



82401/82406 Series Millimeter-Wave Source Modules

User Manual

China Electronics Technology Instruments Co., Ltd
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Foreword

Thank you for choosing the 82401/82406 series millimeter-wave source modules, which are developed and produced by China Electronics Technology Instruments Co., Ltd (CETI). Our products are high-end, precise, sophisticated, excellent and embraces a high performance-cost ratio among the competitors of the same class.

We are devoted to providing high-quality products and best after-sales service with your most concerns and demands. Following the consistent tenet of “High Quality and Considerable Service”, we are committed to provide satisfactory products and services for our customers. For any questions, please contact us:

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This manual describes the applications, performance characteristics, basic working principle, operating guidance, and other directions regarding the 82406 series millimeter-wave source modules developed and manufactured by CETI, enabling you to get familiar with the operation methods and key points of use as soon as possible. In order to skillfully operate this instrument, please carefully read and strictly follow this manual.

However, due to time constraints and limitations of the author, the manual may be subject to errors or deficiencies. We sincerely welcome your corrections! We apologize for any inconvenience caused by our mistake in our work.

This manual is the first version of the *82401/82406 Series Millimeter-wave source modules User Manual*.

This manual may be subject to change without notice. CETI reserves all the rights to the final explanation for all the information and terminologies referred to in this manual.



Statement:

This manual is the property of CETI. Without our permission, any organizations or individuals shall neither alter/temper nor duplicate/transmit this manual for profits; otherwise, CETI reserves the right to pursue any liabilities therefrom.

Do not try to disassemble or alter any part not specified in this manual. Any disassembling without permission will degrade electromagnetic shielding effectiveness, damage internal parts, and affect the reliability of the product. If the part is within the warranty, we will not provide free-of-charge maintenance.

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Chapter I Overview

The 82401/82406 series millimeter-wave source modules is a kind of products which are designed and developed by China Electronics Technology Instruments Co., Ltd (CETI) based on the urgent need of the testing method for millimeter-wave or terahertz frequency band



Figure 1-1 82401/82406 Series Millimeter-wave source modules

Figure 1-1 presents the physical drawing of the 82401/82406 series millimeter-wave source modules. The series products include 10 model numbers: 82406/82401N/82406A/82401QA/82406B/82406C/82401SA/82406D/82401TA/82406E, with standard output waveguide covering 50~75 GHz/60~90 GHz/75~110 GHz/90~140 GHz/110~170 GHz/170~220 GHz/170~260 GHz /220~325 GHz/260~400 GHz/325~500 GHz signal respectively. The series products show the merits of high output power and convenient application, which can satisfy the test requirements of radar, antenna, etc.

Following this manual, you can proficiently use the 82401/82406 series millimeter-wave source modules. If you encounter any problems, comments and recommendations during use, please timely contact us according to the contact information in the foreword. Our consistent tenet is to continuously improve the products and satisfy the demands of our customers to the maximum extent.

This user manual includes four parts and nine chapters:

Chapter I indicates the basic information of the 82401/82406 series millimeter-wave source modules, which includes the advanced technologies, different available function and brief introduction of this manual.

Chapter II-Chapter VI cover the operation instructions, including how to unpack and check a new millimeter-wave source module, precautions for the use and daily maintenance methods of the millimeter-wave source modules, instructions of joint of front and rear panels, basic operation methods of the 82401/82406 series millimeter-wave source modules, including introduction to the millimeter-wave source modules, including operation instructions of the amplitude stabilizer power output mode and the saturation power output mode.

Chapter VII and Chapter VIII cover the technical instructions, including details of the working principles and key technologies of the 82401/82406 series millimeter-wave source modules as well as the main technical indexes and performance characteristics test methods of the 82401/82406 series millimeter-wave source modules.

Chapter IX covers the maintenance instructions, including the fault diagnosis procedures, fault information descriptions and repair methods.

The Appendix gives the performance test record of the 82401/82406 series millimeter-wave source modules.

We hope that our products can make your work convenient and quick!

Part I Instructions

Chapter II Unpacking

1 Model confirmation

You will find the following items after unpacking:

Millimeter-wave source modules	1
Certificate of conformity	1
15 V adapter	1
Power cord	1
Control cable	1
Packing list	1
Aluminum metal box	1

Please check all items carefully according to the ordering contract and packing list. If there is any question, please contact our service consultation center through the service consultation hotline specified in the foreword, and we will give the solution as soon as possible.

