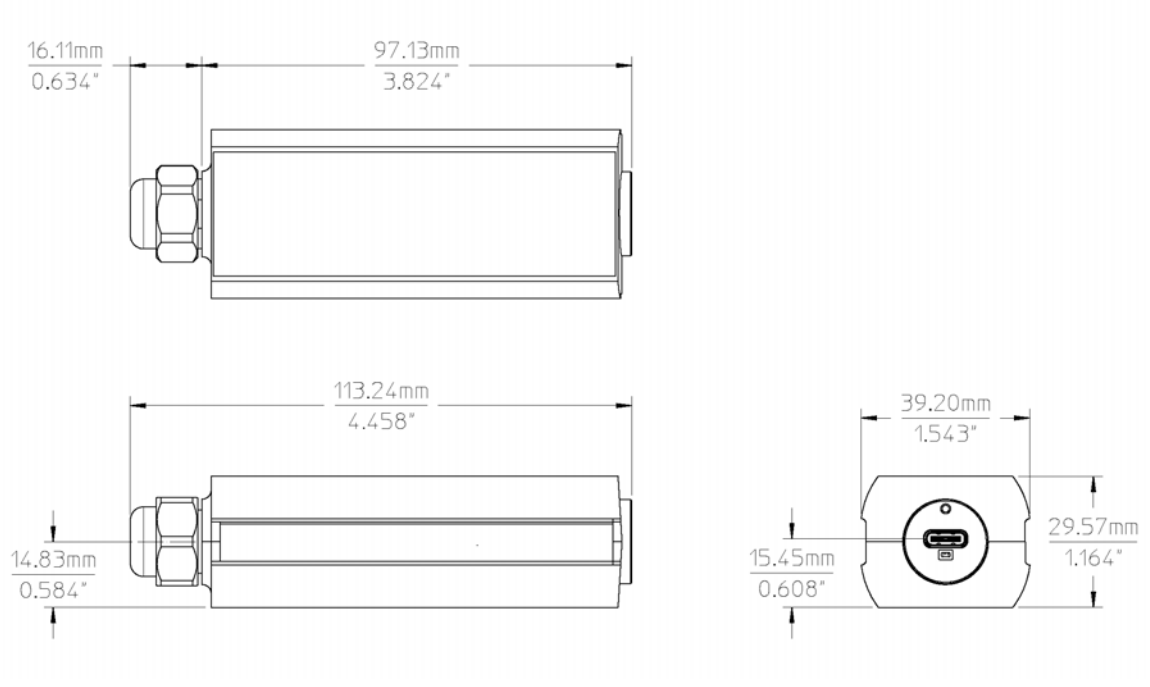

Figure 3-2 U1832B USB Noise Source

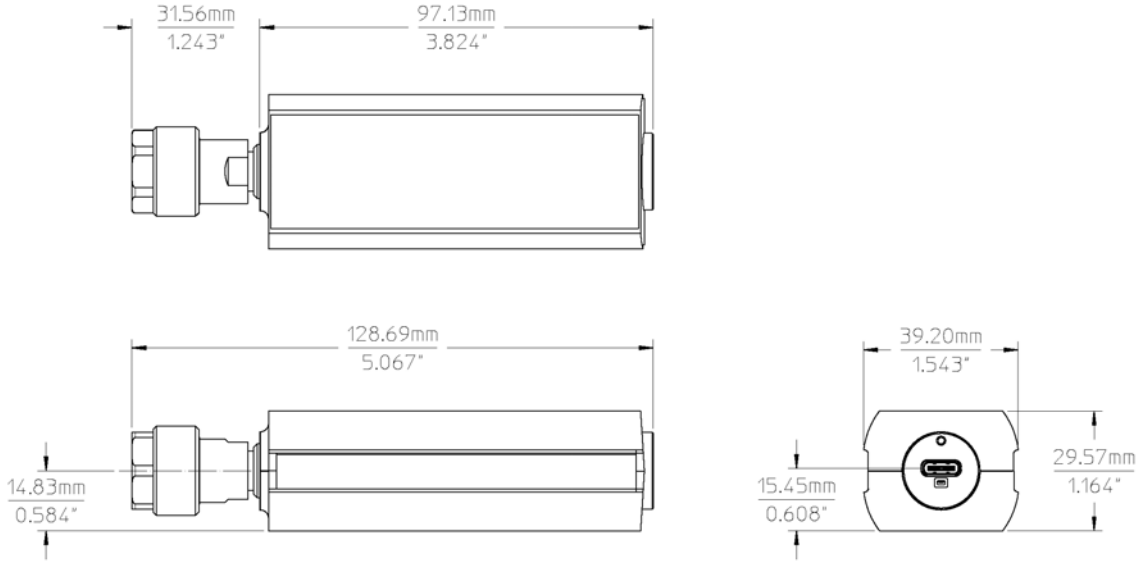

Figure 3-3 U1833A USB Noise Source

