

**Calibration Guide**

# **Model OSL Series**

**Precision Open/Short/Load Calibration Tees**





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产品中有毒有害物质或元素的名称及含量

For Chinese Customers Only YLYB

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 [Cr(VI)]	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷线路板 (PCA)	×	○	×	×	○	○
机壳、支架 (Chassis)	×	○	×	×	○	○
LCD	×	×	×	×	○	○
其他 (电缆、风扇、连接器等) (Appended goods)	×	○	×	×	○	○

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 ×：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。

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注) 电池的环保使用期限是 5 年。生产日期标于产品序号的前四码 (如 S/N 0728XXXX 为 07 年第 28 周生产)。

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## Safety Symbols

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To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Company uses the following symbols to indicate safety-related information. For your own safety, please read the information carefully *before* operating the equipment.

### Symbols Used in Manuals

#### Danger



This indicates a very dangerous procedure that could result in serious injury or death, or loss related to equipment malfunction, if not performed properly.

#### Warning



This indicates a hazardous procedure that could result in light-to-severe injury or loss related to equipment malfunction, if proper precautions are not taken.

#### Caution



This indicates a hazardous procedure that could result in loss related to equipment malfunction if proper precautions are not taken.

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## Safety Symbols Used on Equipment and in Manuals

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions *before* operating the equipment. Some or all of the following five symbols may or may not be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.



This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



This indicates a compulsory safety precaution. The required operation is indicated symbolically in or near the circle.



This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.



This indicates a note. The contents are described in the box.



These indicate that the marked part should be recycled.

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# Chapter 1 — General Information

## 1-1 Introduction

This guide provides performance verification procedures for Anritsu Model OSL Series Open/Short/Load Calibration Tees.

## 1-2 Description

The model OSL Series family consists of the following models:

**Table 1-1.** OSL Series Precision Open/Short/Load Calibration Tees

<b>Anritsu Part Number</b>	<b>Description</b>
OSLN50LF	N male Precision Open/Short/Load, DC to 4 GHz
OSLNF50LF	N female Precision Open/Short/Load, DC to 4 GHz
OSLN50-1	N male Precision Open/Short/Load, DC to 6 GHz
OSLNF50-1	N female Precision Open/Short/Load, DC to 6 GHz
OSLN50	N male Precision Open/Short/Load, DC to 18 GHz
OSLNF50	N female Precision Open/Short/Load, DC to 18 GHz

## 1-3 Recommended Test Equipment

**Table 1-2.** Recommended Test Equipment

<b>Equipment</b>	<b>Critical Specification</b>	<b>Recommended Manufacturer/Model</b>
Vector Network Analyzer	Frequency: 40 MHz to 20 GHz	Anritsu Model 37247D or 37347D
Calibration Kit	Connector Type: N Impedance: 50 Ohm Termination: sliding termination	Anritsu Model SC6650
Adapter	Connector: N(m) to K(f)	Anritsu Model 34NKF50
Adapter	Connector: N(f) to K(f)	Anritsu Model 34NFKF50
Digital Multi-meter		Agilent Model 34401A

# Chapter 2 — Performance Verification

## 2-1 Introduction

This chapter contains tests that can be used to verify the performance of the OSL Series Open/Short/Load Calibration Tees.

The tests include:

- Return Loss Verification
- Open and Short 180° Phase Shift Verification
- Precision Load DC Resistance Verification

The Load is verified by measuring the return loss after calibration on the VNA.

The Open and Short 180° phase shift is verified by measuring the phase with a VNA.

## 2-2 Specifications

Refer to [Table 2-1](#) for the OSL series specifications.

**Table 2-1.** OSL Series Specifications

Specification	Anritsu Part Number		
	OSLN50LF OSLNF50LF	OSLN50-1 OSLNF50-1	OSLN50 OSLNF50
Frequency Range	DC to 4 GHz	DC to 6 GHz	DC to 18 GHz
Load DC Resistance	$50 \pm 0.25$ Ohm	$50 \pm 0.25$ Ohm	$50 \pm 0.15$ Ohm
Return Loss	42 dB	42 dB	42 dB: DC to 5 GHz 36 dB: 5 to 15 GHz 32dB: 15 to 18 GHz
Open and Short Phase Shift	$180^\circ \pm 6^\circ$	$180^\circ \pm 10^\circ$	$180^\circ \pm 20^\circ$

## 2-3 Verification Procedures

This section details VNA calibration and:

- [“Return Loss Verification Procedures” on page 2-5](#)
- [“Open and Short 180° Phase Shift Verification” on page 2-6](#)
- [“Precision Load DC Resistance Verification” on page 2-7](#)

