Agilent U2761A USB Modular Function/Arbitrary Waveform Generator

Service Guide

Agilent Technologies

Notices

Manual Part Number

U2761-90010

Edition

First Edition, April 30, 2008

Agilent Technologies, Inc.
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Santa Clara, CA 95052 USA

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Safety Notices

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.

Safety Symbols

The following symbols on the instrument and in the documentation indicate precautions which must be taken to maintain safe operation of the instrument.

	Direct current (DC)		Equipment protected throughout by double insulation or reinforced insulation
	Alternating current (AC)		Off (supply)
	Both direct and alternating current		On (supply)
	Three-phase alternating current		Caution, risk of eletric shock
	Earth (ground) terminal		Caution, risk of danger (refer to this manual for specific Warning or Caution information)
	Protective conductor terminal		Caution, hot surface
	Frame or chassis terminal		Out position of a bi-stable push control
	Equipotentiality		In position of a bi-stable push control

General Safety Information

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the instrument. Agilent Technologies Inc. assumes no liability for the customer's failure to comply with these requirements.

WARNING

- **Do not operate the product in an explosive atmosphere or in the presence of flammable gases or fumes.**
- **Do not use the equipment if it does not operate properly. Have the equipment inspected by qualified service personnal.**

CAUTION

- Observe all markings on the instrument before connecting any wiring to the instrument.
- Use the device with the cables provided.
- Repair or service that is not covered in this manual should only be performed by qualified personnels.

Environment Conditions

This instrument is designed for indoor use and in the area with low condensation. The table below shows the general environmental requirements for this instrument.

Environment conditions	Requirements
Operating temperature	0 °C to 50 °C
Operating humidity	20 to 85% RH noncondensing
Storage temperature	–20 °C to 70 °C
Storage humidity	5 to 90% RH noncondensing

CAUTION

The U2761A USB modular function/arbitrary waveform generator complies with the following safety and EMC requirements.

- IEC 61010-1:2001/EN61010-1:2001 (2nd Edition)
- Canada: CAN/CSA-C22.2 No. 61010-1-04
- IEC 61326-2002/EN 61326:1997+A1:1998+A2:2001+A3:2003
- Canada: ICES-001:2004
- Australia/New Zealand: AS/NZS CISPR11:2004
- USA: ANSI/UL 61010-1:2004

Regulatory Markings

CE ISM 1-A	The CE mark is a registered trademark of the European Community.This CE mark shows that the product complies with all the relevant European Legal Directives.	N10149	The C-tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australia EMC Framework regulations under the terms of the Radio Communication Act of 1992.
ICES/NMB-001	ICES/NMB-001 indicates that this ISM device complies with Canadian ICES-001. Cet appareil ISM est confomre a la norme NMB-001 du Canada.		This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical/electronic product in domestic household waste.
C SA US	The CSA mark is a registered trademark of the Canadian Standards Association.		

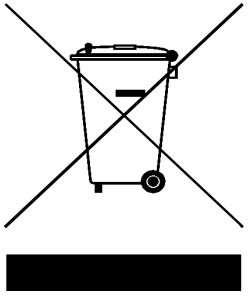
Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC

This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical/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 shown as below:



Do not dispose in domestic household waste

To return this unwanted instrument, contact your nearest Agilent office, or visit:

www.agilent.com/environment/product

for more information.

Agilent Technologies	**DECLARATION OF CONFORMITY** According to EN ISO/IEC 17050-1:2004	CE

Manufacturer's Name: Agilent Technologies Microwave Products (M) Sdn. Bhd
Manufacturer's Address: Bayan Lepas Free Industrial Zone,
11900, Bayan Lepas, Penang, Malaysia

Declares under sole responsibility that the product as originally delivered

Product Name: Agilent USB Modular Function Generator
Models Number: U2761A
Product Options: This declaration covers all options of the above product(s)

complies with the essential requirements of the following applicable European Directives, and carries the CE marking accordingly:

Low Voltage Directive (2006/95/EC)
EMC Directive (2004/108/EC)

and conforms with the following product standards:

EMC

Standard	Limit
IEC 61326:2002 / EN 61326:1997+A1:1998+A2:2001+A3:2003	
CISPR 11:1990 / EN55011:1990	Class A Group 1
IEC 61000-4-2:1995 / EN 61000-4-2:1995	4 kV CD, 8 kV AD
IEC 61000-4-3:1995 / EN 61000-4-3:1996	3 V/m, 80-1000 MHz
IEC 61000-4-4:1995 / EN 61000-4-4:1995	0.5 kV signal lines, 1 kV power lines
IEC 61000-4-5:1995 / EN 61000-4-5:1995	0.5 kV line-line, 1 kV line-ground
IEC 61000-4-6:1996 / EN 61000-4-6:1996	3 V, 0.15-80 MHz
IEC 61000-4-11:1994 / EN 61000-4-11:1994	1 cycle / 100%

Canada: ICES-001:2004
Australia/New Zealand: AS/NZS CISPR11:2004

The product was tested in a typical configuration with Agilent Technologies test systems.

Safety IEC 61010-1:2001 / EN 61010-1:2001
Canada: CAN/CSA-C22.2 No. 61010-1-04
USA: ANSI/UL 61010-1:2004

C US
206349

This DoC applies to above-listed products placed on the EU market after:

08-Jan-2008
Date

Tay Eng Su
Quality Manager

For further information, please contact your local Agilent Technologies sales office, agent or distributor, or Agilent Technologies Deutschland GmbH, Herrenberger Straße 130, 71034 Böblingen, Germany.

Template: A5971-5302-2, Rev. E U2761A DoC Revision 1.0

Product Regulations

EMC

	Performance Criteria
IEC 61326-1:2002 / EN 61326-1:1997+A1:1998+A2:2001+A3:2003	
CISPR 11:1990 / EN 55011:1990 – Group 1 Class A	
IEC 61000-4-2:1995 / EN 61000-4-2:1995 (ESD 4kV CD, 8kV AD)	A
IEC 61000-4-3:1995 / EN 61000-4-3:1996 (3V/m, 80% AM)	A
IEC 61000-4-4:1995 / EN 61000-4-4:1995 (EFT 0.5kV line-line, 1kV line-earth)	B
IEC 61000-4-5:1995 / EN 61000-4-5:1995 (Surge 0.5kV line-line, 1kV line-earth)	A
IEC 61000-4-6:1996 / EN 61000-4-6:1996 (3V, 0.15~80 MHz, 80% AM, power line)	A
IEC 61000-4-11:1994 / EN 61000-4-11:1994 (Dips 1 cycle, 100%)	A
Canada: ICES-001:2004	
Australia/New Zealand: AS/NZS CISPR11:2004	

Safety IEC 61010-1:2001 / EN 61010-1:2001
Canada: CAN/CSA-C22.2 No. 61010-1-04
USA: ANSI/UL 61010-1:2004

Additional Information:
The product herewith complies with the essential requirements of the Low Voltage Directive 2006/95/EC and the EMC Directive 2004/108/EC and carries the CE Marking accordingly (European Union).

[1]Performance Criteria:
A Pass - Normal operation, no effect.
B Pass - Temporary degradation, self recoverable.
C Pass - Temporary degradation, operator intervention required.
D Fail - Not recoverable, component damage.
N/A – Not applicable

Notes:

Regulatory Information for Canada
ICES/NMB-001:2004
This ISM device complies with Canadian ICES-001.
Cet appareil ISM est confomre à la norme NMB-001 du Canada.

Regulatory Information for Australia/New Zealand
This ISM device complies with Australian/New Zealand AS/NZS CISPR11:2004
N10149

In This Guide...

1 Characteristics and Specifications

The characteristics and specifications of the U2761A are listed in this chapter.

2 Getting Started

In this chapter, you will learn about the the self-test procedure for the U2761A. The information for returning the U2761A for calibration or servicing is also provided.

3 Calibration

This chapter describes the performance verification and calibration procedures for the U2761A.

4 Disassembly

The disassembly procedure for the U2761A is discussed in this chapter.

