Agilent Technologies
Z5623A Option K03

User's and Service Guide Supplement

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Manufacturing Part Number: Z5623-90067

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Warranty Statement

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Safety Notes

The following safety notes are used throughout this document. Familiarize yourself with each of these notes and its meaning before performing any of the procedures in this document.

WARNING	**Warning denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.**

CAUTION	Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in damage to or destruction of the instrument. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

Definitions

- Specifications describe the performance of parameters covered by the product warranty (temperature - 0 to 55 °C, unless otherwise noted.)
- *Typical* describes additional product performance information that is not covered by the product warranty. It is performance beyond specification that 80% of the units exhibit with a 95% confidence level over the temperature range 20 to 30 °C. Typical performance does not include measurement uncertainty.
- *Nominal* values indicate expected performance, or describe product performance that is useful in the application of the product, but is not covered by the product warranty.

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1 Introduction

Description

The Agilent Z5623AK03 Distribution Amplifier is designed for use with the E4438C with Option HCC or the E8247/57/67C With Option HCC. The test set provides the capability to phase lock up to eight signals sources of the same family.

The test set has two modes of operation, Distribution Mode and Calibration Mode. The mode is manually selected by a switch on the front panel.

NOTE This User's and Service Guide documents the use of the test set with an Agilent E8362B Network Analyzer.

Verifying the Shipment

After the test set has been unpacked, keep the original packaging materials so they can be used if you need to transport the instrument.

Check the items received against Table 1 to make sure you have received everything.

Inspect the test set and all accessories for any signs of damage that may have occurred during shipment. If your test set or any accessories appear to be damaged or missing, refer to "Contacting Agilent" on page 33.

Table 1 Content List

Description	Agilent Part Number	Qty
Power Cord	See Figure 2 on page 13	1
Cable Assy, SMA	70429-20055	16
Kit-Front Handle	5062-9226	1
Kit-Rack Mount	5063-9232	1
Termination, 50 Ω	1810-0118	6
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Requirements

Electrical

The alternating-current (AC) power that is supplied to the test set must meet the following requirements:

Voltage: 90 to 250 Vac

Frequency: 48 to 66 Hz

Available power: 40 watts minimum

If the available AC line voltage is outside the 90 to 250 Vac range, an autotransformer that provides third wire continuity to earth ground may be used.

Environmental

Operating Environment

Indoor use only

Operating temperature: 0 to 55 °C

Maximum relative humidity: 80 percent for temperatures up to 31 °C decreasing linearly to 50 percent relative humidity at 40 °C

Altitude: up to 15,000 feet (4,572 meters)

Enclosure protection: IP 20, according to IEC 529

CAUTION This product is designed for use in INSTALLATION CATEGORY II, and POLLUTION DEGREE 2, per IEC 101 and 664 respectively.

Non-Operating Storage Conditions

Temperature: –40 °C to +70 °C

Humidity: 0 to 90 percent relative at +65 °C (non-condensing)

Altitude: 0 to 15,240 meters (50,000 feet)

General Characteristics

Weight

Net: Approximately 9 kg

Shipping: Approximately 20 kg

Cabinet Dimensions

These dimensions exclude front and rear panel protrusions.

- Height 3.5 in (89 mm)
- Width 16.75 in (425 mm)
- Depth 19.7 in (500 mm)

Miscellaneous Characteristics

RF connectors: SMA (female)

Switch type: Mechanical

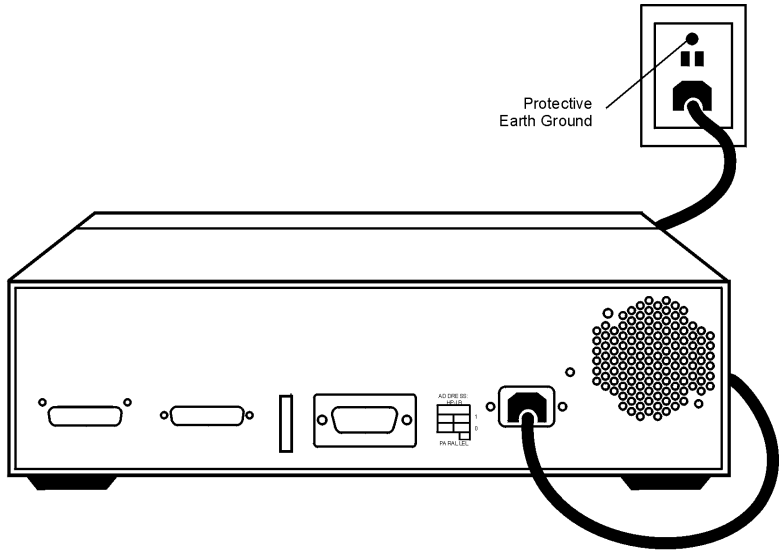
Preparations

Electrical

1. Ensure that the "Requirements" on page 10 are met.
2. Verify that the power cable is not damaged and that the power source outlet provides a protective earth ground contact. Note that Figure 1 depicts only one type of power source outlet. Refer to Figure 2 to see the different types of power cord plugs that can be used with your test set.

