

**Calibration Guide**

# **Model SM/PL Series**

**Precision Loads**





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## Chinese RoHS Compliance Statement

产品中有毒有害物质或元素的名称及含量

For Chinese Customers Only NLNB

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)	×	○	×	×	○	○
其他 (电缆、风扇、连接器等) (Appended goods)	×	○	×	×	○	○

○：表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。  
 ×：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) 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.

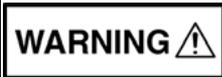
### Symbols Used in Manuals

#### 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.

# Table of Contents

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## Chapter 1—General Information

- 1-1 Introduction . . . . . 1-1
- 1-2 Description . . . . . 1-1
- 1-3 Recommended Test Equipment . . . . . 1-2

## Chapter 2—Performance Verification

- 2-1 Introduction . . . . . 2-1
- 2-2 Specifications . . . . . 2-1
- 2-3 Verification Procedures . . . . . 2-2
  - VNA Calibration Procedure . . . . . 2-3
  - Return Loss Verification Procedure . . . . . 2-4
  - DC Resistance Verification Procedure . . . . . 2-4



# Chapter 1 — General Information

## 1-1 Introduction

This guide provides performance verification procedures for Anritsu Model SM/PL, SM/PLNF, SM/PL-1 and SM/PLNF-1 Precision Loads.

## 1-2 Description

The SM/PL Series consists of the following models:

**Table 1-1.** SM/PL Series Precision Loads

<b>Anritsu Part Number</b>	<b>Description</b>
SM/PL	N male Precision Load, DC to 4 GHz
SM/PLNF	N female Precision Load, DC to 4 GHz
SM/PL-1	N male Precision Load, DC to 6 GHz
SM/PLNF-1	N female Precision Load, DC to 6 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 (Sliding Loads included)	Anritsu Model SC6650
Adapter	Connector Type: K female to N male	Anritsu Model 34NKF50
Adapter	Connector Type: K female to N female	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 SM/PL, SMPLNF, SM/PL-1 and SM/PLNF-1 Precision Loads.

The tests include:

- Return Loss Verification
- Precision Load DC Resistance Test

## 2-2 Specifications

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

**Table 2-1.** SM/PL Series Specifications

Specification	Anritsu Part Number	
	SM/PL SM/PLNF	SM/PL-1 SM/PLNF-1
Frequency Range	DC to 4 GHz	DC to 6 GHz
DC Resistance	50 ± 0.25 Ohm	50 ± 0.25 Ohm
Return Loss	42 dB	42 dB

## 2-3 Verification Procedures

This section details VNA calibration and:

- [“Return Loss Verification Procedure” on page 2-4](#)
- [“DC Resistance Verification Procedure” on page 2-4](#)

### 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 Precision Load. For example, install a 34NFKF50 to test an SM/PL or install a 34NKF50 to test an SM/PLNF load.
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 and 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 SM/PL and SM/PLNF
    - 6 GHz for SM/PL-1 and SM/PLNF-1.
  - h. MAXIMUM NUMBER OF DATA POINTS: 401
  - i. PORT 1 CONN:
    - N (F) for SM/PL and SM/PL-1
    - N (M) for SM/PLNF and SM/PLNF-1
  - 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 Procedure

1. Connect the DUT Precision Load to the adapter on VNA Port 1.
2. Set the VNA as follows:
  - a. Channel Menu: SINGLE CHANNEL, CH1
  - b. S-parameter: S11
  - c. GRAPH TYPE: LOG MAGNITUDE
  - d. SCALE: use AUTOSCALE
  - e. Marker Menu: MARKER 1 ON, DISPLAY MARKERS ON
  - f. Readout Marker: MARKER TO MAX.
  - g. 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).
  - h. Record the absolute value of MARKER 1 as return loss (for example, 43.123 dB).
  - i. The Return Loss spec is 42 dB. The worst case:  
| Marker 1 Readout in dB |  
must be > 42 dB to pass this test

## DC Resistance Verification Procedure

### 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, "SM/PL Series Specifications"](#)).



# Anritsu

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