2 Appearance inspection

Carefully observe whether the instrument is damaged during transportation. When the instrument is obviously damaged, it is forbidden to power it on! Please contact our service consultation center through the service consultation hotline specified in the foreword. We will repair or replace the machine according to actual conditions as soon as possible.

3 Operation environment

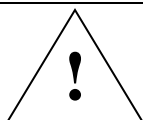
Refer to the environmental adaptability part of the technical index part of this manual. Special attention shall also be paid to the following requirements:

Power supply: 220 V ($\pm 10\%$), 50 Hz ($\pm 5\%$), 50 W.

Power socket: The three-pin power socket shall be properly grounded.

Power cord: Three-pin power cord packed in the box..

Power adapter: +15 V~+16 V DC.



**Please
note that:**

In order to prevent or decrease the mutual interference derived from the multiple devices supplied by the same power supply, especially the internal hardware damage caused by the pulse interference from the equipment with high power, please use 15 V adapter to drive the millimeter-wave source modules



Warning:

Bad grounding may lead to equipment damage or even personal injury. Before powering on the millimeter-wave source modules, it is important to ensure good contact of the ground wire. The power socket with a protective ground wire shall be used, and do not replace a protective ground wire with an external cable.

4 Electrostatic protection

The static electricity is destructive to electronic components and equipment. Generally, we will use two anti-static measures, including combination of conductive table mat and wristband as well as combination of conductive floor mat and ankle. If these two combinations are used together, a good anti-static protection can be provided. Otherwise, if the two combinations are used singly, only the former one can provide the protection. In order to ensure the user safety, a isolation resistor ($\geq 1M\Omega$) connected to ground should be provided for the anti-static part. Please correctly use the following anti-static measures to reduce electrostatic damage:

Ensure that all instruments are correctly grounded.

The staff shall wear anti-static wrist straps or adopt other anti-static measures before contacting joints and cores or carrying out any assembly operation.



Warning: The above anti-static measures shall not be used in cases with a voltage higher than 500 V!

5 Preheating

In order to ensure the measurement precision, please preheat the machine for at least 30 minutes before use.

Chapter III User Inspection

1 Preliminary inspection

The user is firstly recommended to check the operation condition and working state of the microwave signal source, which provides inputRF signals to the millimeter-wave source modules,. And then connect the millimeter-wave source modules to the microwave signal source (The specific method can be seen in Chapter VII).

2 Detailed inspection

- a) Amplitude-stabilized output mode: Connect the millimeter-wave source module with the corresponding data exchange port of the microwave signal generator with the BNC connection cable, and then connect the millimeter-wave source module with the corresponding data exchange port of the microwave signal generator with the automatic identification cable; after that, turn on the millimeter-wave source module and the signal generator in turn, finally, the signal generator will automatically identify the indicators such as frequency band range of the millimeter-wave source module (The specific method can be seen in Chapter VII).
- b) Maximum power output mode: connect the millimeter-wave source module with the corresponding data exchange port of the microwave signal generator with the automatic identification cable; after that, turn on the millimeter-wave source module and the signal generator in turn, finally, the signal generator will automatically identify the indicators such as frequency band range of the millimeter-wave source module (The specific method can be seen in Chapter VII)..

Chapter IV Routine Maintenance

1. Instrument cleaning:

After using period of time, please clean your millimeter-wave source modules through the following steps:

- a) Power off the signal source, and remove all connection cable from the microwave signal source.
- b) Remove the power cord.
- c) Dip a piece of clean and soft cotton cloth into the special cleaning agent for precision instruments, and gently wipe off the millimeter-wave source modules.
- d) Wipe off and dry the display with a piece of clean and soft cotton cloth.
- e) Connect the interface cable and power adapter after the cleaning agent is dried for restart.



**Please
note that:**

Do not use cleaning agent containing fluoride, acid and alkaline. Do not directly spray the cleaning agent onto the millimeter-wave source modules, otherwise it may flow into the module and damage the instrument.