5 Troubleshooting

This chapter provides the general troubleshooting tips for the U2761A.

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1 Characteristics and Specifications

This chapter specifies the characteristics, environmental conditions, and specifications of the U2761A.

Product Characteristics

REMOTE INTERFACE
- Hi-Speed USB 2.0
- USBTMC 488.2 Class device

POWER CONSUMPTION
- +12 VDC, 1.2 A
- Isolated ELV power source

OPERATING ENVIRONMENT
- Operating temperature from 0 °C to 50 °C
- Operating humidity at 20% to 85% RH (noncondensing)
- Altitude up to 2000 meters
- Pollution Degree 2
- For indoor use only

STORAGE COMPLIANCE
- Storage temperature from –20 °C to 70 °C
- Storage humidity at 5% to 90% RH (noncondensing)

SAFETY COMPLIANCE

Certified with:
- IEC 61010-1:2001/EN61010-1:2001 (2nd Edition)
- Canada: CAN/CSA-C22.2 No. 61010-1-04
- USA: ANSI/UL 61010-1:2004

EMC COMPLIANCE
- IEC 61326-2002/EN 61326:1997+A1:1998+A2:2001+A3:2003
- Canada: ICES-001:2004
- Australia/New Zealand: AS/NZS CISPR11:2004

SHOCK & VIBRATION

Tested to IEC/EN 60068-2

IO CONNECTOR

BNC connector

DIMENSION (W×D×H)
- 117.00 mm × 180.00 mm × 41.00 mm (with bumpers)
- 105.00 mm × 175.00 mm × 25.00 mm (without bumpers)

WEIGHT
- 528 g (with bumpers)
- 476 g (without bumpers)

WARRANTY

One year

Product Specifications and Characteristics

WAVEFORMS	
Standard	Sine, Square, Ramp, Triangle, Pulse, DC
Built-in arbitrary	Exponential Rise, Exponential Fall, Negative Ramp

WAVEFORM CHARACTERISTICS			
Sine			
Frequency range	1 μHz to 20 MHz (1 μHz resolution)		
Amplitude flatness [1] (relative to 1 kHz)	<100 kHz	0.2 dB	
	100 kHz to 1 MHz	0.35 dB	
	1 MHz to 20 MHz	0.7 dB	
Harmonic distortion [2]	Frequency range	<1 Vpp	≥1 Vpp
	DC to 20 kHz	–70 dBc	–60 dBc
	20 kHz to 100 kHz	–65 dBc	–60 dBc
	100 kHz to 1 MHz	–50 dBc	–45 dBc
	1 MHz to 20 MHz	–40 dBc	–35 dBc
Total harmonic distortion [2]	DC to 20 kHz	0.10%	
Spurious (Nonharmonic) output [3]	DC to 1 MHz	–65 dBc	
	1 MHz to 20 MHz	–65 dBc + 6 dB/octave	
Phase noise (10 kHz offset)	–115 dBc/Hz (Typical)		
Square			
Frequency range	1 μHz to 20 MHz (1 μHz resolution)		
Rise/fall time	<18 ns, 10 to 90% terminated load (50 Ω)		
Overshoot	<2%		
Variable duty cycle	20% to 80% (up to 10 MHz) 40% to 60% (up to 20 MHz)		
Asymmetry (@ 50% duty)	1% of period + 5 ns		
Jitter (RMS)	>50 kHz = 1 ns + 100 ppm of period ≤50 kHz = 10 ns + 100 ppm of period		

Ramp, Triangle	
Frequency range	1 μHz to 200 kHz (1 μHz resolution)
Linearity	<0.2% of peak output
Programmable symmetry	0% to 100%
Pulse	
Frequency range	500 μHz to 5 MHz (1 μHz resolution)
Pulse width (period ≤ 10 s)	40 ns minimum, 10 ns resolution
Overshoot	<3%
Jitter (RMS)	300 ps + 0.1 ppm of period
Arbitrary	
Frequency range	1 μHz to 200 kHz (1 μHz resolution)
Memory depth	64 kSa
Amplitude resolution	14 bits/sample (including sign)
Sampling rate	50 MSa/s
Minimum rise/fall time	35 ns, typical
Linearity	<0.2% of peak output
Settling time	<250 ns to 0.5% of final value
Jitter (RMS)	10 ns + 30 ppm

COMMON CHARACTERISTICS	
Amplitude	
Range	40 mVpp to 5 Vpp (Into 50 Ω load) 80 mVpp to 10 Vpp (Into open circuit)
Accuracy [1] (across 50 Ω load at 1 kHz)	±1% of settling ±5 mV (±10 mV @ Hi-Z)
Units	Vpp, Vrms, dBm
Resolution	4 digits
DC offset	
Range (peak AC + DC)	±2.5 V (Into 50 Ω load) ±5 V (Into open circuit)
Accuracy [1] (across 50 Ω load)	±2% of offset setting ±1% of amplitude setting ±5 mV (±10 mV @ Hi-Z)
Amplitude limit	Amplitude + Offset limit to within ±2.5 V range across 50 Ω load or ±5 V across open circuit
Main output	
Impedance	50 Ω load (Typical)
Isolation	At least 42 Vpk to earth
Protection	Short-circuit protected, overload automatically disables main output
Internal frequency reference	
Accuracy [4]	±8 ppm in 1 year
External frequency reference	
Input lock range	10 MHz ± 170 Hz
Input amplitude level	500 mVpp to 5 Vpp
Impedance	50 Ω AC coupled
Lock time	<2 s
Output frequency	10 MHz
Output amplitude level	632 mVpp, typical
Impedance	Return loss 10 dB typical at 10 MHz
Phase offset Range Resolution Accuracy	 +360 ° to –360 ° 0.01 ° 20 ns

MODULATION	
AM	
Carrier waveforms	Sine, Square, Ramp, Arbitrary
Source	Internal
Internal modulation	Sine, Square, Ramp, Arbitrary (2 mHz to 20 kHz)
Depth	0.0% to 100.0%
FM	
Carrier waveforms	Sine, Square, Ramp, Arbitrary
Source	Internal
Internal modulation	Sine, Square, Ramp, Arbitrary (2 mHz to 20 kHz)
Deviation	1 Hz to 500 kHz
PM	
Carrier waveforms	Sine, Square, Ramp, Arbitrary
Source	Internal
Internal modulation	Sine, Square, Ramp, Arbitrary (2 mHz to 20 kHz)
Deviation	0.0 to 360.0 °
FSK	
Carrier waveforms	Sine, Square, Ramp, Arbitrary
Source	Internal
Internal modulation	50% duty cycle square (2 mHz to 100 kHz)
PSK	
Carrier waveforms	Sine, Square, Ramp, Arbitrary
Source	Internal
Internal modulation	50% duty cycle square (2 mHz to 100 kHz)
Deviation	0.0 to 360.0 °
ASK	
Carrier waveforms	Sine, Square, Ramp, Arbitrary
Source	Internal
Internal modulation	50% duty cycle square (2 mHz to 100 kHz)

SWEEP CHARACTERISTICS	
Waveforms	Sine, Square, Ramp, Arbitrary
Type	Linear or Logarithmic
Direction	Up or Down
Sweep time	1 ms to 500 s
Trigger	Single, External, or Internal

TRIGGER CHARACTERISTICS	
Trigger input	
Input level	TTL compatible
Slope	Rising or Falling, Selectable
Pulse width	>100 ns
Input impedance	>10 kΩ, DC coupled
Latency	<500 ns
Jitter (RMS)	6 ns (3.5 ns for Pulse)
Trigger output	
Input level	TTL compatible into ≥1 kΩ
Pulse width	>400 ns
Output impedance	50 Ω, typical
Fanout	4 TTL
Rise time	≤20 ns

1 Add 1/10th of output amplitude and offset specification per °C for operation outside the range of 18 °C to 28 °C.

2 DC offset set to 0 V.

3 Spurious output at low amplitude is –70 dBm, typical.

4 Add 1 ppm/°C (average) for operation outside the range of 18 °C to 28 °C.

1 Characteristics and Specifications

2 Getting Started

This chapter provides the self-test procedure for the U2761A USB modular function generator. It also provides the information for returning your U2761A to Agilent for calibration or servicing.