### Equipment Required

- Anritsu Model 37247D or 37347D Vector Network Analyzer
- Anritsu Model SC6650 N Connector Calibration Kit
- Anritsu Model 34NKF50 or 34NFKF50 Adapter

## VNA Calibration Procedure

1. Allow the VNA to warm up for a minimum of 1 hour.
2. Install an appropriate adapter to the VNA Port 1 so the test port has a connector that can mate to the OSL Series Open/Short/Load Calibration Tee. For example, install a 34NFKF50 adapter to VNA Port 1 when testing a male Open/Short/Load Calibration Tee.
3. Insert the Calibration Component Coefficients disk of the SC6650 into the VNA floppy drive.
4. Load the Cal Kit Coefficients disk into the VNA:
  - a. Press the **Utility Menu** key
  - b. Cal Component Utilities
  - c. Install the information from the floppy disk.
5. Press the **Default Program** key to reset the VNA.
6. Press the **BeginCal** key then set the calibration as follows:
  - a. CAL METHOD: SOLT
  - b. TRANSMISSION LINE TYPE: COAXIAL
  - c. CALIBRATION TYPE: REFLECTION ONLY
  - d. PORT 1 ONLY (S11)
  - e. CALIBRATION DATA POINTS: NORMAL (1601 points maximum)
  - f. START frequency: 40 MHz
  - g. STOP frequency:  
4 GHz for OSLN50LF or OSLNF50LF;  
6 GHz for OSLN50-1 or OSLNF50-1;  
18 GHz for OSLN50 or OSLNF50
  - h. MAXIMUM NUMBER OF DATA POINTS: 401
  - i. PORT 1 CONN:  
N (F) for OSLN50LF, OSLN50-1 or OSLN50  
N (M) for OSLNF50LF, OSLNF50-1 or OSLNF50
  - j. LOAD TYPE: SLIDING
7. Select START CAL and follow the on screen prompt and connect the appropriate calibration standard(s) to complete the calibration.

## Return Loss Verification Procedures

1. Connect the LOAD of the DUT Calibration Tee to the adapter on VNA Port 1.
2. Set the VNA as follows:
  - a. Channel Menu: SINGLE CHANNEL
  - b. CH1
  - c. S-parameter: S11
  - d. GRAPH TYPE: LOG MAGNITUDE
  - e. Auto Scale
  - f. Marker Menu: MARKER 1 ON, DISPLAY MARKERS ON
  - g. Readout Marker: MARKER TO MAX
  - h. The MARKER 1 will display the highest point (worst case in return loss) in frequency and a negative number in dB (for example,  $-43.123$  dB at 3 GHz).
  - i. Record the absolute value of MARKER 1 as return loss (for example, 43.123 dB).
  - j. The Return Loss spec is 42 dB. The worst case:  
| Marker 1 Readout in dB |  
must be  $> 42$  dB to pass this test.
  - k. For OSLN50 and OSLNF50, the return loss is specified for 3 frequency bands. The rotary knob should be used to move the Marker 1 to read out the worst case return loss in each band.

## Open and Short 180° Phase Shift Verification

1. Set the VNA as follows:
  - a. Channel Menu: Single channel
  - b. Ch 1
  - c. S-parameter: S11
  - d. Graph type: Phase
  - e. Set Scale: resolution 10°/div, reference value 180°; phase shift 10°
  - f. Limits:  
upper 174°, lower 186°; for OSLN50LF and OSLNF50LF  
upper 170°, lower 190°; for OSLN50-1 and OSLNF50-1  
upper 160°, lower 200°; for OSLN50 or OSLNF50  
display limits ON
2. Connect the SHORT of the DUT Calibration Tee to the adapter on VNA Port 1.
3. Make following selection on the VNA:
  - a. Ch 1
  - b. Trace Memory
  - c. VIEW DATA
  - d. STORE DATA TO MEMORY
  - e. VIEW DATA (/) BY MEMORY
4. Remove the SHORT and connect the OPEN of the same DUT Calibration Tee to the adapter on VNA Port 1.
5. The displayed trace must be within the limit lines to pass the specification. The actual value can be verified using markers.



## Precision Load DC Resistance Verification

### Equipment Required

- Agilent Model 34401A Multi-meter

### Procedure

Use an Ohmmeter to measure the DC resistance between the outer conductor and center conductor of the Precision Load and verify that it is within specification (refer to [Table 2-1, “OSL Series Specifications”](#)).





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