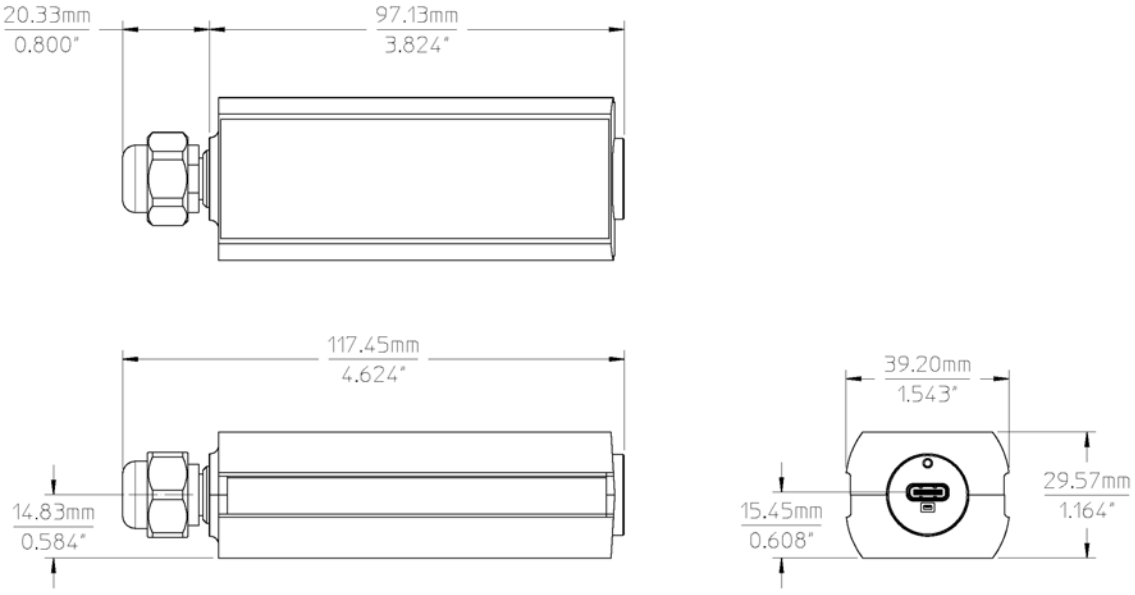

Figure 3-4 U1833B USB Noise Source

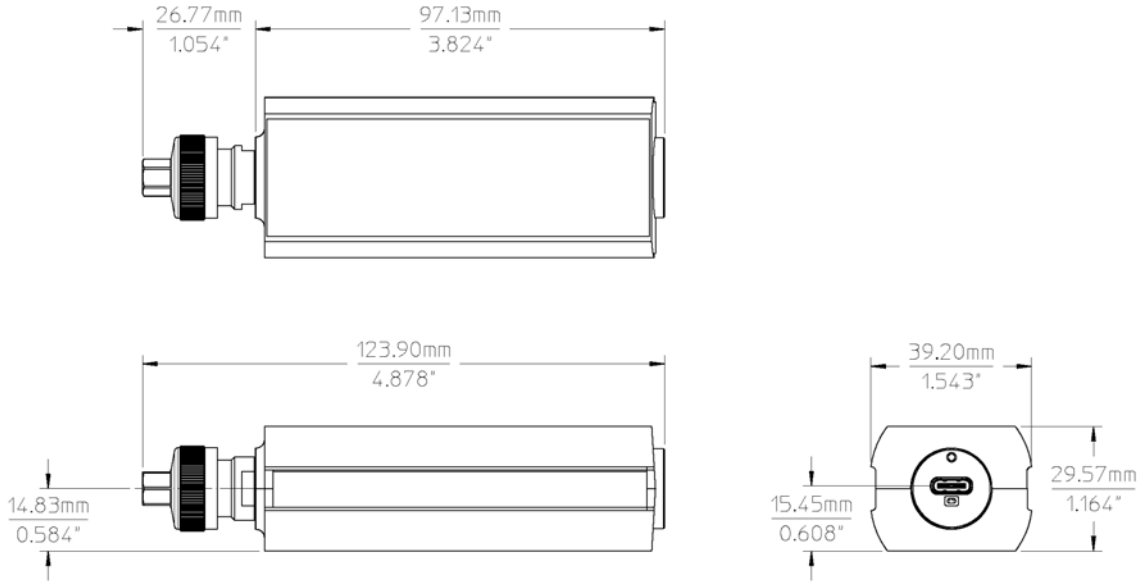

Figure 3-5 U1832C USB Noise Source