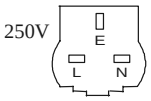
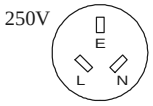
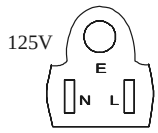
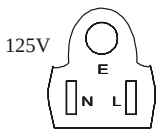
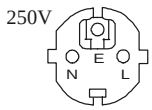
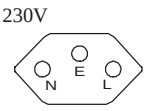
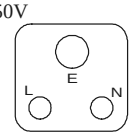
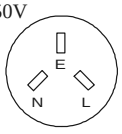
   Cables are available in different lengths. For descriptions and part numbers of cables other than those described in Figure 2, Refer to "Contacting Agilent" on page 33.
3. If this product is to be powered by autotransformer, make sure the common terminal is connected to the neutral (grounded) side of the ac power supply.

Figure 1 **Protective Earth Ground**



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

Figure 2 Power Cables

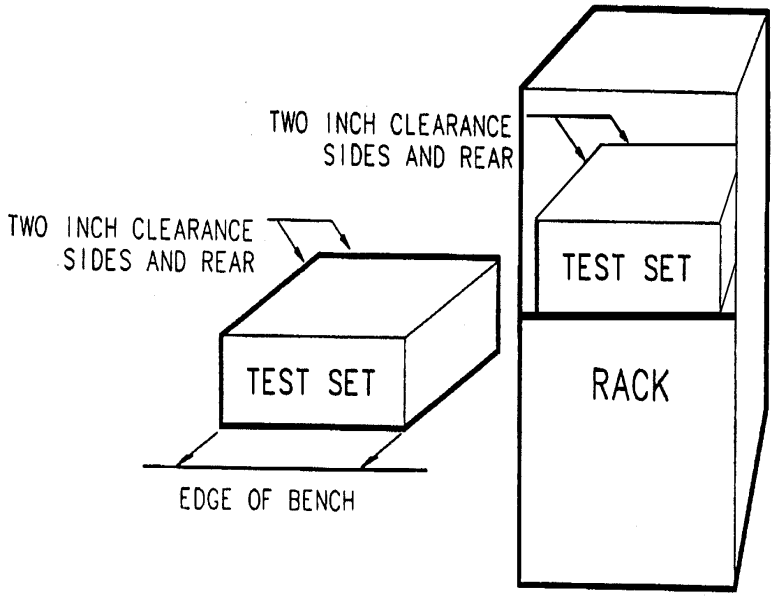
Plug Type [a]	Cable Part Number	Plug [b] Description	Length cm (in.)	Cable Color	For Use in Country
	8120-8705 8120-8709	Straight BS 1363A 90˚	229 (90) 229 (90)	Mint Gray Mint Gray	Option 900 United Kingdom, Hong Kong, Cyprus, Nigeria, Singapore, Zimbabwe
	8120-1369 8120-0696	Straight AS 3112 90˚	210 (79) 200 (78)	Gray Gray	Option 901 Argentina, Australia, New Zealand, Mainland China
	8120-1378 8120-1521	Straight NEMA 5-15P 90˚	203 (80) 203 (80)	Jade Gray Jade Gray	Option 903 United States, Canada, Brazil, Colombia, Mexico,Philippines, Saudi Arabia, Taiwan
	8120-4753 8120-4754	Straight NEMA 5-15P 90˚	229 (90) 229 (90)	Gray Gray	Option 918 Japan
	8120-1689 8120-1692	Straight CEE 7/VII 90˚	200 (78) 200 (78)	Mint Gray Mint Gray	Option 902 Continental Europe, Central African Republic, United Arab Republic
	8120-2104 8120-2296	Straight SEV Type 12 90˚	200 (78) 200 (78)	Gray Gray	Option 906 Switzerland
	8120-2956 8120-2957	Straight SR 107-2-D 90˚	200 (78) 200 (78)	Gray Gray	Option 912 Denmark
	8120-4211 8120-4600	Straight IEC 83-B1 90˚	200 (78) 200 (78)	Mint Gray Mint Gray	Option 917 South Africa, India
	8120-5182 8120-5181	Straight SI 32 90˚	200 (78) 200 (78)	Jade Gray Jade Gray	Option 919 Israel

a. E =earth ground, L = line, and N = neutral.
b. Plug identifier numbers describe the plug only. The Agilent Technologies part number is for the complete cable assembly.

Environmental

1. Ensure that the "Requirements" on page 10 are met.
2. If you are installing the test set into a cabinet, ensure there are at least two inches of clearance around the sides and back of the test set and the system cabinet. See Figure 3. The convection into and out of the test set must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the test set by 4 °C for every 100 watts dissipated in the cabinet.

Figure 3 Ventilation Clearance Requirements



CAUTION If the total power dissipated in the cabinet is greater than 800 watts, forced convection must be used.