Chapter V Instructions of Front and Rear Panels

1 Instructions of front panel

The schematic diagram of front panel is as shown in Figure 5-1:



Figure 5-1 Schematic Diagram of Front Panel

The RF output port of the 82401/82406 series millimeter-wave source modules is used to output the millimeter-wave or terahertz signals of the corresponding frequency covering 50 GHz~ 500 GHz.

2 Instructions of rear panel

The rear panel of the 82401/82406 series millimeter-wave source modules is as shown in Figure 5-2, which consists of power switch, LED indicator lamp, RF input port, power input port and control interface. The RF input interface is the input port of the excitation signal to the millimeter-wave source modules from the microwave signal generator. The detection output port is the detection signal output interface when the amplitude-stabilized option is used. The control interface is used for automatic identification of cable connection. The direct current required for active microwave parts of the millimeter-wave source modules will be provided by an external power adapter.



Figure 5-2 Schematic Diagram of Rear Panel

2.1 Power Switch

The power switch is used to control startup/shutdown of the millimeter-wave source modules. It's as shown in Figure 5-3.



Figure 5-3 Power Switch

2.2 LEDIndicator

The LED indicator is as shown in Figure 5-4, which is used to display the power access state of the millimeter-wave source modules. Its color is green, and the physical state of the corresponding instrument is as shown in Table 5-1:

Table 5-1 State Description of Indicator Lamp

Instrument state	State of indicator lamp	Physical state of the millimeter-wave source modules
Off state	Off	a) The AC~DC adapter is connected, and not powered on. b) Both the AC~DC adapter and power supply is not connected.
On state	Green, normally on	Connected to the AC - DC adapter, and powered on.



Figure 5-4 LED Indicator

2.3 RF Input

The RF input port is as shown in Figure 5-5, which is the input port of the excitation signal of the microwave signal source. The input frequency range is as shown in Table 5-2:

Table 5-2 Input Frequency Range of the RF Port

Model	Input frequency range of the RF port
82406	12.5 GHz~18.75 GHz
82401N	10.0GHz~15.0GHz
82406A	12.5 GHz~18.33GHz
82401QA	15.0GHz~23.33GHz
82406B	9.16GHz~14.17GHz
82406C	14.16GHz~18.33GHz
82401SA	14.16GHz~21.67GHz
82406D	12.22GHz~18.06GHz
82401TA	14.44GHz~22.23GHz
82406E	9.02GHz~13.89GHz



Figure 5-5 RF Input Port

2.4 Power Input

The power input port is as shown in Figure 5-6. As the millimeter-wave source modules need DC power supply, the accompanied AC~DC adapter shall be used during AC power supply. The input of the adapter is 85~264 V and 50/60 Hz AC current, and the current shall not be higher than 2.5 A.



Figure 5-6 Power Input Port

2.5 Control Interface

The control interface is as shown in Figure 5-7, which is used for connection of the automatic identification cable between the millimeter-wave source modules and the signal generator.



Figure 5-7 Control Interface

Chapter VI Operation Guidance

This chapter introduces the basic operation method when a source module is used together with a source generator/host produced by our company. It includes introduction to the operation instructions of the amplitude-stabilized output mode and the maximum power output mode.



Instructions:

Hard/soft keys of the generator's or module's panels input are described as follows:

Hard key description: **【XXX】**, XXX is the name of the hard key.

Soft key description: [XXX], XXX is the name of the soft key.

If the soft key includes multiple states, the valid state shall be indicated in brackets.

For example, [Sweep Time Man|Auto] (Man) means that the manual sweep time is valid.

Section I Operation instructions of the adjustable output power mode of amplitude-stabilized option

The amplitude-stabilized option of 82406/82401N/82406A/82401QA/82406B can realize manual adjustment of output power of the millimeter-wave source modules, which has adjustable and flat output power. The specific operation methods are as follows:

1. Connect the **【SOURCE MODULE INTERFACE】** of the millimeter-wave source modules with the **【Source Module Interface】** at the rear panel of the signal source host with the control cable, and then connect the **【ALC OUT】** of the millimeter-wave source modules with **【ALC In】** interface at the back of the signal source host with the BNC connection cable, and finally connect the **【RF IN】** port of the millimeter-wave source modules with the **【RF Output】** port of the signal source host with the RF cable.
2. Connect the adapter plug with the **【Power】** interface of the millimeter-wave source modules, and then start the millimeter-wave source module.
3. After the millimeter-wave source modules is started (the LED indicator lamp is turned on and the fan begins rotating), turn on the source host, and the host will automatically identify and set the multi-frequency coefficient of the millimeter-wave source module. When the "Successful Connection" prompt is displayed, the center frequency of the connected millimeter-wave source modules working frequency band will be displayed on the screen of the signal source host and the initial power will be displayed as "0" dBm, which indicates that the connection between the signal source host and the millimeter-wave source module is normal and the initial setup is completed.
4. In this case, set the required frequency and power value, and the set frequency and specific power signal can be obtained from the output port at the center of the module's front panel.