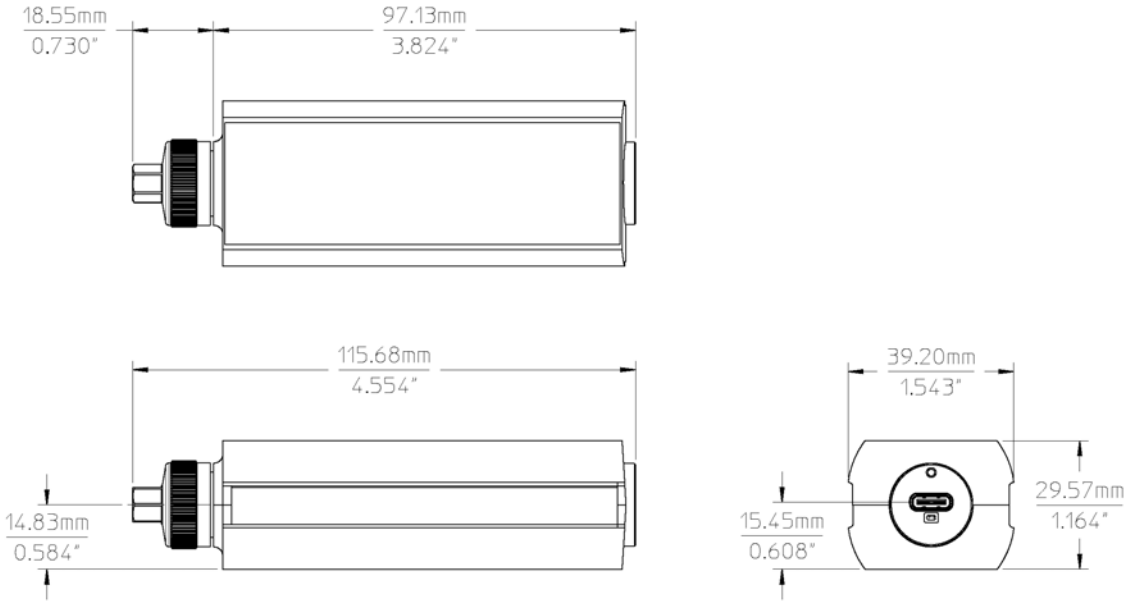

Figure 3-6 U1833C USB Noise Source

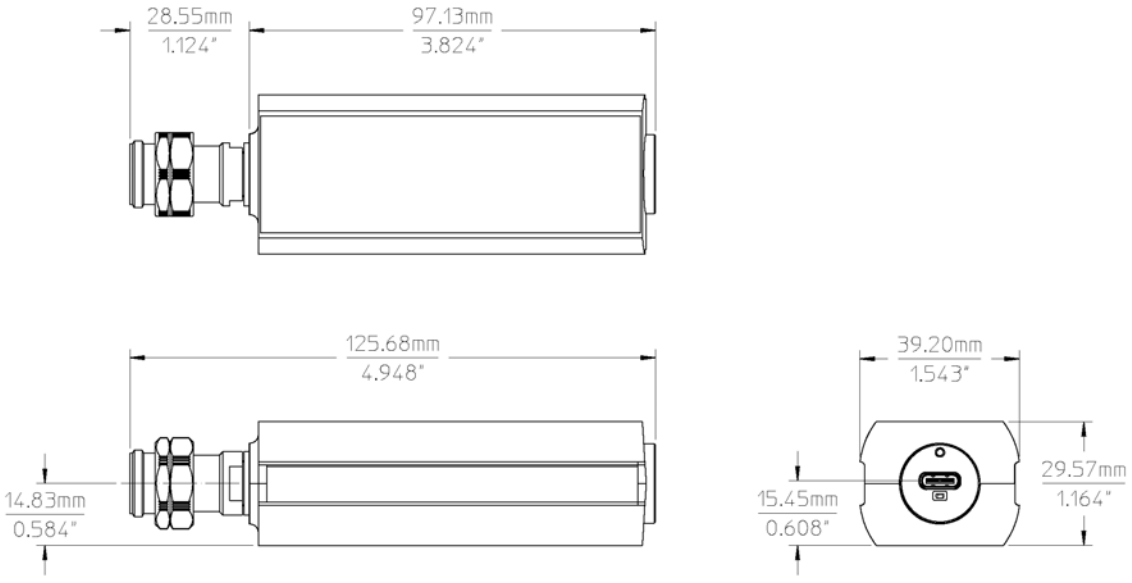

Figure 3-7 U1833D USB Noise Source

Figure 3-8 illustrates the typical ENR and return loss of U1832A and U1833A USB Noise Sources below the limiting threshold.