If you have a defective module, you can return it to Agilent for repair or replacement.

Introduction

Self-Test

A brief power-on self-test occurs automatically whenever the U2761A is turned on. This limited test assures that the instrument is capable of operation. To perform a complete self-test, send the following SCPI command to the U2761A.

```
*TST?
```

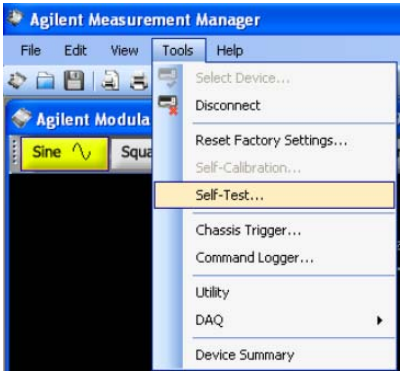
The U2761A will automatically perform the complete self-test procedure when the SCPI command is sent. The self-test will be completed in a few seconds.

- If the self-test is successful, a zero (0) is returned.
- If the self-test fails, an error number is returned.

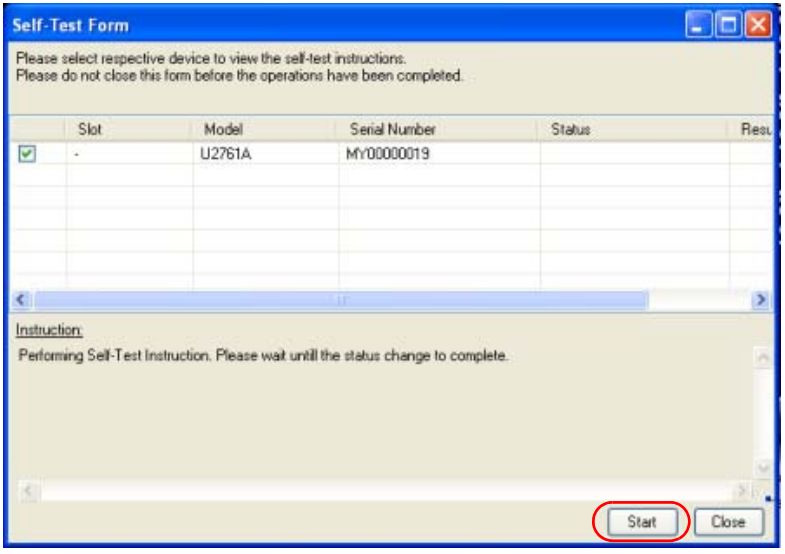
Agilent Measurement Manager

To start the self-test procedure using the Agilent Measurement Manager, perform the following test.

1 Click **Tools > Self-Test**.



2 Click **Start** on the Self-Test form.



3 Click **OK** to continue when the message box appears.

4 Wait for a few minutes for the self-test to complete.

5 The result is displayed on the form once the self-test has completed.

Agilent Technologies Calibration Services

When your U2761A is due for calibration, contact your local Agilent Service Center for a low-cost recalibration. The U2761A is supported on automated calibration systems, which allows Agilent to provide this service at a competitive price.

Calibration Interval

The U2761A should be verified and calibrated on a regular interval based on the measurement accuracy requirements of your application. A one-year interval is adequate for most applications. Accuracy specifications are warranted only if adjustments are made at regular verification and calibration intervals.

Types of Service Available

If your U2761A fails during the warranty period, Agilent will repair or replace it under the terms of your warranty. After your warranty expires, Agilent offers repair services at competitive prices.

Extended Service Contracts

Most Agilent products are provided with optional service contracts that extend the coverage period after the standard warranty expires. If you have this service contract and your U2761A happens to fail during the coverage period, Agilent will repair or replace it according to the contract.

Obtaining Repair Service (Worldwide)

To obtain service for your U2761A (in-warranty, under service contract, or post-warranty), contact your nearest Agilent Service Center. They will arrange to have your unit repaired or replaced, and are able to provide warranty or repair cost information where applicable.

To obtain warranty, service, or technical support information you can contact Agilent at one of the following telephone numbers.

In the United States: 800 829 4444

In Europe: 31 20 547 2111

In Japan: (81) 426 56 7832

You can also use our Web link for the information on contacting Agilent worldwide:

www.agilent.com/find/assist

Or contact your Agilent representative.

Before shipping your U2761A, ensure that you acquire shipping instructions, including the components to be shipped, from the Agilent Service Center. Agilent recommends that you retain the original shipping carton for use in such shipments.

Repackaging for Shipment

If the U2761A is to be shipped to Agilent for service or repair, make sure that you do the following.

- Attach a tag to the U2761A identifying the owner and indicating the required service or repair. Include the model number and full serial number.
- Place the U2761A in its original container with appropriate packaging material for shipping.
- Secure the container with strong tape or metal bands.
- If the original shipping container is not available, place your U2761A in a container with at least four inches of compressible packaging material around all sides of the U2761A. Use static-free packaging materials to avoid additional damage to your U2761A.

NOTE Agilent suggests that you always insure your shipments.

Cleaning

Clean the outer area of the U2761A with a soft, lint-free, and slightly dampened cloth. Do not use detergent. Disassembly is not required for cleaning.

3 Calibration

The verification and calibration procedures described in this chapter verify that the U2761A is operating normally and is within its warranted specifications.

Introduction

If the U2761A fails any of the tests or if any abnormal test results are obtained, return the unit to the Agilent Service Center for readjustment.

Recommended Test Equipment

The recommended test equipment for the verification and calibration procedures are listed in the table below.

Table 3-1 Recommended test equipment

Instrument	Minimum requirement		Recommended model	Purpose
Digital multimeter (DMM)	AC volts	• True rms • AC coupled • Accuracy: ±0.02% to 1 MHz	Agilent 3458A	Measures voltage. Used in multiple procedures
	DC volts	• Accuracy: 50 ppm • Resolution: 100 μV		
	Resistance	• 4-wire measurement • Offset compensated • Accuracy: ±0.1 Ω		
Power meter	• 100 kHz to 100 MHz • 1 μW to 100 mW (–30 dBm to +20 dBm) • Accuracy: 0.02 dB • Resolution: 0.01 dB		Agilent E4418B	Measures voltage. Used in multiple procedures
Power sensor	• 100 kHz to 100 MHz • 1 μW to 100 mW (–30 dBm to +20 dBm)		Agilent 8482A	Measure voltages. Used in multiple procedures
Frequency counter	• Accuracy: 0.1 ppm		Agilent 53131A Opt 010	Checks timebase parameter
Oscilloscope	• 500 MHz • 2 GSa/s • 50 Ω input termination		Agilent DS08064A	Checks output signal
Spectrum analyzer	• 10 kHz to 1 GHz • Average Continuous Power: +25 dBm • Amplitude Accuracy: ±0.5 dB • Input Impedance: 50 Ω		Agilent E4443A	Checks output signal
Cable and adaptor	• 50 Ω BNC (male to male) cable • BNC (female) to dual banana • BNC (female) to N type (male) • BNC (female) to N type (female)		–	Signal interconnected

Test Consideration

For optimum performance, all procedures should comply with the following recommendations.

- Ensure that the calibration ambient temperature is stable and between 23 °C ± 3 °C.
- The ambient relative humidity must be less than 80%.
- Allow a one-hour warm-up period before verification or adjustment.
- Keep the measurement cables as short as possible and consistent with the impedance requirement.
- Use RG-58 or equivalent 50 Ω cable.

Performance Verification Procedures

It is recommended to carry out performance verification tests when you first receive the U2761A. The performance verification test results should be compared to the specifications of the U2761A. You should repeat the performance verification tests at every calibration interval.

If the U2761A fails the performance verification tests, adjustment or repair is required. Some of the specifications are adjustable, or otherwise replacement of parts may be required.