Please note that:

Please power on the millimeter-wave source module before the signal source generator is fully turned on. After this operation is completed, parameters such as multi-frequency coefficient will be completed by the system automatically, and it is only necessary to enter the required frequency value and power value in the signal source host. The amplitude-stabilized option only supports our 1464/1465 series synthetic sweep signal generator.

Section II Operation instructions of the maximum power output mode

The maximum value of the saturated output power can be obtained under this mode. The specific operation method is as follows:

- Operation of the saturated output mode of the millimeter-wave source module without amplitude-stabilized option:

1. Connect the **【SOURCE MODULE INTERFACE】** of the millimeter-wave source modules with the **【Source Module Interface】** at the rear panelback of the signal source host with the control cable.
2. Connect the adapter plug with the **【Power】** interface of the millimeter-wave source modules, and then start the millimeter-wave source module.
3. After the normal startup of the source module After the millimeter-wave source modules is opened (the LED indicator lamp is turned on and the fan begins rotating), turn on the source host source generator, and the host will automatically identify it and set the multi-frequency coefficient of the millimeter-wave source modules. When the “Successful Connection” prompt is displayed, the center frequency of the connected millimeter-wave source modules working frequency band will be displayed on the screen of the signal source host source generator and the initial power will be displayed as “0” dBm, which indicates that the connection between the signal source host source generator and the millimeter-wave source module is normal and initial setup is completed. In this case, the millimeter-wave source module can only output the signal of the corresponding frequency band.
4. set the required frequency and power value, and the set frequency and specific power signal can be obtained from the output port at the center of the module’s front panel. The output power value of the signal source generator shall be set to the range between 5 dBm and 15 dBm under this mode.
5. When the automatic identification cable is unavailable, you can also obtain saturation output power by manual setting. The operation is as follows:

Connect the **【RF IN】** port of the millimeter-wave source module with the **【RF Output】** port of the signal source generator with the RF cable. Connect the adapter plug with the **【Power】** interface, and then open the millimeter-wave source module. Press **【Frequency】**, **【More】** and **【FreqMult】** in sequence and enter the required multi-frequency coefficient, then press down **【dBm】** finish the setup (for details of the corresponding multi-frequency coefficient of each model, see Table 8-1), and then set the output power inputted to the millimeter-wave source modules by the signal source generator (press down **【Power】** , and enter the required power value and press down **【dBm】** key to complete settings. It is recommended to set it to 6-10 dBm), and finally set the required frequency, and the saturation output power under the set frequency can be obtained at the center output port of the front panel of the millimeter-wave source module. When the automatic identification cable is unavailable and the multi-frequency source coefficient shall be set manually, other frequency out of the corresponding frequency band of the source module can be obtained through setting the frequency on the signal source generator. However, we will not guarantee the quality of other frequency signal out of the corresponding frequency band.

- Power saturation output operation of 82406/82401N/82406A/82401QA/82406B millimeter-wave source modules with amplitude-stabilized option:

When no BNC cable is connected, just repeat the above “Operation of the saturated output mode of the millimeter-wave source module without amplitude-stabilized option”.



**Please
note
that:**

If the series product is connected with products of other company for use, please refer to step 5.



**Please
note
that:**

When disconnecting the control cable and BNC connection cable between the millimeter-wave source modules and the signal source generator, all connected instruments shall be turned off firstly. If the series product is connected with products of other company for use, please refer to step 5.

Part II Technical Specifications



Chapter VII Working Principles

The working principle of the standard millimeter-wave terahertz millimeter-wave source modules is as shown in Figure 7-1 (a). The microwave signal generator provides the software control of the submillimeter-wave source module via a control cable. The RF signal will be outputted to the input port of the millimeter-wave terahertz millimeter-wave source module through a RF cable. The DC power supply required for the millimeter-wave source module will be provided by an adapter.

