

Operating and Programming Manual

HP 81542MM Lightwave Multimeter Source Module

SERIAL NUMBERS

This manual applies to all instruments.



HP Part No. 81542-90011
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Subject Matter

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Control Serial Number: Edition 1 applies directly to all instruments.
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Safety Considerations

Before operation, review the instrument and manual, including the red safety page, for safety markings and instructions. You must follow these to ensure safe operation and to maintain the instrument in safe condition.

Initial Inspection

Inspect the shipping container for damage. If there is damage to the container or cushioning, keep them until you have checked the contents of the shipment for completeness and verified the instrument both mechanically and electrically.

The Performance Tests give procedures for checking the operation of the instrument. If the contents are incomplete, mechanical damage or defect is apparent, or if an instrument does not pass the operator's checks, notify the nearest Hewlett-Packard office.

Warning



To avoid hazardous electrical shock, do not perform electrical tests when there are signs of shipping damage to any portion of the outer enclosure (covers, panels, etc.).

Line Power Requirements

The HP 81542MM operates when installed into the HP 8153A Lightwave Multimeter mainframe

Operating Environment

The HP 8153A safety information summarizes the HP 81542MM operating environment ranges. In order for the HP 81542MM to meet specifications, the operating environment must be within the limits specified for the HP 8153A.

Storage and Shipment

The module can be stored or shipped at temperatures between -40°C and $+70^{\circ}\text{C}$. Protect the module from temperature extremes that may cause condensation within it.

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C

HP 81542MM Specifications

Specifications describe the instrument's warranted performance. Supplementary performance characteristics describe the instrument's non-warranted typical performance.

Because of the modular nature of the instrument, these performance specifications apply only to this module. You should insert these pages into the appropriate section of the manual.

Table C-1. HP 81542MM Specifications

Type	LED
Central Wavelength^[1]	1300nm±40nm
Fiber Type	MM 50/125μm
Spectral Bandwidth (FWHM)	<90nm
Output Power	>-20dBm
CW-Stability^[1]	
Short Term (15min, T=Constant)	±0.002dB
Long Term (6h, T=0 to 55°C±1K)	±0.01dB
Dimensions	75mm H, 32mm W, 335mm D (2.8"×1.3"×13.2"×)
Weight	net 0.7kg (1.5lbs), shipping 1kg (2.2lbs)
Recalibration Period	1 year
^[1] After a warmup time of 60min. with output enabled. If previously stored at the same temperature, only 20min. warmup required.	

Supplementary Performance Characteristics

Internal Digital Modulation

You can select internal modulation frequencies of 270HZ, 1kHz, or 2kHz. All outputs are pulse shaped, with a duty cycle of 50%.

Output Attenuation

The output can be attenuated from 0 to 6dB, in steps of 0.1dB.

Stability

The value of the long term CW-stability doubles with just one minute warmup time (source enabled).


Performance Tests

Introduction

The procedures in this section test the optical performance of the instrument. The complete specifications to which the HP 81542MM is tested are given in Table C-1. All tests can be performed without access to the interior of the instrument. The performance tests refer specifically to tests using the Diamond HMS-10/HP connector.

Equipment Required

Equipment required for the performance test is listed below.

Note  The source module under test can be inserted into the second channel of the Power Meter Standard. In this case, the second multimeter mainframe is not necessary.

Instrument/Accessory	Recommended Model
Power Meter Standard	HP 8153A Mainframe with HP 81533A Optical Head Interface Module with HP 81521B Optical Head
Multimeter Mainframe	HP 8153A
Connector Adapter (head)	HP 81000AA
Connector Interface	HP 81000AI 2ea (08154-61701)
Multimode Fiber	HP 81501AC
Cleaning Kit	HP 15475A
BNC to BNC Cable	8120-1840
Oscilloscope	

Test Record

Results of the performance test may be noted in the Performance Test Record. The Test Record can also be used as a permanent record and may be reproduced without written permission from Hewlett-Packard

Test Failure

If the HP 81542MM fails any performance test, return the instrument to the nearest Hewlett-Packard Sales/Service Office for repair.

Instrument Specification

Specifications are the performance characteristics of the instrument that are certified. These specifications, listed in Table C-1, are the performance standards or limits against that the HP 81542MM can be tested. Appendix C also lists some supplemental characteristics of the HP 81542MM and should be considered as additional information.

Any changes in the specifications due to manufacturing changes, design, or traceability to the National Bureau of Standards will be covered in a manual change supplement or revised manual. The specifications listed in such a change supercede any previously published.

Performance Tests

The performance tests given in this section are separated into Output Power Test and Stability Test. Perform each step in the tests in the order they are given, using the corresponding test equipment.

Note



Make sure that all optical connections in the test setups given in the procedure are dry and clean. For cleaning use the cleaning kit (P/N HP 15475A)

Output Power and Stability Tests

Specifications:

Optical output power of 50/125 μ m fiber: >-20dBm
Stability over 15 minutes at constant temperature: ± 0.002 dB
Stability over 6h and ± 1 K env. temp. window: ± 0.01 dB

I. Output Power Test

- a. Make sure that cable connectors and detector windows are clean.
- b. Turn instruments on, enable the LED output of the HP 81542MM and allow instruments to warm up for at least 60 minutes.
- c. On the power meter:
 - i. Set λ to the wavelength displayed for the HP 81542MM source channel.
 - ii. Make sure that the CAL parameter on the power meter is set to zero.
 - iii. With the connector adapter, on the optical head, covered with a plastic cap, press **(Zero)** to zero the power meter.
- d. Connect the equipment as shown in Figure D-1.