Electrostatic Discharge Protection

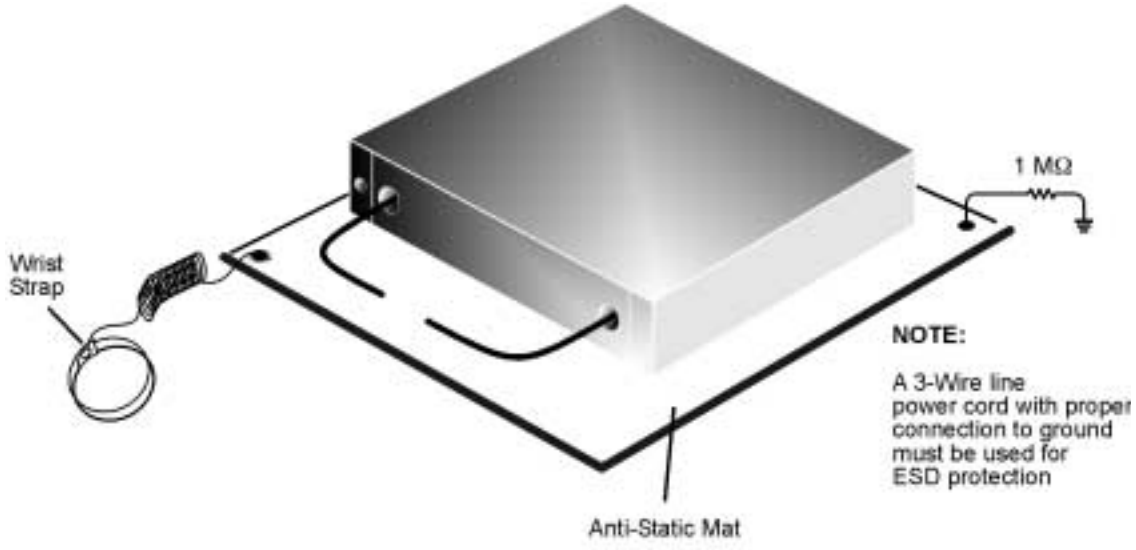
Protection against electrostatic discharge (ESD) is essential while removing or connecting cables or assemblies within the network analyzer.

Static electricity can build up on your body and can easily damage sensitive internal circuit elements when discharged. Static discharges too small to be felt can cause permanent damage. To prevent damage to the instrument:

- *always* wear a grounded wrist strap having a 1 MΩ resistor in series with it when handling components and assemblies.
- *always* use a grounded, conductive table mat while working on the instrument.
- *always* wear a heel strap when working in an area with a conductive floor. If you are uncertain about the conductivity of your floor, wear a heel strap.

Figure 4 shows a typical ESD protection setup using a grounded mat and wrist strap.

Figure 4 ESD Protection Setup



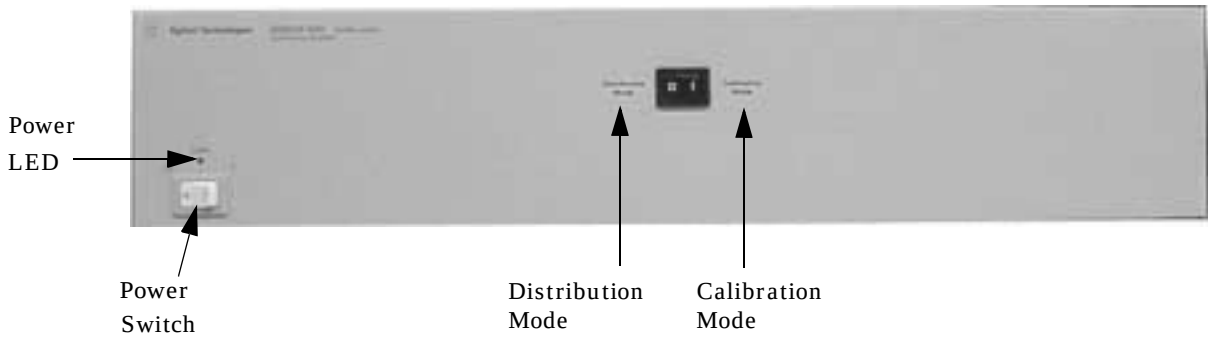
esd_setup

Test Set Familiarization

This section familiarizes the user with various front and rear panel features of the test set.

Front Panel

Figure 5 Front Panel Features



Power On Switch

The Power On switch turns the AC power to the test set on and off. The switch is located at the bottom left corner of the front panel.

The switch disconnects the mains circuits from the mains supply after the EMC filters and before other parts of the instrument.