Internal Timebase Verification

This test verifies the accuracy of the output frequency of the U2761A. All output frequencies are derived from a single generated frequency.

1 Connect the U2761A to a frequency counter as shown in the following figure. The input termination of the frequency counter must be 50 Ω.

Figure 3-1 U2761A to frequency counter connection

2 Set the U2761A to the output shown in the table below and measure the output frequency. Make sure that the U2761A output is enabled.

Table 3-2 Configuration for timebase verification

U2761A			Measurement	
Function	**Amplitude**	**Frequency**	**Nominal**	**Error[1]**
Sine	1.00 Vpp	10.0000 MHz	10.0000 MHz	±80 Hz

1 Based upon ±8 ppm for one year.

3 Compare the measured frequency with the test limit shown in Table 3-2.

DC Offset (High-Z) Verification

This procedure verifies the accuracy of the DC offset with high impedance load (DMM input impedance of 10 MΩ).

1 Set the DMM to measure DC voltage. Connect the DMM to the U2761A as shown in the following figure. The DMM input impedance must be set to 10 MΩ.

Figure 3-2 U2761A to DMM connection

2 Set the U2761A based on the following.

- Load impedance: High-Z
- Function: DC

3 Set the U2761A to each output listed in the table below.

Table 3-3 Configuration for DC offset verification

U2761A	Measurement	
DC offset	**Nominal**	**Error[1]**
–4.750 VDC	–4.750 VDC	±105 mVDC
–2.250 VDC	–2.250 VDC	±55 mVDC
0.000 VDC	0.000 VDC	±10 mVDC
+2.250 VDC	+2.250 VDC	±55 mVDC
+4.750 VDC	+4.750 VDC	±105 mVDC

1 Based upon ±2% of offset setting ±10 mV (High-Z).

4 Compare the measured voltages with the test limits shown in Table 3-3.

AC Amplitude (High-Z) Verification

This procedure verifies the accuracy of the AC output amplitude at frequencies of 1 kHz and 100 kHz, and establishes reference measurement for the higher frequency flatness verification procedures.

1 Set the DMM to measure AC voltage. Connect the DMM to the U2761A as shown in Figure 3-2.

2 Set the U2761A based on the following.

- Load impedance: High-Z
- Offset: 0 V

3 Set the U2761A to each output listed in the table below.

Table 3-4 Configuration for AC amplitude verification

U2761A			Measurement	
Function	**Frequency**	**Amplitude**	**Nominal**	**Error**[1]
Sine	1.00000 kHz	70 mVrms	70 mVrms	±4.236 mVrms
Sine	100.000 kHz	70 mVrms	70 mVrms	±5.146 mVrms
Sine	1.00000 kHz	700 mVrms	700 mVrms	±10.54 mVrms
Sine	100.000 kHz	700 mVrms	700 mVrms	±19.64 mVrms
Sine	1.00000 kHz	3.500 Vrms	3.500 Vrms	±38.54 mVrms
Sine	100.000 kHz	3.500 Vrms	3.500 Vrms	±84.04 mVrms
50% Ramp	1.00000 kHz	50 mVrms	50 mVrms	±3.387 Vrms
50% Ramp	1.00000 kHz	500 mVrms	500 mVrms	±7.887 mVrms
50% Ramp	1.00000 kHz	2.500 Vrms	2.500 Vrms	±27.89 mVrms
50% Square	1.00000 kHz	90 mVrms	90 mVrms	±5.900 mVrms
50% Square	1.00000 kHz	900 mVrms	900 mVrms	±14.00 mVrms
50% Square	1.00000 kHz	4.500 VRms	4.500 Vrms	±50.00 mVrms

1 1 kHz: Based upon ±1% of setting ±5 mVpp (50 Ω) converted to Vrms for High-Z.

100 kHz: Based upon ±0.2 dB (2.3%) of setting ±5 mVpp (50 Ω) converted to Vrms for High-Z.

4 Compare the measured voltage with the test limits shown in above table, and fill in Table 3-5 using the following equation.

$$Offset = 20 \times \log\left(\frac{Vrms_{100kHz}}{Vrms_{1kHz}}\right)$$

Table 3-5 AC amplitude verification worksheet

U2761A			DMM	Calculation
Function	**Frequency**	**Amplitude**	**Measurement**	**Offset**
Sine	1.00000 kHz	70 mVrms	Vrms	Offset $_{-20\ dB}$ = ___ dB
Sine	100.000 kHz	70 mVrms	Vrms	
Sine	1.00000 kHz	700 mVrms	Vrms	Offset $_{0\ dB}$ = ___ dB
Sine	100.000 kHz	700 mVrms	Vrms	
Sine	1.00000 kHz	3.500 Vrms	Vrms	Offset $_{+\ 20\ dB}$ = ___ dB
Sine	100.000 kHz	3.500 Vrms	Vrms	

–20 dB Range AC Flatness Verification

This procedure verifies the high frequency AC amplitude flatness above 100 kHz on the –20 dB attenuator range relative to 1 kHz.

1 Connect the power meter to measure the output amplitude of the U2761A as shown in the figure below.

Figure 3-3 U2761A to power meter connection

2 Set the U2761A based on the following.

- Load impedance: 50 Ω
- Function: Sine wave
- Frequency: 100 kHz
- Amplitude: 35 mVrms (–16.108 dBm)

3 Set the power meter **Filter Mode** to **Manual** and set **Average Length** to **500** to improve measurement stability. Allow a minimum of 30 s between the time of setting the U2761A and collecting the measurement reading.

4 On the power meter, use the **Relative Power** function to set the current reading as the reference value. This allows you to compare future measurement result in dB.

5 Set the power meter **Offset** to the **Offset_20dB** value previously calculated in Table 3-5. The power meter will directly read the flatness error specification to 1 kHz.

6 Set the U2761A to each output listed in Table 3-6. Measure the output amplitude using the power meter (the relative measurement in dB).

7 Compare the measured output with the test limits shown in Table 3-6.

Table 3-6 Configuration for –20 dB range flatness verification

U2761A			Measurement	
Function	**Amplitude**	**Frequency**	**Nominal**	**Error**
Sine	35 mVrms	100.000 kHz	0.000 dB	±0.2 dB
Sine	35 mVrms	160.000 kHz	0.000 dB	±0.35 dB
Sine	35 mVrms	250.000 kHz	0.000 dB	±0.35 dB
Sine	35 mVrms	400.000 kHz	0.000 dB	±0.35 dB
Sine	35 mVrms	630.000 kHz	0.000 dB	±0.35 dB
Sine	35 mVrms	1.00000 MHz	0.000 dB	±0.35 dB
Sine	35 mVrms	1.60000 MHz	0.000 dB	±0.7 dB
Sine	35 mVrms	2.50000 MHz	0.000 dB	±0.7 dB
Sine	35 mVrms	4.00000 MHz	0.000 dB	±0.7 dB
Sine	35 mVrms	6.30000 MHz	0.000 dB	±0.7 dB
Sine	35 mVrms	10.0000 MHz	0.000 dB	±0.7 dB
Sine	35 mVrms	11.5000 MHz	0.000 dB	±0.7 dB
Sine	35 mVrms	13.2000 MHz	0.000 dB	±0.7 dB
Sine	35 mVrms	15.2000 MHz	0.000 dB	±0.7 dB
Sine	35 mVrms	17.4000 MHz	0.000 dB	±0.7 dB
Sine	35 mVrms	20.0000 MHz	0.000 dB	±0.7 dB

0 dB Range AC Flatness Verification

This procedure verifies the high frequency AC amplitude flatness above 100 kHz on the 0 dB range relative to 1 kHz.

1. Connect the power meter to measure the output amplitude of the U2761A as shown in Figure 3-3.
2. Set the U2761A based on the following.

