

Keysight 11636C DC to 50 GHz Power Divider



Operating and
Service Manual

Notices

Copyright Notice

© Keysight Technologies 2007-2017
No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Keysight Technologies as governed by United States and international copyright laws.

Manual Part Number

11636-90005

Edition

Edition 3, December 1, 2017

Printed in:

Printed in Malaysia

Published by:

Keysight Technologies
Bayan Lepas Free Industrial Zone,
11900 Penang, Malaysia

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.

Declaration of Conformity

Declarations of Conformity for this product and for other Keysight products may be downloaded from the Web. Go to <http://www.keysight.com/go/conformity>. You can then search by product number to find the latest Declaration of Conformity.

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.

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.

Safety Information

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.

Environmental Conditions

The 11636C is designed to fully comply with Keysight Technologies' product operating environmental specifications. The following is the list down summary of environmental specifications.

Environmental condition	Requirement
Temperature	Operating condition - 45 °C to 70 °C
	Storage condition - -65 °C to 85 °C
	Cycling - -65 °C to 150 °C, 10 cycles at 20 °C per minute ramp rate, 20 minutes dwell time per MIL-STD-883F, Method 1010.8, Condition C (modified)
Humidity	Operating condition - 50% to 95% RH at 40 °C, 24 hours cycling, 5 times
	Storage condition - 90% RH at 65 °C, 24 hours
Shock	Half sine, smoothed - 1000 G at 0.5 ms, 3 shock pulses per orientation, 18 total per MIL-STD-883F, Method 2002.4, Condition B (modified)
Vibration	Broadband random - 2.41 G rms, 10 min/axis
Altitude	Storage - ≤ 4600 meters (15,000 feet)
ESD immunity	Direct discharge - 4 kV (to center conductor) - 15 kV (to outer conductor)

Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC

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

Product category:

With reference to the equipment types in the WEEE directive Annex 1, this instrument is classified as a “Monitoring and Control Instrument” product.

The affixed product label is as shown below.



Do not dispose in domestic household waste.

To return this unwanted instrument, contact your nearest Keysight Service Center, or visit <http://about.keysight.com/en/companyinfo/environment/takeback.shtml> for more information.

Sales and Technical Support

To contact Keysight for sales and technical support, refer to the support links on the following Keysight websites:

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

Table of Contents

Environmental Conditions	3
Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC	4
Product category:	4
Sales and Technical Support	4
1 Introduction	
Product Overview	10
Features	10
2 Characteristics and Specifications	
3 Introduction	
Installation	14
Initial inspection	14
Operating Instruction	15
Operator's check	15
Performance Tests	16
Service Instructions	17
Adjustment	17
Repair	17
Maintenance	17

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK.

List of Figures

Figure 1-1	Keysight 11636C DC to 50 GHz Power Divider10
Figure 3-1	Quick-check configuration15

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK.

1 Introduction

Product Overview 10

This chapter provides an overview of the Keysight 11636C power divider.

Product Overview

The Keysight 11636C DC to 50 GHz Power Divider, operating from DC to 50 GHz, provides excellent output power symmetry between the two output ports. Its design features excellent amplitude and phase tracking to ensure excellent source match for fault location applications using network analyzers and also precise power division.

Any port may be used as an input, as the Keysight 11636C provides a symmetrical 6 dB power division. The 11636C can also be used as a power combiner. When signals are input at two output ports, the sum of the two appears at the input port. However, this is not recommended for ratio or source leveling applications.



Figure 1-1 Keysight 11636C DC to 50 GHz Power Divider

Features

- Broadband coverage from DC to 50 GHz
- Excellent amplitude (0.3 dB from DC to 50 GHz) and phase tracking ($\pm 2^\circ$ typical) minimizes amplitude and phase difference between the two outputs to ensure an accurate power division.
- Low SWR of 1.67 at 50 GHz minimizes your measurement uncertainty

2 Characteristics and Specifications

For the characteristics and specifications of the 11636C DC to 50 GHz Power Divider, refer to the technical overview at <http://literature.cdn.keysight.com/litweb/pdf/5989-6698EN.pdf>.

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK.

3 Introduction

Installation	14
Operating Instruction	15
Performance Tests	16
Service Instructions	17

This chapter mainly discuss on the installation of the power divider and operating instruction which walk- through quick- check procedure to assure the power divider is working before implement in the system. There are also the performance tests and service instructions available later in this chapter.

Installation

Initial inspection

- 1** Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the instrument has been 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” or “Performance Tests”.
- 2** If the contents are incomplete, if there is mechanical damage or defect, or if the instrument does not pass the electrical performance test, contact the nearest Keysight Technologies Sales and Service office. Refer to the Service and Support information in the front matter 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 materials or their equivalents. Keysight Technologies can provide packaging materials identical to the original materials. Refer to Service and Support information in the front matter 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.

Operating Instruction

Operator's check

The operator's check is supplied to allow the operator to make quick check of the power divider prior to use or if a failure is suspected.

CAUTION

ESD exceeding the level specified in the technical overview may cause permanent damage to the device.

Description

The power divider is connected to a network analyzer configured for the s-parameter measurement. The network analyzer may be set to sweep over the whole or selected frequency range of the power divider to be verified. The s-parameter measurement is the best way to determine if the switch is working properly.

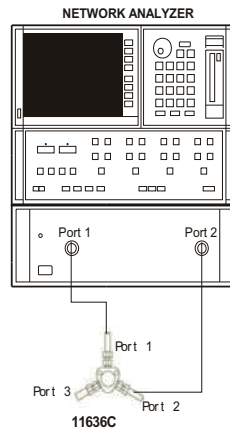


Figure 3-1 Quick-check configuration

Quick-check procedure

- 1** Connect Port 1 of power divider to Port 1 of the network analyzer and Port 2 of the power divider to Port 2 of network analyzer as illustrated in [Figure 3-1](#).
- 2** Then terminate Port 3 of power divider with 50 ohm load.
- 3** Perform s- parameters measurement and verify against specifications in the technical overview.
- 4** Repeat the above steps. Connect Port 3 of power divider to Port 1 of the network analyzer and Port 1 of the power divider to Port 2 of the network analyzer. Next, terminate Port 2 of power divider with 50 ohm load. Now, the quick- check procedure already complete and performance are measured and verified.

Performance Tests

The power divider can be tested to the accuracy of the specifications with a network analyzer or equivalent equipment of suitable accuracy. If a network analyzer is available, test instrument using the procedure in the analyzer's operating manual.

Service Instructions

Adjustment

The power divider do not have internal adjustments and should not be opened.

Repair

The 11636C power divider is not recommended for repair as most components are not easily removed.

Maintenance

The connectors, particularly the connector faces, must be kept clean.

For instruction on connecting and care of your connectors, refer to Microwave Connector Care Quick Reference Card (08510- 90360).

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK.



This information is subject to change without notice. Always refer to the English version at the Keysight website for the latest revision.

© Keysight Technologies 2007-2017
Edition 3, December 1, 2017

Printed in Malaysia



11636-90005

www.keysight.com