Power LED

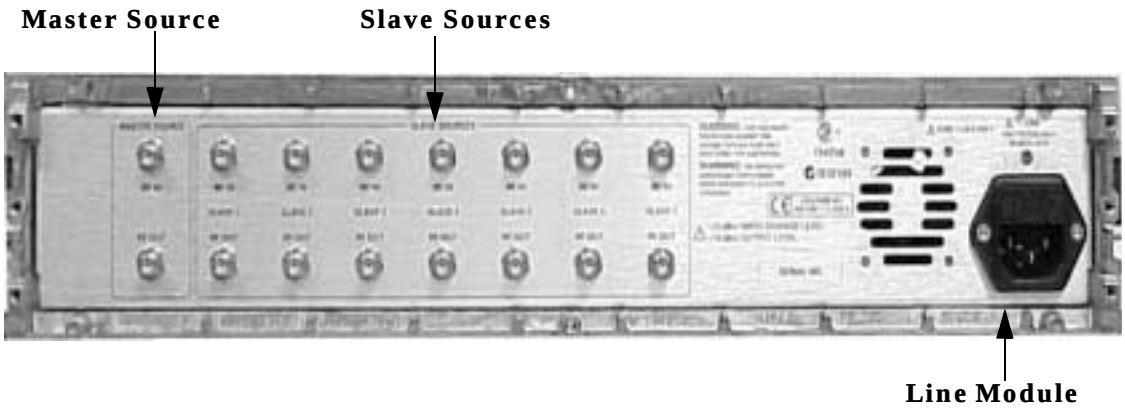
The power LED is illuminated when the power switch is in the on (1) position.

Mode Switch

Selects between distribution and calibrations modes.

Rear Panel

Figure 6 Rear Panel Features



Line Module

The line module contains the power cable receptacle and the line fuse.

RF Connectors

All of the RF connectors are 50 Ω SMA female 3.5 mm connectors.

Power Cables

The line power cable is supplied in one of several configurations, depending on the destination of the original shipment.

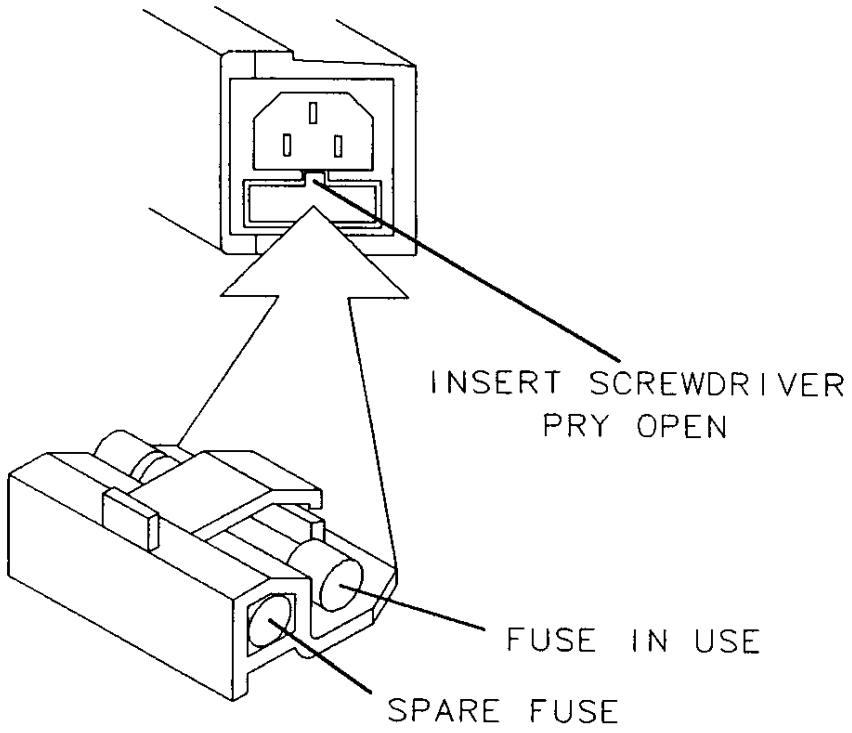
Each instrument is equipped with a three-wire power cable. When connected to an appropriate ac power receptacle, this cable grounds the instrument chassis. The type of power cable shipped with each instrument depends on the country of destination. See Figure 2 on page 13 for the part numbers of these power cables.

WARNING **This is a Safety Class I 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 the instrument, is likely to make the instrument dangerous. Intentional interruption is prohibited.**

The Line Fuse

The line fuse (F 3 A/250 V, 2110-0780) and a spare reside within the line module. Figure 7 illustrates where the fuses are and how to access them.

Figure 7 Location of Line Fuses



Operation

The Agilent Z5623AK03 is a manually controlled instrument that has two modes of operation. The mode of operation is selected by the switch on the front panel.

Calibration Mode

This mode allows for the calibration of each individual signal source. The LO output signal of each source is routed back to the LO input.

Distribution Mode

This mode distributes the Master sources LO output to the Master and Slave sources LO inputs.

NOTE When the instrument is in calibration mode there is no phase coherency lock and all instruments will operate independently.

Introduction to Phase Coherency

The phase coherent simulation system developed by Agilent provides a more repeatable, configurable alternative that can be used in the laboratory or the flight line. It is comprised solely of commercially available equipment and requires only the addition of waveforms used to stimulate the receivers. The system provides the full-phase coherency that is mandatory for testing multi-receiver systems.