The principle of the millimeter-wave terahertz millimeter-wave source modules with amplitude-stabilized option is as shown in Figure 7-1 (b). The microwave signal generator provides the software control of the submillimeter-wave source module via a control cable. The RF signal will be outputted to the input port of the millimeter-wave terahertz millimeter-wave source module through the RF cable, and the detection data exchange between it and the millimeter-wave source modules will be realized through the BNC connection cable. The DC power supply required for the millimeter-wave source module will be provided by an adapter.

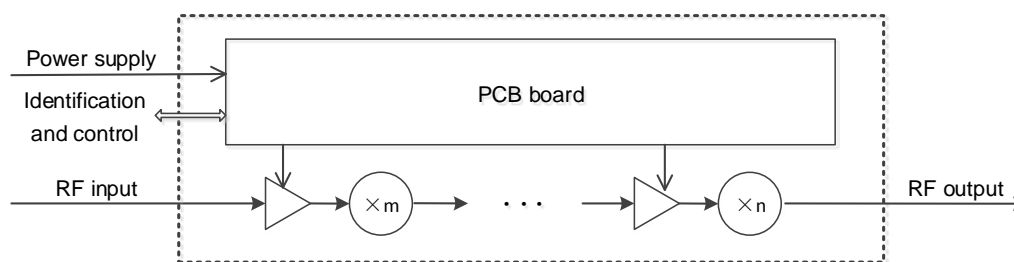


Figure 7-1 (a) Principle Diagram of the Standard Millimeter-wave Terahertz Millimeter-wave source modules

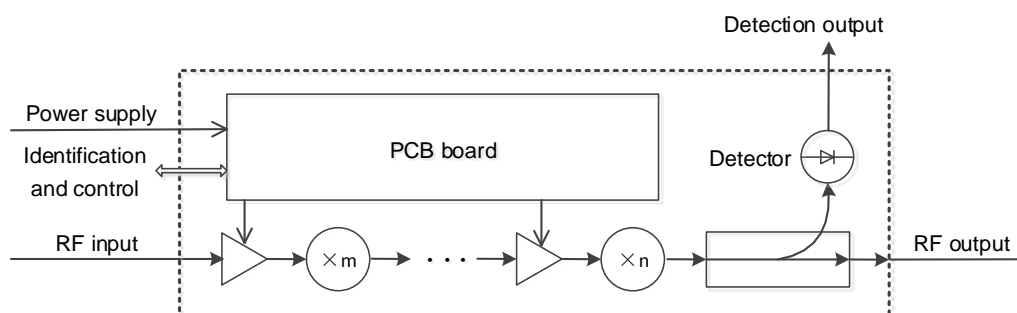


Figure 7-1 (b) Principle Diagram of the Millimeter-wave Terahertz Millimeter-wave source modules with Amplitude-stabilized Option

The 82401/82406 series millimeter-wave source modules is adopted with the millimeter-wave terahertz power amplification technology and millimeter-wave terahertz multi-frequency technology based on Schottky diode, which will carry out multistage amplification and frequency multiplication of low frequency signals generated by the microwave signal synthesis source to obtain millimeter-wave terahertz frequency band signals satisfying the power requirements. The DC power supply will provide offset voltage to the microwave millimeter-wave terahertz amplifier through the PCB circuit board of the millimeter-wave source modules. The PCB circuit board also includes basic information such as frequency band of the millimeter-wave source modules, so as to realize functions of amplitude-stabilized option and automatically identify the millimeter-wave source modules through our signal source generator.



Chapter VIII Main Technical Specifications and Performance Test

The 82401/82406 series product can be connected with a 1464 or 1465 series synthetic sweep signal generator to form the signal generation system, as shown in Figure 8-1:



Figure 8-1 Millimeter-wave and Terahertz Multi-frequency Source System

The series product is an intelligent frequency extending device, namely, after the module is interconnected with the generator through the control cable, the host can automatically identify the module mode, set the host multi-frequency coefficient to the corresponding value, and set the frequency range to the working frequency of the corresponding multi-frequency source frequency extending device. Under this state, the initial output power of the signal source generator is set to 0 dBm by default. As the intelligent signal source frequency extending device can be free from manual setting of multi-frequency coefficient and frequency range on the host, it will be convenient to use. In addition, the 82406/82401N/82406A/82401QA/82406B millimeter-wave source modules are also equipped with amplitude-stabilized option, which can realize large dynamic range of output power adjustment.