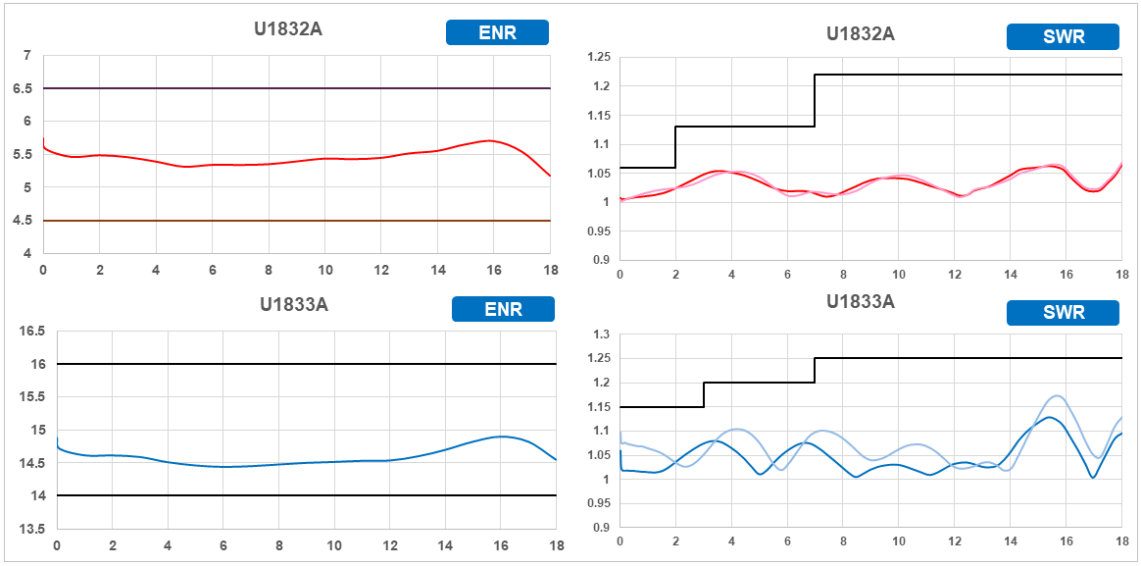

Figure 3-8 Typical ENR and Return Loss of U1832A and U1833A

Figure 3-9 illustrates the typical insertion loss and return loss of U1832B and U1833B USB Noise Sources below the limiting threshold.

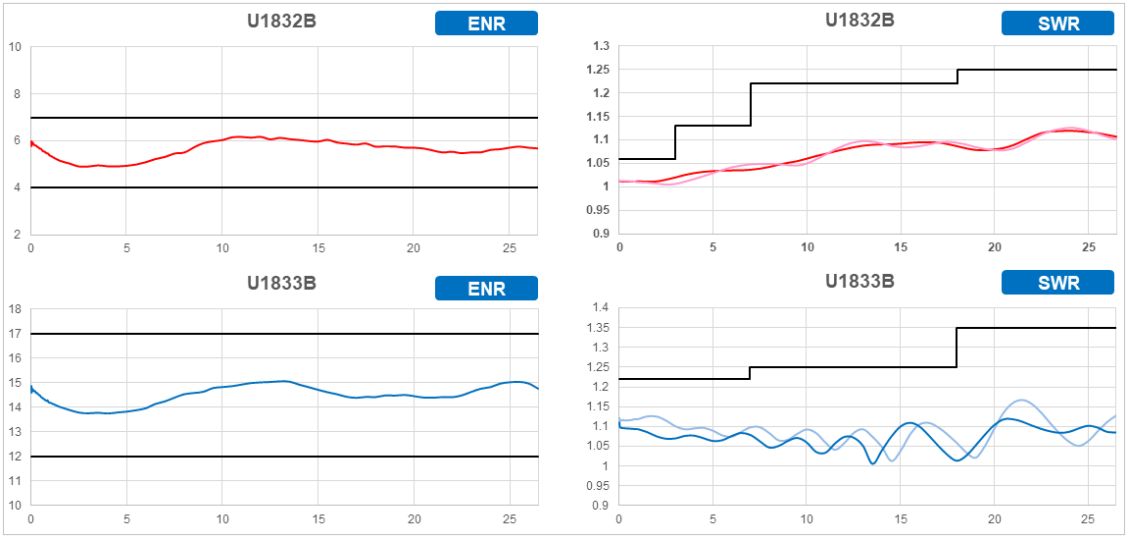

Figure 3-9 Typical ENR and Return Loss of U1832B and U1833B

Figure 3-10 illustrates the typical ENR and return loss of U1832C and U1833C USB Noise Sources below the limiting threshold.