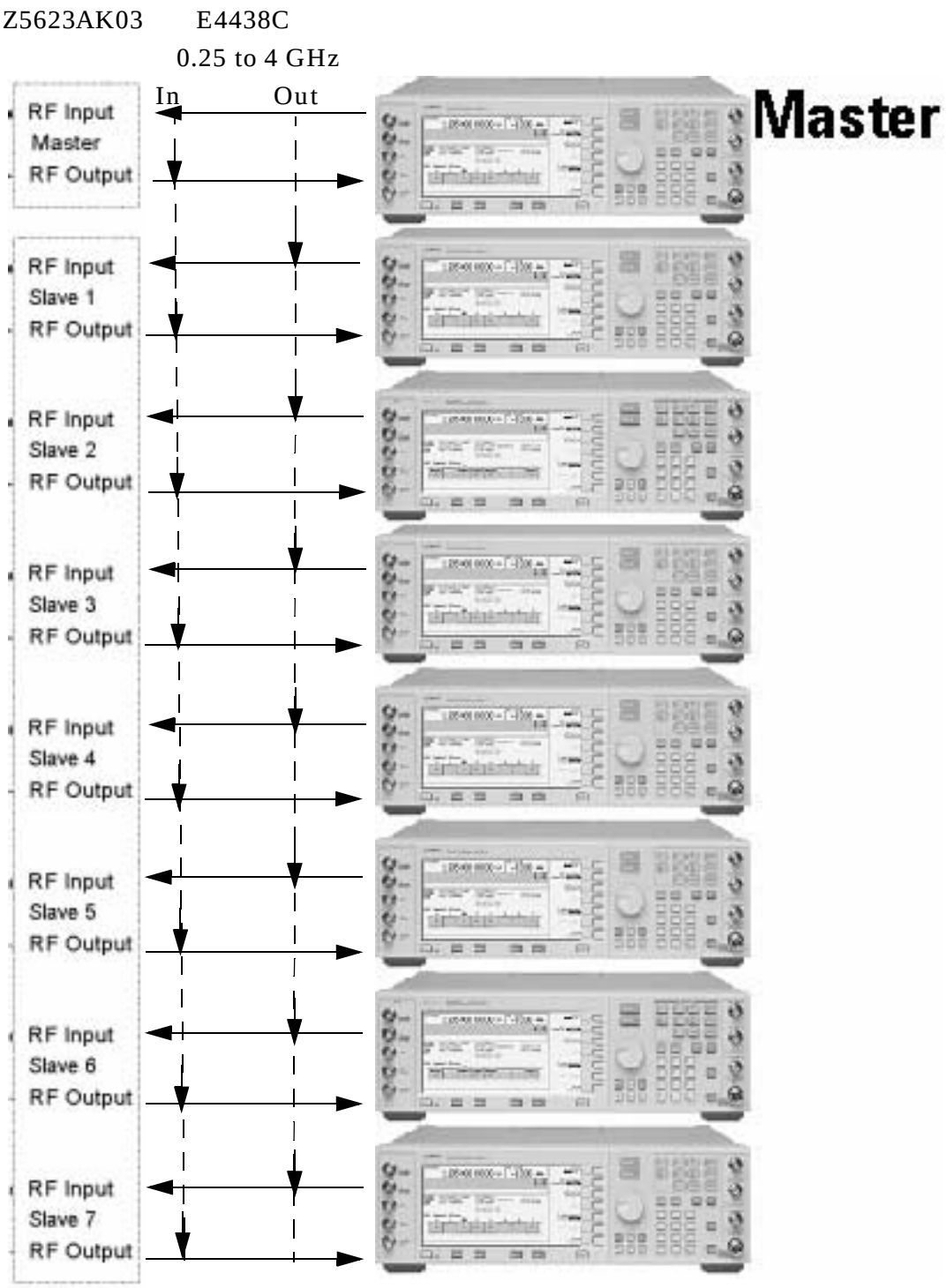
The E4438C Option HCC and the Z5623A Option K03 allows a "Master" unit to fully control the phase, amplitude and frequency over time of the additional "Slave" unit(s). Multiple receivers are used to accurately simulate actual signal conditions and evaluate phase-array radars.

NOTE When changing the frequency of the Master, the Slave units must have the same frequency setting or the Slave(s) unit will be unlevel and no RF output power will be detected.

NOTE When the instrument is in calibration mode there is no phase coherency lock and all instruments will operate independently. The user may perform a unit calibration as often as desired to produce reliable measurements.

Refer to Figure 8, "Z5623A K03 to E4438C HCC," for system setup.

Figure 8 Z5623A K03 to E4438C HCC



System Connections

Connecting to the Master Source

Test Set Port (rear panel)	Cable	Signal Source Port (rear panel)
Master RF IN	70429-20055	Freq 0.25 to 4 GHz OUT
Master RF OUT	70429-20055	Freq 0.25 to 4 GHz IN

Connecting to the Slave Source

Test Set Port (rear panel)	Cable	Signal Source Port (rear panel)
Slave x RF IN (x=1 to 7)	70429-20055	Freq 0.25 to 4 GHz OUT
Slave x RF OUT (x=1 to 7)	70429-20055	Freq 0.25 to 4 GHz IN

Terminating Unused Slave Source

Test Set Port (rear panel)	Load
Slave x RF IN	None
Slave x RF OUT	1810-0118

Test Set Specifications

Damage Levels

CAUTION Damage to internal parts of the test set will occur if max power levels are exceeded. Damage levels, for equipment connected to the RF Outputs, may be less than damage levels to the test set.