- Load impedance: 50 Ω
- Function: Sine wave
- Frequency: 100 kHz
- Amplitude: 350 mVrms (+3.892 dBm)

3. Set the power meter **Filter Mode** to **Auto** if you have previously set it to **Manual**.
4. On the power meter, use the **Relative Power** function to set the current reading as the reference value. This will allow you to compare future measurement result in dB.
5. Set the power meter **Offset** to **Offset$_{0dB}$** value previously calculated in Table 3-5. The power meter will directly read the flatness error specification relative to 1 kHz.
6. Set the U2761A to each output listed in the Table 3-7. Measure the output amplitude using the power meter (the relative measurement in dB).
7. Compare the measured output with the test limits shown in the Table 3-7.

Table 3-7 Configuration for 0 dB range flatness verification

U2761A			Measurement	
Function	**Amplitude**	**Frequency**	**Nominal**	**Error**
Sine	350 mVrms	100.000 kHz	0.000 dB	±0.2 dB
Sine	350 mVrms	160.000 kHz	0.000 dB	±0.35 dB
Sine	350 mVrms	250.000 kHz	0.000 dB	±0.35 dB
Sine	350 mVrms	400.000 kHz	0.000 dB	±0.35 dB
Sine	350 mVrms	630.000 kHz	0.000 dB	±0.35 dB
Sine	350 mVrms	1.00000 MHz	0.000 dB	±0.35 dB
Sine	350 mVrms	1.60000 MHz	0.000 dB	±0.7 dB
Sine	350 mVrms	2.50000 MHz	0.000 dB	±0.7 dB
Sine	350 mVrms	4.00000 MHz	0.000 dB	±0.7 dB
Sine	350 mVrms	6.30000 MHz	0.000 dB	±0.7 dB
Sine	350 mVrms	10.0000 MHz	0.000 dB	±0.7 dB
Sine	350 mVrms	11.5000 MHz	0.000 dB	±0.7 dB
Sine	350 mVrms	13.2000 MHz	0.000 dB	±0.7 dB
Sine	350 mVrms	15.2000 MHz	0.000 dB	±0.7 dB
Sine	350 mVrms	17.4000 MHz	0.000 dB	±0.7 dB
Sine	350 mVrms	20.0000 MHz	0.000 dB	±0.7 dB

+20 dB Range AC Flatness Verification

This procedure verifies the high frequency AC amplitude flatness above 100 kHz on the +20 dB amplifier range relative to 1 kHz.

1. Connect the power meter and power sensor together to measure the output amplitude of the U2761A as shown in Figure 3-3.
2. Set the U2761A based on the following.

- Load impedance: 50 Ω
- Function: Sine wave
- Frequency: 100 kHz
- Amplitude: 1.750 Vrms (+17.871 dBm)

3. Set the power meter **Filter Mode** to **Auto** if you have previously set it to **Manual**.
4. On the power meter, use the **Relative Power** function to set the current reading as the reference value. This will allow you to compare future measurement result in dB.
5. Set the power meter **Offset** to **Offset$_{+20dB}$** value previously calculated in Table 3-5. The power meter will directly read the flatness error specification relative to 1 kHz.
6. Set the U2761A to each output listed in the Table 3-8. Measure the output amplitude using the power meter (the relative measurement in dB).
7. Compare the measured output with the test limits shown in the Table 3-8.

Table 3-8 Configuration for +20 dB range flatness verification

U2761A			Measurement	
Function	**Amplitude**	**Frequency**	**Nominal**	**Error**
Sine	1.750 Vrms	100.000 kHz	0.000 dB	±0.2 dB
Sine	1.750 Vrms	160.000 kHz	0.000 dB	±0.35 dB
Sine	1.750 Vrms	250.000 kHz	0.000 dB	±0.35 dB
Sine	1.750 Vrms	400.000 kHz	0.000 dB	±0.35 dB
Sine	1.750 Vrms	630.000 kHz	0.000 dB	±0.35 dB
Sine	1.750 Vrms	1.00000 MHz	0.000 dB	±0.35 dB
Sine	1.750 Vrms	1.60000 MHz	0.000 dB	±0.7 dB
Sine	1.750 Vrms	2.50000 MHz	0.000 dB	±0.7 dB
Sine	1.750 Vrms	4.00000 MHz	0.000 dB	±0.7 dB
Sine	1.750 Vrms	6.30000 MHz	0.000 dB	±0.7 dB
Sine	1.750 Vrms	10.0000 MHz	0.000 dB	±0.7 dB
Sine	1.750 Vrms	11.5000 MHz	0.000 dB	±0.7 dB
Sine	1.750 Vrms	13.2000 MHz	0.000 dB	±0.7 dB
Sine	1.750 Vrms	15.2000 MHz	0.000 dB	±0.7 dB
Sine	1.750 Vrms	17.4000 MHz	0.000 dB	±0.7 dB
Sine	1.750 Vrms	20.0000 MHz	0.000 dB	±0.7 dB

Calibration Procedure

Calibration is necessary when the one-year calibration interval has expired, or whenever the U2761A fails any verification test. To enter the calibration mode, send the following SCPI command to the U2761A.

```
CALibration:SECure:STATe OFF,U2761A
```

Once the calibration state is unsecured, the U2761A is now in the calibration mode and setup is 0 by default. All the calibration setup is predetermined and transparent to the user. The user is free to perform a full calibration setup from 1 to 115, or may choose to perform only a particular group. To perform a particular calibration setup, send the following SCPI command to U2761A.

```
CALibration:SETup<1|2|3|...|115>
```

The current calibration setup can be queried using the following SCPI command when necessary.

```
CALibration:SETup?
```

The U2761A will output a predefined waveform at the output terminal according to the setup number entered. Perform the measurements as described in "Timebase Adjustment" on page 30 until "+20 dB Range Flatness Adjustment" on page 40, and enter the measured values to the U2761A using the SCPI commands as follows.

```
CALibration:VALue <value>
```

The calibration value must be entered at the magnitude of the units shown in the configuration tables accordingly. If the user accidentally enters a wrong value, simply reenter a correct value under the same calibration setup. Proceed to the next calibration setup by entering a new setup number once the calibration value is entered.

Please note that the calibration constant will only be stored after the user completes the subsequent calibration setup in each group within a single calibration mode login. To exit the calibration mode, send the following SCPI command to the U2761A.

```
CALibration:SECure:STATe ON,U2761A
```

Timebase Adjustment

The U2761A relies on a TCVCXO to generate the precision clock to drive the DDS architecture. This procedure determines the suitable control voltage for the TCVCXO to output the correct frequency. This procedure implements a three-time approach to obtain the best possible control voltage.

1. Set the frequency counter to measure frequency. The frequency counter resolution must be higher than 0.1 ppm (eight digits or more).
2. Set the frequency counter input termination to 50 Ω. If your frequency counter does not have a 50 Ω input termination, you must provide an external termination.
3. Connect the frequency counter as shown in Figure 3-1. Use the frequency counter to measure the output frequency for each setup shown in the table below.
4. Enter the measured value to the U2761A as described in "Calibration Procedure" on page 29.

Table 3-9 Timebase adjustment configuration

U2761A			Frequency counter		
Setup	**Frequency**	**Amplitude**	**Lower margin**	**Measurement**	**Upper margin**
1	<10 MHz	1 Vpp	9.999000 MHz	MHz	9.999800 MHz
2	>10 MHz	1 Vpp	10.000200 MHz	MHz	10.001000 MHz
3	≈10 MHz	1 Vpp	9.999900 MHz	MHz	10.000100 MHz
4[1]	=10 MHz	1 Vpp	9.999990 MHz	MHz	10.000010 MHz

1 Calibration constant is stored after completing this setup.

5 Proceed to output impedance adjustment or exit the calibration mode when necessary.

Output Impedance Adjustment

The U2761A stores the calibration constant for output impedance. The output impedance measurement is necessary to calculate the correct output amplitude when the load impedance is not at High-Z termination. The output impedance is measured at three different output paths.

1 Set the DMM to measure offset-compensated, four-wire ohms. Set the DMM to use 100 NPLC integration. Connect the DMM to the U2761A as shown in the figure below.