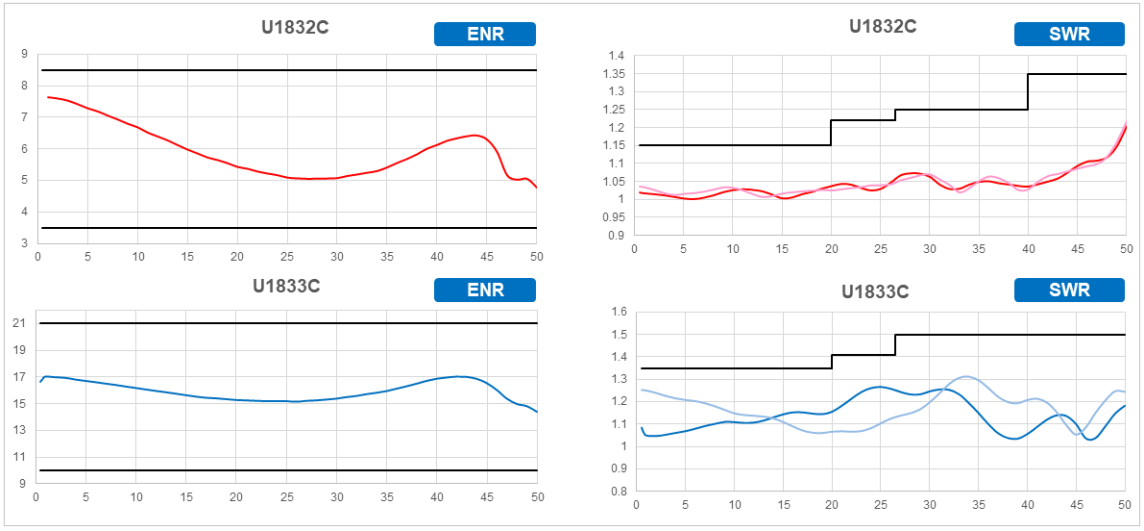

Figure 3-10 Typical ENR and Return Loss of U1832C and U1833C

Figure 3-11 illustrates the typical ENR and return loss of U1833D USB Noise Source below the limiting threshold.

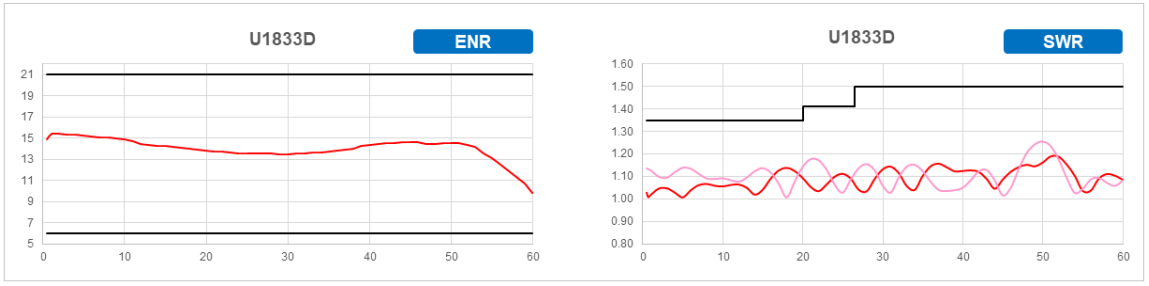

Figure 3-11 Typical ENR and Return Loss of U1833D

Environmental Specifications

U1832A/B/C and U1833A/B/C/D USB Noise Sources are designed for indoor use in an area with low condensation. Table 3-2 shows the environmental specifications for these instruments.

NOTE Samples of this product have been type tested in accordance with the Keysight Environmental Test Manual and verified to be robust against the Environmental stresses of Storage, Transportation and End-use; those stresses include, but are not limited to temperature, humidity, shock, vibration and altitude conditions. The primary source of Keysight Environmental Test standards is the International Electro-technical Commission (IEC) standards.

Table 3-2 U1832x/U1833x Environmental Specifications

Environmental condition	Requirement
Temperature	Operating condition – 0 °C to 55 °C Storage condition – –40 °C to 70 °C
Humidity	Operating condition – Up to 95% RH at 40 °C (non-condensing) Method 1: 23°C/50% RH to 40°C/95% RH
Shock	End-use handling shock – ΔV: 1.6 m/s (60 in/s) ±5%, duration <3 ms Transportation shock – 50 g, ΔV: 8 m/s ±10%
Vibration	Operating random vibration – 5-500 Hz, 0.21 Grms Survival Swept Sine Vibration – 5 Hz-500 Hz-5 Hz, 0.5 Grms Survival random vibration – 5-500 Hz, 2.09 Grms Packaging Drop – 48" drop height

Environmental condition	Requirement
Altitude	Operating – 4,600 meters (15,092 feet) Non-operating – 4,600 meters (15,092 feet)
ESD immunity	Contact discharge – 4 kV per IEC 61000-4-2 Air discharge – 8 kV per IEC 61000-4-2

4 Operating Guides

This chapter provides simple quick-check instructions to verify the U1832A/B/C and U1833A/B/C/D USB Noise Sources' functionality prior to usage. It also provides information on service and maintenance of the U1832A/B/C and U1833A/B/C/D USB Noise Sources.