Section I Main Technical Specifications

The main technical specifications of the millimeter-wave source modules are as shown in Table 8-1.

Section II Performance Test



Instructions:

The specific test steps for each of the following indicators are prepared according to the test instruments as shown in the figure. When other test instruments with equivalent performance characteristics being used, they shall be operated according to the corresponding user guide Guide. The reset instrument mentioned in the test steps refers to the reset mode of manufacturer. If the equipment is in the user-defined reset state, it shall be changed to the reset state of manufacturer and reset again to ensure that the equipment is in the known state initially.

Measurement of saturation output power

a) Test instructions

It is used to test the **saturation** output power of the 82401/82406 series millimeter-wave source modules, and the index shall be as follows:

82406 output power: ≥ 13 dBm (50 GHz~75 GHz)

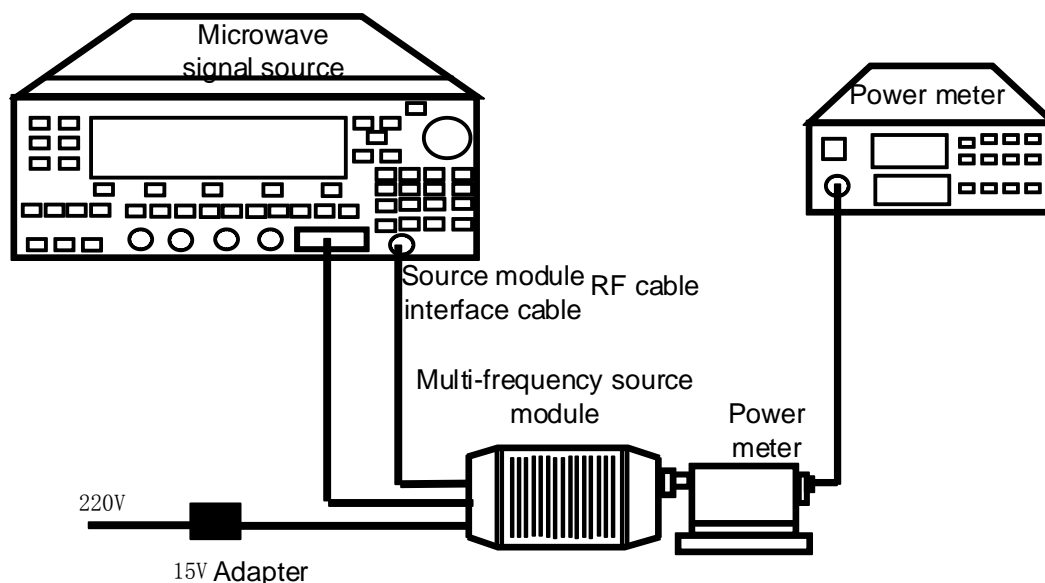
82401N output power: ≥ 11 dBm (60GHz~90GHz)

Table 8-1 Performance Indicators of the Millimeter-wave source modules

Model	82406	82401 N	82406A	82401 QA	82406B	82406C	82401SA	82406D	82401TA	82406E
Frequency range (GHz)	50~75	60~90	75~110	90~140	110~170	170~220	170~260	220~325	260~400	325~500
Output power (dBm)	$\geq +13$	$\geq +11$	$\geq +10$	$\geq +5$	$\geq +2$	≥ -2	≥ -6	≥ -8	≥ -15	≥ -18
	16 (typ.)	13 (typ.)	15 (typ.)	10 (typ.)	10 (typ.)	2 (typ.)	0 (typ.)	-3 (typ.)	-10 (typ.)	-10 (typ.)
Multi-frequency coefficient	4	6	6	6	12	12	12	18	18	36
Amplitude-stabilized option	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
Input frequency range (GHz)	12.5~18. 75	10~15	12.5~18. 33	15~23. 33	9.17~14. 17	14.17~18 .33	14.17~21 .67	12.2~18. 06	14.44~22 .22	9.02~13. 89
Overall dimensions (LxHxD, no corner protection, mm)	120x85x240									
Power input form	15 V-16 V adapter									
Power consumption	<20 W									
RF input port interface	3.5 mm female connector									
Output port interface	WR15	WR12	WR10	WR8.0	WR6.5	WR5.1	WR4.3	WR3.4	WR2.8	WR2.2