Figure 3-4 U2761A to DMM four-wire connection

2 Use the DMM to make the resistance measurement at the output terminal for each setup shown in the table below. The expected measured value is approximately 50 Ω.

3 Enter the measured value to the U2761A as described in "Calibration Procedure" on page 29.

Table 3-10 Output impedance adjustment configuration

U2761A		DMM		
Setup	**Output path**	**Lower margin**	**Measurement**	**Upper margin**
5	–20 dB	49.5 Ω	Ω	50.5 Ω
6	0 dB	49.5 Ω	Ω	50.5 Ω
7[1]	+20 dB	49.5 Ω	Ω	50.5 Ω

1 Calibration constant is stored after completing this setup.

4 Proceed to DC offset adjustment or exit the calibration mode when necessary.

DC Offset Adjustment

The U2761A stores the calibration constant related to gain and offset of the internal system DAC to control the offset setting. This setting is used for both offset and DC outputs.

1 Set the DMM to measure DC voltage. Connect the DMM to the U2761A as shown in Figure 3-2. The DMM input impedance should be set to 10 MΩ.

2 Use the DMM to perform the DC voltage measurement at the output terminal for each setup shown in the table below.

3 Enter the measured value to the U2761A as described in "Calibration Procedure" on page 29.

Table 3-11 DC offset (High-Z) adjustment configuration

U2761A			DMM		
Setup	**Amplifier**	**DC offset**	**Lower margin**	**Measurement**	**Upper margin**
8	Off	+4.800 VDC	+4.608 VDC	VDC	+4.992 VDC
9	Off	–4.800 VDC	–4.992 VDC	VDC	–4.608 VDC
10	On	+2.600 VDC	+2.496 VDC	VDC	+2.704 VDC
11	On	+4.800 VDC	+4.608 VDC	VDC	+4.992 VDC
12	On	–2.600 VDC	–2.704 VDC	VDC	–2.496 VDC
13[1]	On	–4.800 VDC	–4.992 VDC	VDC	–4.608 VDC

1 Calibration constant is stored after completing this setup.

4 Proceed to AC amplitude (High-Z) adjustment or exit the calibration mode when necessary.

AC Amplitude (High-Z) Adjustment

This procedure calculates the AC amplitude calibration factor of three output paths for Sine wave, Ramp wave, and Square wave individually.

1 Set the DMM to measure AC voltage. Connect the DMM to the U2761A as shown in Figure 3-2.

2 Use the DMM to perform AC voltage measurement at the output terminal for each setup shown in the table below.

3 Enter the measured value to the U2761A as described in "Calibration Procedure" on page 29.

Table 3-12 Configuration for Sine wave AC amplitude adjustment

U2761A				DMM		
Setup	**Function**	**Frequency**	**Amplitude**	**Lower margin**	**Measurement**	**Upper margin**
14	Sine	1.00000 kHz	32 mVrms	30.4 mVrms	Vrms	33.6 mVrms
15	Sine	1.00000 kHz	60 mVrms	57.0 mVrms	Vrms	63.0 mVrms
16	Sine	100.000 kHz	60 mVms	57.0 mVrms	Vrms	63.0 mVrms
17	Sine	1.00000 kHz	80 mVrms	74.4 mVrms	Vrms	85.6 mVrms
18	Sine	1.00000 kHz	600 mVrms	558 mVrms	Vrms	642 mVrms
19	Sine	100.000 kHz	600 mVrms	558 mVrms	Vrms	642 mVrms
20	Sine	1.00000 kHz	800 mVrms	744 mVrms	Vrms	856 mVrms
21	Sine	1.00000 kHz	3.000 Vrms	2.79 Vrms	Vrms	3.21 Vrms
22	Sine	100.000 kHz	800 mVrms	744 mVrms	Vrms	856 mVrms

4 Fill in the table below using the measurement results in Table 3-12.

Table 3-13 Sine wave flatness worksheet

Parameter	Calculation	Offset
$\text{Offset}_{-20\text{dB}}$	$Offset = 20 \times \log \frac{V_{value(16)}}{V_{value(15)}}$	dB
$\text{Offset}_{0\text{dB}}$	$Offset = 20 \times \log \frac{V_{value(19)}}{V_{value(18)}}$	dB
$\text{Offset}_{+20\text{dB}}$	$Offset = 20 \times \log \frac{V_{value(22)}}{V_{value(20)}}$	dB

5 Use the DMM to perform the AC voltage measurement at the output terminal for each setup shown in the table below.

6 Enter the measured value to the U2761A as described in "Calibration Procedure" on page 29.

Table 3-14 Configuration for 50% ramp AC amplitude adjustment

U2761A				DMM		
Setup	**Function**	**Frequency**	**Amplitude**	**Lower margin**	**Measurement**	**Upper margin**
23	50% Ramp	1.00000 kHz	28 mVrms	26.6 mVrms	Vrms	29.4 mVrms
24	50% Ramp	1.00000 kHz	50 mVrms	47.5 mVrms	Vrms	52.5 mVrms
25	50% Ramp	1.00000 kHz	70 mVrms	65.1 mVrms	Vrms	74.9 mVrms
26	50% Ramp	1.00000 kHz	500 mVrms	465 mVrms	Vrms	535 mVrms
27	50% Ramp	1.00000 kHz	700 mVrms	651 mVrms	Vrms	749 mVrms
28	50% Ramp	1.00000 kHz	2.500 Vrms	2.325 Vrms	Vrms	2.675 Vrms

7 Use the DMM to perform the AC voltage measurement at the output terminal for each setup shown in the table below.

8 Enter the measured value to the U2761A as described in "Calibration Procedure" on page 29.

Table 3-15 Configuration for 50% pulse AC amplitude adjustment

U2761A				DMM		
Setup	**Function**	**Period**	**Amplitude**	**Lower margin**	**Measurement**	**Upper margin**
29	50% Pulse	1.00000 ms	44 mVrms	41.8 mVrms	Vrms	46.2 mVrms
30	50% Pulse	1.00000 ms	90 mVrms	85.5 mVrms	Vrms	94.5 mVrms
31	50% Pulse	1.00000 ms	110 mVrms	102.3 mVrms	Vrms	117.7 mVrms
32	50% Pulse	1.00000 ms	900 mVrms	837 mVrms	Vrms	963 mVrms
33	50% Pulse	1.00000 ms	1.100 Vrms	1.023 Vrms	Vrms	1.177 Vrms
34[1]	50% Pulse	1.00000 ms	4.500 Vrms	4.185 Vrms	Vrms	4.815 Vrms

1 Calibration constant is stored after completing this setup.

9 Proceed to −20 dB range AC flatness adjustment or exit the calibration mode when necessary.

–20 dB Range AC Flatness Adjustment

This procedure calibrates the AC amplitude flatness for high frequency using –20 dB attenuator. This calibration is performed using Sine wave at nominal amplitude of 30 mVrms across 50 Ω load.

1. Connect the power meter to measure the output amplitude of the U2761A as shown in Figure 3-3.
2. Set the power meter **Filter Mode** to **Manual** and **Averaging Length** to **500**, to improve the measurement stability. Allow a minimum of 30 s between setting time and collecting the measurement reading.
3. Use the power meter to perform a 100 kHz AC power measurement at the output terminal for setup 35 shown in Table 3-16. Setup 35 establishes the power reference for all the remaining setups in Table 3-16. You must always perform setup 35 before any of the following setups.
4. On the power meter, use the **Relative Power** function to set the current reading as the reference value. This will allow you to make future measurement result in dB.
5. Set the power meter **Offset** to **Offset$_{_20dB}$** value previously calculated in Table 3-13. The power meter will directly read the flatness error specification relative to 1 kHz.
6. Enter the measured value to the U2761A as described in “Calibration Procedure” on page 29.
7. Proceed to 0 dB range AC flatness adjustment or exit the calibration mode when necessary.