Operating Instructions

This section refers to operating instructions of the Keysight U1832A/B/C and U1833A/B/C/D USB Noise Sources.

Operator's check

The operator's checks in this section should be performed if failure of the USB Noise Source is suspected. The checks can be used only to verify that the USB Noise Sources are producing a broadband noise spectrum. They cannot be used to check the units against specifications. All the operator's checks are performed using Keysight X-Series Signal Analyzers.

Operator's check for data communication

The following procedure checks that the USB Noise Source can transfer the ENR data to the Signal Analyzers.

1 Preset the Signal Analyzers.

2 Once completed, the display shows Noise Source: SNS, as shown in Figure 4-1.

Figure 4-1 Noise Source: SNS shown on display

3 At Meas Setup menu, press **ENR** menu key and select **ENR Table**.
The Model ID and the Serial # of the USB Noise Source is displayed.

Figure 4-2 USB Noise Source model ID and serial # on ENR table

4 Press the **Fill Table** from **SNS** menu key. Wait until the data is uploaded from the USB Noise Source before proceeding. Verify the data has been transferred from the USB Noise Source to the Signal Analyzer. Figure 4-3 is the typical ENR Table after data transfer.

```
[Filetype ENR]
[Version 1.0]
[Serialnumber MY009]
[Model U1833B]
```

Frequency	ENR
10 MHz	14.41704 dB
100 MHz	14.69249 dB
1 GHz	14.23343 dB
2 GHz	13.87288 dB
3 GHz	13.62331 dB
4 GHz	13.62004 dB
5 GHz	13.83142 dB
6 GHz	13.56342 dB
7 GHz	13.77955 dB
8 GHz	14.11919 dB
9 GHz	14.57626 dB
10 GHz	14.75821 dB
11 GHz	14.91519 dB
12 GHz	14.96209 dB
13 GHz	14.90995 dB
14 GHz	14.96508 dB
15 GHz	14.91388 dB
16 GHz	14.75153 dB
17 GHz	14.49469 dB
18 GHz	14.25979 dB
19 GHz	14.28494 dB
20 GHz	14.27759 dB
21 GHz	14.46143 dB
22 GHz	14.43896 dB
23 GHz	14.33187 dB
24 GHz	14.16190 dB
25 GHz	14.49605 dB
26 GHz	14.36757 dB
26.5 GHz	13.96308 dB

Figure 4-3 Typical ENR Table after data transfer

Operator's check for switching Noise Source

The following procedure checks that the USB Noise Source can be switched between different modes - **Off/On/Normal**.

1 Connect the USB Noise Source to the Signal Analyzers using the 8121-3431 USB cable, as shown in Figure 4-4.

Figure 4-4 USB Noise Source connection to the Signal Analyzer

2 At Meas Setup menu, press the **ENR** menu key and select **NS Setup**. Press the Noise Source Preference menu key and set it to **SNS (Auto)**.

Figure 4-5 Noise Source setup menu

3 Press the Noise Source State menu key and set it to **Off**.
The Noise Source LED is in blue color, and Figure 4-6 shows a typical $\mathbf{P_{cold}}$ plot at **Off** state.