Table 2 Maximum Power Levels

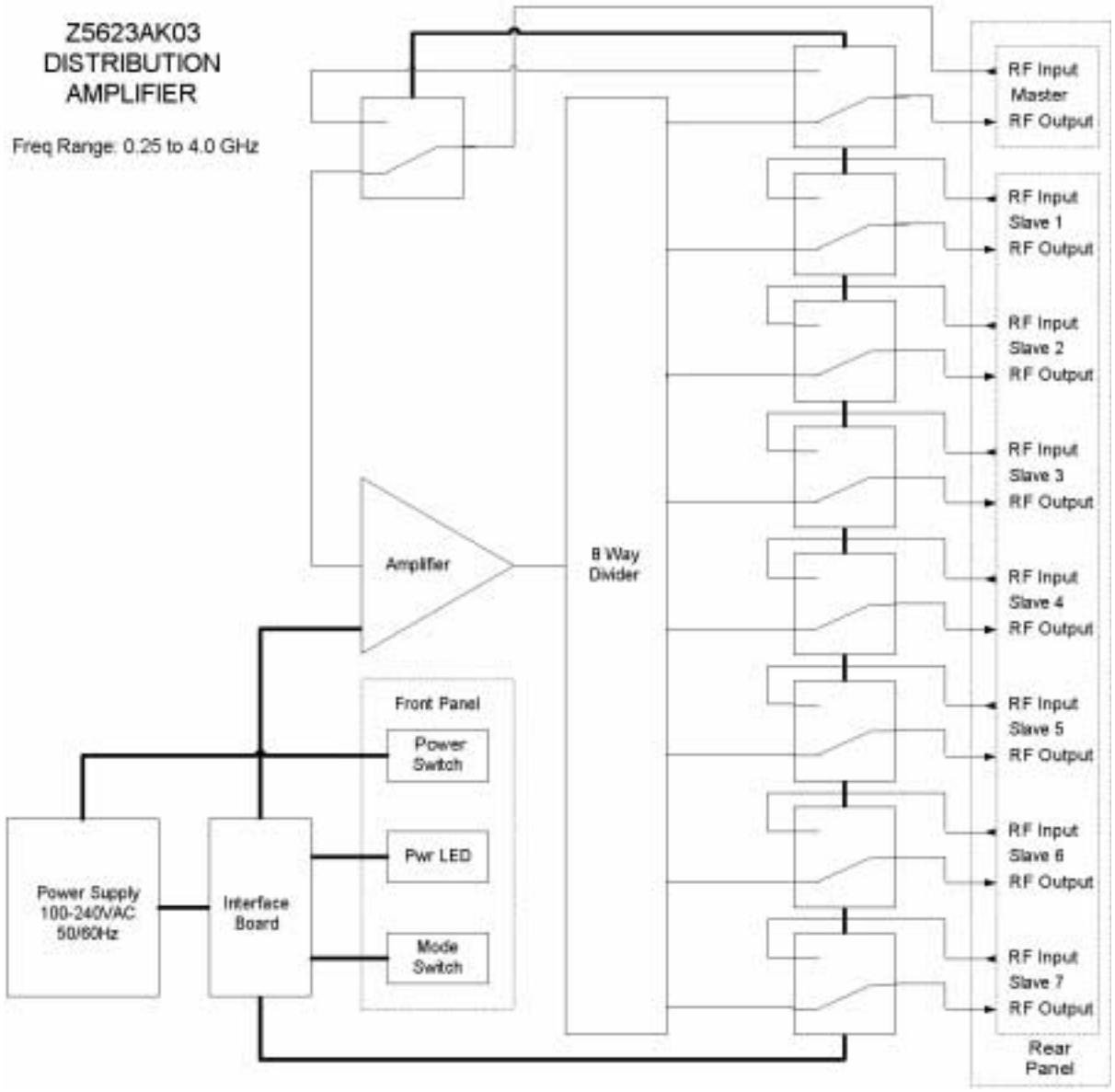
Master Source In	+15 dBm
Slave Source In	+25 dBm

Table 3 Typical Performance

Typical Performance	**0.25 to 4 GHz**
Maximum Power at Output Ports[a]	13 dBm
Gain[a]	2 dbm (± 2 dBm)
Insertion Loss[b]	≤ 1.5 dBm

a. With the input power level set to +9 dbm and the test set in distribution mode.
b. This is from input to output ports of the same source in calibration mode.

Figure 9 Z5623AK03 Block Diagram



Performance Verification

Equipment Required

- E8362B Network Analyzer 10 MHz to 20 GHz *or equivalent*
- 85033D/E 3.5 mm Calibration Kit *or equivalent*
- two 3.5 mm RF Cables, 36 inch *or equivalent*

Performance Procedure

To test the performance of the Z5623AK03 it is assumed the user is familiar with the operation of the equipment listed above.