Table 3-16 Configuration for –20 dB range AC flatness adjustment

U2761A			Power meter		
Setup	**Function**	**Frequency**	**Lower margin**	**Measurement**	**Upper margin**
35	Sine	100.000 kHz	–0.2 dB	($Offset_{-20dB}$) dB	+0.2 dB
36	Sine	780.000 kHz	–1.4 dB	dB	+1.4 dB
37	Sine	1.56000 MHz	–1.4 dB	dB	+1.4 dB
38	Sine	2.34000 MHz	–1.4 dB	dB	+1.4 dB
39	Sine	3.13000 MHz	–1.4 dB	dB	+1.4 dB
40	Sine	3.91000 MHz	–1.4 dB	dB	+1.4 dB
41	Sine	4.69000 MHz	–1.4 dB	dB	+1.4 dB
42	Sine	5.47000 MHz	–1.4 dB	dB	+1.4 dB
43	Sine	6.25000 MHz	–1.4 dB	dB	+1.4 dB
44	Sine	7.03000 MHz	–1.4 dB	dB	+1.4 dB
45	Sine	7.81000 MHz	–1.4 dB	dB	+1.4 dB
46	Sine	8.59000 MHz	–1.4 dB	dB	+1.4 dB
47	Sine	9.38000 MHz	–1.4 dB	dB	+1.4 dB
48	Sine	10.1600 MHz	–1.4 dB	dB	+1.4 dB
49	Sine	10.9400 MHz	–1.4 dB	dB	+1.4 dB
50	Sine	11.7200 MHz	–1.4 dB	dB	+1.4 dB
51	Sine	12.5000 MHz	–1.4 dB	dB	+1.4 dB
52	Sine	13.2800 MHz	–1.4 dB	dB	+1.4 dB
53	Sine	14.0600 MHz	–1.4 dB	dB	+1.4 dB
54	Sine	14.8400 MHz	–1.4 dB	dB	+1.4 dB
55	Sine	15.6300 MHz	–1.4 dB	dB	+1.4 dB
56	Sine	16.4100 MHz	–1.4 dB	dB	+1.4 dB
57	Sine	17.1900 MHz	–1.4 dB	dB	+1.4dB
58	Sine	17.9700 MHz	–1.4 dB	dB	+1.4 dB
59	Sine	18.7500 MHz	–1.4 dB	dB	+1.4 dB
60	Sine	19.5300 MHz	–1.4 dB	dB	+1.4 dB
61[1]	Sine	20.0000 MHz	–1.4 dB	dB	+1.4 dB

1 Calibration constant is stored after completing this setup.

0 dB Range Flatness Adjustment

This procedure calibrates the AC amplitude flatness for high frequency using 0 dB direct path. This calibration is performed using Sine wave at nominal amplitude of 300 mVrms across 50 Ω load.

1. Connect the power meter to measure the output amplitude of the U2761A as shown in Figure 3-3.
2. Set the power meter **Filter Mode** to **Auto** if you have previously set it to **Manual**.
3. Use the power meter to perform a 100 kHz AC power measurement at the output terminal for setup 62 shown in Table 3-17. Setup 62 establishes the power reference for all remaining setups in Table 3-17. You must always perform setup 62 before any of the following setups.
4. On the power meter, use the **Relative Power** function to set the current reading as the reference value. This will allow you to make future measurement result in dB.
5. Set the power meter **Offset** to **Offset$_{0dB}$** value previously calculated in Table 3-13. The power meter will directly read the flatness error specification relative to 1 kHz.
6. Enter the measured value to the U2761A as described in "Calibration Procedure" on page 29.
7. Proceed to +20 dB range AC flatness adjustment or exit the calibration mode when necessary.

Table 3-17 Configuration for 0 dB range AC flatness adjustment

U2761A			Power meter		
Setup	**Function**	**Frequency**	**Lower margin**	**Measurement**	**Upper margin**
62	Sine	100.000 kHz	–0.2 dB	($Offset_{0dB}$) dB	+0.2 dB
63	Sine	780.000 kHz	–1.4 dB	dB	+1.4 dB
64	Sine	1.56000 MHz	–1.4 dB	dB	+1.4 dB
65	Sine	2.34000 MHz	–1.4 dB	dB	+1.4 dB
66	Sine	3.13000 MHz	–1.4 dB	dB	+1.4 dB
67	Sine	3.91000 MHz	–1.4 dB	dB	+1.4 dB
68	Sine	4.69000 MHz	–1.4 dB	dB	+1.4 dB
69	Sine	5.47000 MHz	–1.4 dB	dB	+1.4 dB
70	Sine	6.25000 MHz	–1.4 dB	dB	+1.4 dB
71	Sine	7.03000 MHz	–1.4 dB	dB	+1.4 dB
72	Sine	7.81000 MHz	–1.4 dB	dB	+1.4 dB
73	Sine	8.59000 MHz	–1.4 dB	dB	+1.4 dB
74	Sine	9.38000 MHz	–1.4 dB	dB	+1.4 dB
75	Sine	10.1600 MHz	–1.4 dB	dB	+1.4 dB
76	Sine	10.9400 MHz	–1.4 dB	dB	+1.4 dB
77	Sine	11.7200 MHz	–1.4 dB	dB	+1.4 dB
78	Sine	12.5000 MHz	–1.4 dB	dB	+1.4 dB
79	Sine	13.2800 MHz	–1.4 dB	dB	+1.4 dB
80	Sine	14.0600 MHz	–1.4 dB	dB	+1.4 dB
81	Sine	14.8400 MHz	–1.4 dB	dB	+1.4 dB
82	Sine	15.6300 MHz	–1.4 dB	dB	+1.4 dB
83	Sine	16.4100 MHz	–1.4 dB	dB	+1.4 dB
84	Sine	17.1900 MHz	–1.4 dB	dB	+1.4 dB
85	Sine	17.9700 MHz	–1.4 dB	dB	+1.4 dB
86	Sine	18.7500 MHz	–1.4 dB	dB	+1.4 dB
87	Sine	19.5300 MHz	–1.4 dB	dB	+1.4 dB
88[1]	Sine	20.0000 MHz	–1.4 dB	dB	+1.4 dB

1 Calibration constant is stored after completing this setup.

+20 dB Range Flatness Adjustment

This procedure calibrates the AC amplitude flatness for high frequency using +20 dB amplifier. This calibration is performed using Sine wave at nominal amplitude of 400 mVrms across 50 Ω load.

1. Connect the power meter to measure the output amplitude of the U2761A as shown in Figure 3-3.
2. Set the power meter **Filter Mode** to **Auto** if you have previously set it to **Manual**.
3. Use the power meter to perform a 100 kHz AC power measurement at the output terminal for setup 89 in Table 3-18. Setup 89 establishes the power reference for all the remaining setups in Table 3-18. You must always perform setup 89 before any of the following setups.
4. On the power meter, use the **Relative Power** function to set the current reading as the reference value. This will allow you to make future measurement result in dB.
5. Set the power meter **Offset** to **Offset$_{+20dB}$** value previously calculated in Table 3-13. The power meter will directly read the flatness error specification relative to 1 kHz.
6. Enter the measured value to the U2761A as described in “Calibration Procedure” on page 29.

NOTE This is the final adjustment procedure for the U2761A.