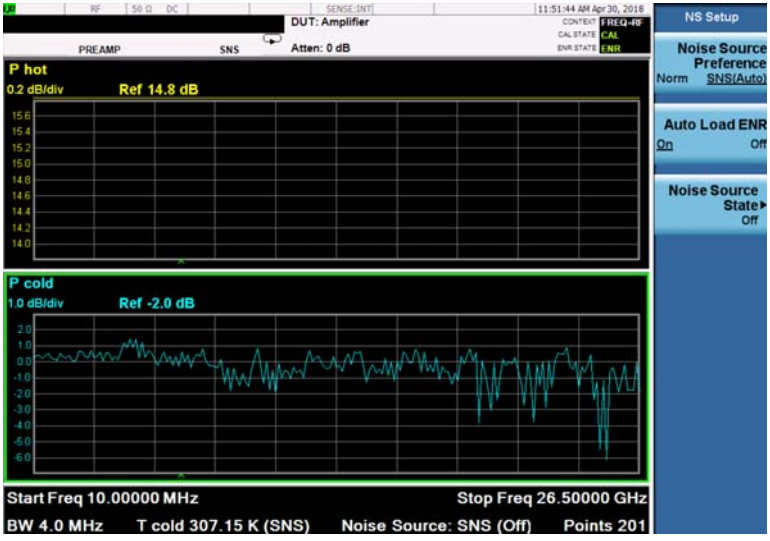

Figure 4-6 Typical P_{cold} plot at Off state

4 Press Noise Source State menu key and set it to **On**.
The Noise Source LED is in green color, and Figure 4-7 shows a typical **P_{hot}** plot at **On** state.

Figure 4-7 Typical P_{hot} plot at On state

5 Press Noise Source State menu key and set it to **Normal**.
The Noise Source LED switches between blue and green color at a fast rate, and Figure 4-8 shows a typical $\mathbf{P_{hot}}$ and $\mathbf{P_{cold}}$ plot at **Normal** state.

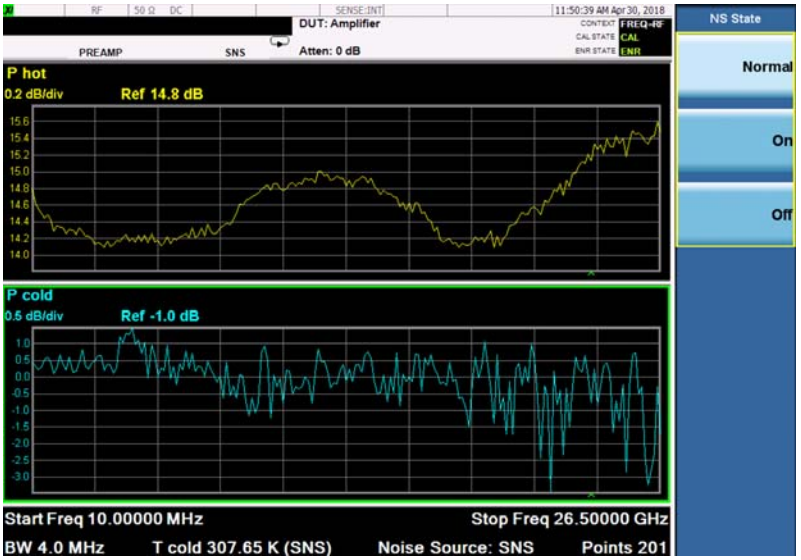

Figure 4-8 Typical P_{hot} and P_{cold} plot at Normal state

6 Monitor the output power (noise) on the measurement screen at different modes. Results appear as per typical plot shown in Figure 4-6, Figure 4-7 and Figure 4-8.

NOTE If any abnormalities are observed during the operator's check, please contact Keysight Technologies or our sales representative.

Service and Maintenance

Service

The U1832A/B/C and U1833A/B/C/D USB Noise Sources do not have internal adjustments and should not be opened; it should only be repaired by service-trained personnel. Should it become necessary to return the U1832A/B/C and U1833A/B/C/D USB Noise Sources for repair or service, contact your nearest Keysight Sales and Service Center. Refer to "Sales and Technical Support" on page 5 of this manual.

Operator's Maintenance

Proper connector care is a vital part of the maintenance which should be performed by the user. The life of the connector can be greatly extended by the general connector care practices outlined in the Connector Care Quick Reference Card available at
www.keysight.com/my/en/assets/9018-06022/reference-guides/9018-06022.pdf

Adjustments

There are no adjustments that can be made to the USB Noise Sources.

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