General S-parameters are used to characterize the connection paths of the test set. Both reflection and transmission measurements are required. These measurements are made using the E8362B, 3.5 mm Calibration Kit and RF cables.

Table 4 Equipment Setup

Item	Unit of Measure
Measure Type	S21
Start	0.25 GHz
Stop	4 GHz
Power	+9 dBm
Scale	1 dB/div
Ref Position	6^{th} div
Sweep Time	1 second
IF Bandwidth	15 kHz

Calibration should be performed at the settings listed in Table 4. Calibrate the PNA at the end of the RF cables.

Test Instructions

Distribution Mode Gain Test

Line	Port Type	Begin Frequency	End Frequency	Begin Response	End Response
1	Max	0.25 GHz	4 GHz	4 dB	4 dB
2	Min	0.25 GHz	4 GHz	0 dB	0 dB

1. Connect the loads to RF OUT on Slave 1 through Slave 7.
2. Set the test set mode switch to Distribution Mode.
3. Connect Port 1 on the network analyzer to the Master RF IN on the test set.
4. Connect Port 2 on the network analyzer to the Master RF OUT on the test set.
5. Verify that the instrument passed.
6. Remove the load from RF OUT on Slave 1.
7. Connect the load on the Master RF OUT.
8. Verify that the instrument passed.
9. Repeat Steps 6 through 9 on Slave 2 through 7.

Calibration Mode Insertion Loss Test

Line	Port Type	Begin Frequency	End Frequency	Begin Response	End Response
1	Min	0.25 GHz	4 GHz	+0.2 dB	+0.2 dB

1. Set the test set mode switch to Calibration Mode.
2. Connect Port 1 on the network analyzer to the Master RF IN on the test set.
3. Connect Port 2 on the network analyzer to the Master RF OUT on the test set.
4. Verify that the instrument passed.
5. Repeat Steps 2 through 4 on Slave 1 through Slave 7.

2 Service and Safety Information

Service and Safety Information

Introduction

Review this product and related documentation to familiarize yourself with safety markings and instructions before you operate the instrument. This product has been designed and tested in accordance with international standards.

Service and Support Options

The Z5623AK03 Distribution Amplifier is not serviceable by the customer or Agilent Technologies Service Center. It is set up for repair or replacement by the factory only. However, verification of performance can be provided by your nearest Agilent Technologies Service Center. Refer to “Contacting Agilent” on page 33.

NOTE There are many other repair and calibration options available from the Agilent Technologies support organization. These options cover a range of service agreements with varying response times. Contact Agilent for additional information on available service agreements for this product. Refer to “Contacting Agilent” on page 33.

Cleaning Instructions

Clean the instrument cabinet using a damp cloth only.

Before Applying Power

Verify that the product is configured to match the available main power source as described in the input power configuration instructions in this manual. If this product is to be powered by autotransformer, make sure the common terminal is connected to the neutral (grounded) side of the ac power supply.

Warnings

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

Warnings applicable to this instrument are:

WARNING **No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers.**

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

WARNING **For continued protection against fire hazard replace line fuse only with same type and rating:**
• United States—F 3A/250V, Part Number 2110-0780
• Europe—F 3.15A/250V, Part Number 2110-0655
The use of other fuses or material is prohibited.

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

WARNING **The power cord is connected to internal capacitors that may retain dangerous electrical charges for 5 seconds after disconnecting the plug from its power supply.**

WARNING **These servicing instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing unless you are qualified to do so.**

WARNING **The opening of covers or removal of parts is likely to expose dangerous voltages. Disconnect the instrument from all voltage sources while it is being opened.**

WARNING **This product is designed for use in Installation Category II and Pollution Degree 2 per IEC 1010 and 664 respectively.**

Cautions

CAUTION The CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like, which 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.

Cautions applicable to this instrument are:

CAUTION Always use the three-prong ac power cord supplied with this instrument. Failure to ensure adequate earth grounding (by not using this cord) can cause instrument damage.

CAUTION This instrument has autoranging line voltage input; be sure the supply voltage is within the specified range.

CAUTION Ventilation Requirements: When installing the instrument in a cabinet, the convection into and out of the instrument must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the instrument by 4 °C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, forced convection must be used.

Instrument Markings

	When you see this symbol on your instrument, you should refer to the instrument's instruction manual for important information.
	This symbol indicates hazardous voltages.
	The laser radiation symbol is marked on products that have a laser output.
	This symbol indicates that the instrument requires alternating current (ac) input.
	The CE mark is a registered trademark of the European Community. If it is accompanied by a year, it indicates the year the design was proven.
	The CSA mark is a registered trademark of the Canadian Standards Association.
ISM1-A	This text indicates that the instrument is an Industrial Scientific and Medical Group 1 Class A product (CISPER 11, Clause 4).
	This symbol indicates that the power line switch is ON.
	This symbol indicates that the power line switch is OFF or in STANDBY position.
 N279	This symbol indicates the product meets the Australian Standards.

Safety Earth Ground

This is a Safety Class I product (provided with a protective earthing terminal). An uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, the product must be made inoperative and secured against any unintended operation.