Table 3-18 Configuration for +20 dB range AC flatness adjustment

U2761A			Power meter		
Setup	**Function**	**Frequency**	**Lower margin**	**Measurement**	**Upper margin**
89	Sine	100.000 kHz	–0.2 dB	($Offset_{+20dB}$) dB	+0.2 dB
90	Sine	780.000 kHz	–1.4 dB	dB	+1.4 dB
91	Sine	1.56000 MHz	–1.4 dB	dB	+1.4 dB
92	Sine	2.34000 MHz	–1.4 dB	dB	+1.4 dB
93	Sine	3.13000 MHz	–1.4 dB	dB	+1.4 dB
94	Sine	3.91000 MHz	–1.4 dB	dB	+1.4 dB
95	Sine	4.69000 MHz	–1.4 dB	dB	+1.4 dB
96	Sine	5.47000 MHz	–1.4 dB	dB	+1.4 dB
97	Sine	6.25000 MHz	–1.4 dB	dB	+1.4 dB
98	Sine	7.03000 MHz	–1.4 dB	dB	+1.4 dB
99	Sine	7.81000 MHz	–1.4 dB	dB	+1.4 dB
100	Sine	8.59000 MHz	–1.4 dB	dB	+1.4 dB
101	Sine	9.38000 MHz	–1.4 dB	dB	+1.4 dB
102	Sine	10.1600 MHz	–1.4 dB	dB	+1.4 dB
103	Sine	10.9400 MHz	–1.4 dB	dB	+1.4 dB
104	Sine	11.7200 MHz	–1.4 dB	dB	+1.4 dB
105	Sine	12.5000 MHz	–1.4 dB	dB	+1.4 dB
106	Sine	13.2800 MHz	–1.4 dB	dB	+1.4 dB
107	Sine	14.0600 MHz	–1.4 dB	dB	+1.4 dB
108	Sine	14.8400 MHz	–1.4 dB	dB	+1.4 dB
109	Sine	15.6300 MHz	–1.4 dB	dB	+1.4 dB
110	Sine	16.4100 MHz	–1.4 dB	dB	+1.4 dB
111	Sine	17.1900 MHz	–1.4 dB	dB	+1.4 dB
112	Sine	17.9700 MHz	–1.4 dB	dB	+1.4 dB
113	Sine	18.7500 MHz	–1.4 dB	dB	+1.4 dB
114	Sine	19.5300 MHz	–1.4 dB	dB	+1.4 dB
115[1]	Sine	20.0000 MHz	–1.4 dB	dB	+1.4 dB

1 Calibration constant is stored after completing this setup.

3 Calibration

4 Disassembly

This chapter describes the procedure to disassemble the U2761A. The information on the replacement parts is also provided.

General Disassembly

This chapter provides the step-by-step guide to dismantle the module. To reassemble the module, follow the instructions in reverse order.

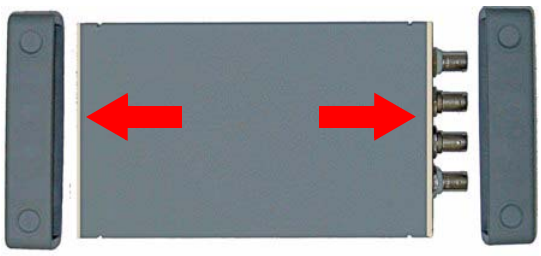
The removable assemblies include the following.

- Front and back bumpers
- Metal casing
- Rear metal casing
- Front metal casing, which is attached to the carrier board and measurement board

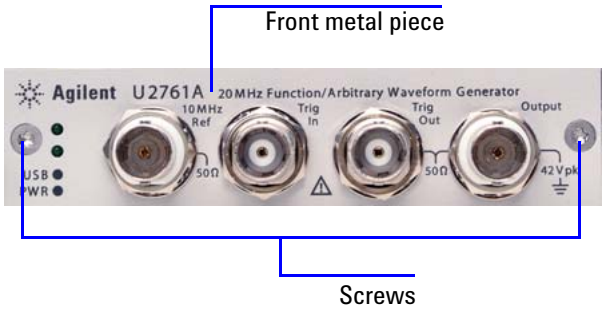
Disassembly Instructions

NOTE The parts shown in the following figures are representative and may look different with what you have in your module.

Follow the instructions in this section to disassemble the U2761A.

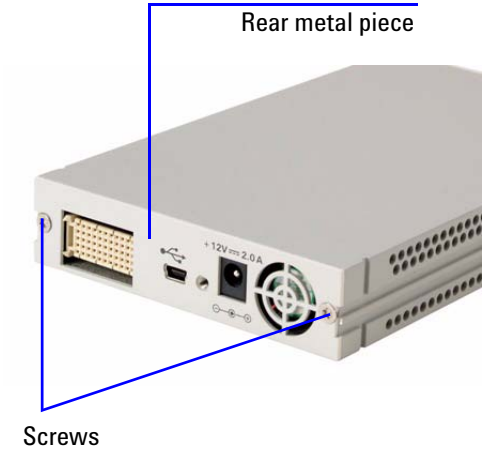


Remove the two bumpers from the metal casing.



Remove the two indicated screws from the front metal piece.

Gently pull the front metal piece out, which is attached to the carrier and measurement boards.



Remove the two indicated screws and proceed to remove the rear metal piece

Reassembly Instructions

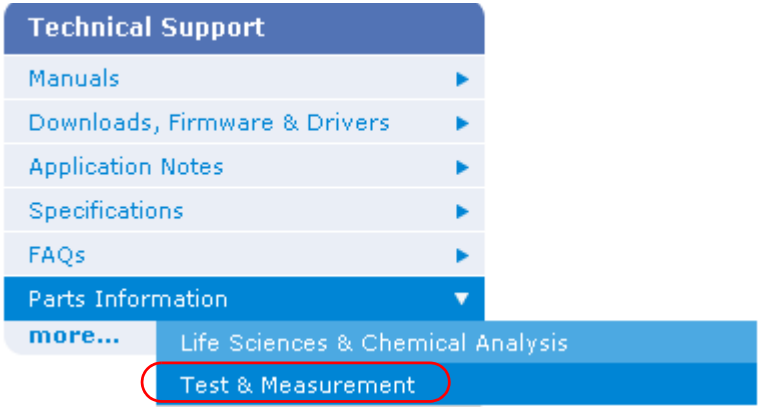
The reassembly process is simply the reverse of disassembly.

Replacement Parts

This section provides the information of orderable replacement parts for the U2761A. You can order the replacement parts through Agilent website or you can contact the nearest Agilent Sales Office or Service Centre. To search for the replacement part number online, follow the steps below.

1 Launch your Internet Explorer to access Agilent website (www.agilent.com).

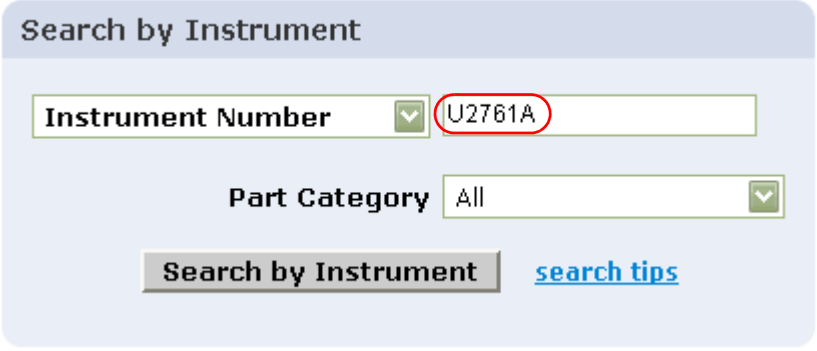
2 On the technical support panel, select **Test & Measurement** under the **Parts Information** selection as shown below.



3 You can search for the replacement parts by entering a specific replacement part number or by instruments.

- To search by part number, type the replacement part number in the text box as shown below.

- To search by instrument, type the model number in the text box and click **View Parts** to select a particular replacement part.



4 The result of your search will appear and click **View Parts** for the selected instrument.

4 Disassembly

5 Troubleshooting

This chapter provides the general information to troubleshoot the U2761A.

Troubleshooting

This section offers suggestions for solving general problems that you may encounter with the U2761A. It guides you on what to check in the following situations.

- **Power indicator LED is not lit.**

  Verify that the AC power cord is connected to the power inlet of the U2761A.

- **Power indicator LED is lit but the USB indicator LED is not lit.**

  Verify that the USB cable is properly connected to the PC and USB inlet of the U2761A.

NOTE If there is no response from the instrument, contact the nearest Agilent Service Center to obtain further assistance.

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(tel) 31 20 547 2111
Japan:
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Korea:
(tel) (080) 769 0800 (fax) (080) 769 0900
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First Edition, April 30, 2008

U2761-90010

Agilent Technologies