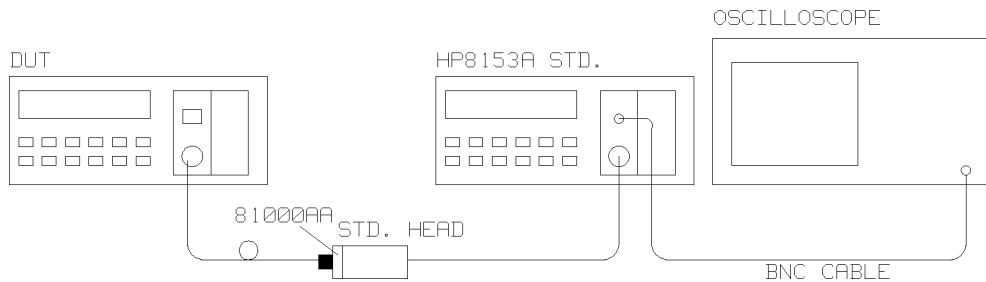


Figure D-1. Performance Test Setup

- e. On the HP 8153A with the module under test:
 - i. Press **(Param)** until the AUX parameter is selected. Make sure that this parameter is set to CW.
 - ii. Press **(Param)** until the ATT parameter is selected. Make sure that this parameter is set to zero.

- f. Measure the output power and note the result in the Test Record.

II. Attenuation Function Test

- g. On the power meter, press **(Disp→Ref)**. Press **(dB)** to select a display in dB.
- h. Using the modify keys on the HP 8153A with the module under test, increase the attenuation and check that the output power changes.

Note the reaction on the Test Record.

- i. Set the attenuation to 0.0dB.

III. Modulation Function Test

- j. Using a BNC cable, connect the power meter transducer output to the oscilloscope input and set the oscilloscope as follows: 0.5V/DIV DC coupled, 1ms/DIV.
- k. On the power meter, switch the autoranging off and select the -20dBm range.
- l. On the HP 8153A with the module under test, press **(Param)** to select the AUX parameter. Monitor the frequency change on the oscilloscope as you set the modulation to 270Hz, 1kHz, and then to 2kHz. Use **(↑)** and **(↓)** to modify the modulation.

Note the reaction on the Test Record.

IV. Stability Test

- a. Enable the HP 81542MM LED output and allow the instruments to warm up for 60 minutes.
- b. Select the channel with the source.
 - i. Press **(Param)** to select the AUX parameter. Set this parameter to CW.
 - ii. Press **(Param)** to select the ATT parameter. Set this parameter to zero.
- c. On the power meter:
 - i. Cover the input to the sensor with a plastic cap and press **(Zero)** to zero the meter.
 - ii. Press **(Param)** to select the λ parameter. Set this parameter to the value displayed for the source.
 - iii. Press **(Param)** to select the T parameter. Set this parameter to 1s.

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- d. Using the HP 81501AC cable, connect the output of the source to the input of the sensor. Make sure that the cable is fixed and that it cannot be moved during the measurement.
- e. Select the MENU mode on the power meter.
 - i. Press **(Record)** to select STABILITY.
 - ii. Press **(Edit)** and select the T_TOTAL parameter. Set the T_TOTAL parameter to 15 minutes.
 - iii. Press **(Edit)** and then **(Exec)** to run the stability application.
- f. When the stability test has completed, press **(More)** to select the SHOW application. Press **(Edit)** and then **(Next)**/**(Prev)** to display the DIFF result. Divide this result by 2 to obtain the value for the stability:

$$\frac{DIFF}{2} = \text{Stability (dB)}$$

Note the result on the Test Record.

- g. Repeat the stability measurement (steps e and f) with T_TOTAL set to 6 hours.

Performance Test for the HP 81542MM

Test Facility:

_____	Report No.	_____
_____	Date	_____
_____	Customer	_____
_____	Tested By	_____

Model HP81542MM Source Module

Serial No. _____ Ambient temperature _____ °C

Options _____ Relative humidity _____ %

Firmware Rev. _____ Line frequency _____ Hz

Special Notes:

Performance Test for the HP 81542MM

Test Equipment Used:

Description	Model No.	Trace No.	Cal. Due Date
1. Lightwave Multimeter (Std.)	HP 8153A	_____	_____
2. Opt. Head Interface Module	HP 81533A	_____	_____
3. Optical Head	HP 81521B	_____	_____
4. Lightwave Multimeter (DUT)	HP 8153A	_____	_____
5. Connector Interface	HP 81000AI	N/A	N/A
6. Connector Adapter	HP 81000AA	N/A	N/A
7. Multimode Fiber	HP 81501AC	N/A	N/A
8. BNC to BNC Cable	P/N 8120-1840	N/A	N/A
9. Oscilloscope	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____
13. _____	_____	_____	_____
14. _____	_____	_____	_____
15. _____	_____	_____	_____
16. _____	_____	_____	_____
17. _____	_____	_____	_____
18. _____	_____	_____	_____

Performance Test for the HP 81542MM

Model HP 81542MM LED Source Module No. _____ Date _____

Test No.	Test Description	Minimum Spec.	Result	Maximum Spec.	Measurement Uncertainty
I.	Output Power Test Output Power	-20dBm	_____		_____
II.	Attenuation Function Test Passed (P)/Failed (F)		_____		
III.	Modulation Function Test Passed (P)/Failed (F)		_____		
IV.	Stability Tests Stability (15min.)	-0.002dB	_____	+ 0.002dB	
	Stability (6h.)	-0.01dB	_____	+ 0.01dB	