Shipping Your Analyzer to Agilent for Service or Repair

If you wish to send your test set to Agilent Technologies for service or repair:

- Include a complete description of the service requested or of the failure and a description of any failed test and any error message.
- Ship the analyzer using the original or comparable antistatic packaging materials.
- Contact Agilent for instructions on where to ship your analyzer. Refer to “Contacting Agilent” on page 33.

Contacting Agilent

By internet, phone, or fax, get assistance with all your test and measurement needs.

Online assistance: www.agilent.com/find/assist			
Americas			
Brazil *(tel)* (+55) 11 4197 3600 *(fax)* (+55) 11 4197 3800	**Canada** *(tel)* 877 894 4414 *(fax)* (+1) 905 282-6495	**Mexico** *(tel)* (+52) 55 5081 9469 *(alt)* 01800 5064 800 *(fax)* (+52) 55 5081 9467	**United States** *(tel)* 800 829 4444 *(alt)* (+1) 303 662 3998 *(fax)* 800 829 4433
Asia Pacific and Japan			
Australia (*tel*) 1800 629 485 (*alt*) 1800 143 243 (*fax*) 1800 142 134	**China** (*tel*) 800 810 0189 (*alt*) (+86) 10800 650 0021 (*fax*) 800 820 2816	**Hong Kong** (*tel*) 800 930 871 (*alt*) (+852) 3197 7889 (*fax*) (+852) 2 506 9233	**India** (*tel*) 1600 112 929 (*fax*) 000800 650 1101
Japan (*tel*) 0120 421 345 (*alt*) (+81) 426 56 7832 (*fax*) 0120 421 678	**Malaysia** (*tel*) 1800 888 848 (*alt*) 1800 828 848 (*fax*) 1800 801 664	**Singapore** (*tel*) 1800 375 8100 (*alt*) (+65) 6 375 8100 (*fax*) (+65) 6836 0252	**South Korea** (*tel*) 080 769 0800 (*alt*) (+82) 2 2004 5004 (*fax*) (+82) 2 2004 5115
Taiwan (*tel*) 0800 047 866 (*alt*) 00801 651 317 (*fax*) 0800 286 331	**Thailand** (*tel*) 1800 226 008 (*alt*) (+66) 2 268 1345 (*fax*) (+66) 2 661 3714		
Europe			
Austria (*tel*) 0820 87 44 11* (*fax*) 0820 87 44 22	**Belgium** (*tel*) (+32) (0)2 404 9340 (*alt*) (+32) (0)2 404 9000 (*fax*) (+32) (0)2 404 9395	**Denmark** *(tel)* (+45) 7013 1515 (*alt*) (+45) 7013 7313 (*fax*) (+45) 7013 1555	**Finland** (*tel*) (+358) 10 855 2100 (*fax*) (+358) 10 855 2923
France (*tel*) 0825 010 700* (*alt*) (+33) (0)1 6453 5623 (*fax*) 0825 010 701*	**Germany** (*tel*) 01805 24 6333* (*alt*) 01805 24 6330* (*fax*) 01805 24 6336*	**Ireland** *(tel)* (+353) (0)1 890 924 204 (*alt*) (+353) (0)1 890 924 206 (*fax*)(+353) (0)1 890 924 024	**Israel** *(tel)* (+972) 3 9288 500 (*fax*) (+972) 3 9288 501
Italy (*tel*) (+39) (0)2 9260 8484 (*fax*) (+39) (0)2 9544 1175	**Luxemburg** (*tel*) (+32) (0)2 404 9340 (*alt*) (+32) (0)2 404 9000 (*fax*) (+32) (0)2 404 9395	**Netherlands** (*tel*) (+31) (0)20 547 2111 (*alt*) (+31) (0)20 547 2000 (*fax*) (+31) (0)20 547 2190	**Russia** (*tel*) (+7) 095 797 3963 (*alt*) (+7) 095 797 3900 (*fax*) (+7) 095 797 3901
Spain (*tel*) (+34) 91 631 3300 (*alt*) (+34) 91 631 3000 (*fax*) (+34) 91 631 3301	**Sweden** (*tel*) 0200 88 22 55* (*alt*) (+46) (0)8 5064 8686 (*fax*) 020 120 2266*	**Switzerland (French)** (*tel*) 0800 80 5353 opt. 2* (*alt*) (+33) (0)1 6453 5623 (*fax*) (+41) (0)22 567 5313	**Switzerland (German)** (*tel*) 0800 80 5353 opt. 1* (*alt*) (+49) (0)7031 464 6333 (*fax*) (+41) (0)1 272 7373
Switzerland (Italian) (*tel*) 0800 80 5353 opt. 3* (*alt*) (+39) (0)2 9260 8484 (*fax*) (+41) (0)22 567 5314	**United Kingdom** (*tel*) (+44) (0)7004 666666 (*alt*) (+44) (0)7004 123123 (*fax*) (+44) (0)7004 444555		
(tel) = primary telephone number; *(alt)* = alternate telephone number; *(fax)* = FAX number; * = in country number			