82406A	output power: ≥ 10 dBm	(75GHz~110GHz)
82401QA	output power: ≥ 5 dBm	(90 GHz~140 GHz)
82406B	output power: ≥ 2 dBm	(110 GHz~170 GHz)
82406C	output power: ≥ -2 dBm	(170 GHz~220 GHz)
82401SA	output power: ≥ -6 dBm	(170 GHz~260 GHz)
82406D	output power: ≥ -8 dBm	(220GHz~325GHz)
82401TA	output power: ≥ -15 dBm	(260 GHz~400 GHz)
82406E	output power: ≥ -18 dBm	(325GHz~500GHz)

b) Test block diagram

Figure 8-2 **Saturation** Output Power Test of the Millimeter-wave source modules

c) Test equipment

1) Synthesis source generator 1464 or 1465 series signal synthesis source

2) Power meter:

Frequency range: 50GHz~75GHz	71716+2436/2438
Frequency range: 60GHz~90GHz	87115N+2436/2438
Frequency range: 75GHz~110GHz	71717+2436/2438
Frequency range: 90GHz~140GHz	87115QA+2436/2438
Frequency range: 110GHz~170GHz	71718+2436/2438
Frequency range: 170GHz~220GHz	87106A+2436/2438
Frequency range: 170GHz~260GHz	87115SA+2436/2438
Frequency range: 220GHz~325GHz	87106B+2436/2438
Frequency range: 260GHz~400GHz	87115TA+2436/2438
Frequency range: 325GHz~500GHz	87108B+2436/2438

3) Adapter waveguide

d) Test steps

1) Connect all the instruments and equipment as shown in Figure 8-2;

2) Firstly, open the multi-frequency module (the LED indicator lamp is turned on and the fan begins rotating), and then turn on the signal source generator, and preheat all the instruments for 30 min;

- 3) Turn off the RF output of the signal source, and reset the power meter;
- 4) Set the output power of the signal source generator to 8 dBm (it is recommended to adjust the output power of the signal source generator to keep the saturated output power in the range between 5 dBm and 15 dBm), and then respectively set the frequency of the signal source generator as the dot frequency with 1 GHz frequency step from the starting frequency of the standard working frequency band of the millimeter-wave source modules.
- 5) Turn on the RF output of the signal source, and wait for the power meter display value to stabilize. In this case, the power measured by the power meter is the maximum output power of the millimeter-wave source modules at the corresponding frequency point.
- 6) Record the output power of all the frequency points of the millimeter-wave source modules;



**Please
note that:**

For specific operation steps, refer to Chapter VI-Operation Guidance.

Part III Maintenance Instructions



Chapter IX Fault Information Instructions and Repair Method

This chapter will introduce to you how to find out problems and require after-sales service.

If you purchase the 82401/82406 series millimeter-wave source modules and encounter some problems during operation, or you need to purchase relevant parts or accessories, we will provide perfect after-sales service.

Generally, the problems come from hardware, software or improper use. If you have any problem, please contact us timely. If the source module you purchased is still within the warranty, we will repair it free of charge according to the commitment in the warranty certificate. If it is beyond the warranty, we will only collect the cost.

Section I Fault diagnosis and fault information descriptions



Instructions:

This part is to guide you how to give simple judgment and processing when the 82401/82406 series millimeter-wave source modules has any fault. If necessary, please accurately feed back the problem to us as much as possible, so that we can give solution as soon as possible.

1 The LED lamp keeps off

Whether the power socket is powered on, and whether the power supply conforms to the working requirements of the millimeter-wave source modules.

If the fault still exists, contact the after-sales service or the manufacturer for repair.

2 The fan doesn't rotate after startup

If the fan doesn't rotate after startup, please check whether the fan is blocked by foreign matters or it is too dusty. In this case, please turn it off and remove foreign matters or clean the fan. And then restart it. If the fan doesn't rotate yet, return it to the manufacturer for repair or replace it.

3 The indexes are abnormal

If all the indexes of the test module are abnormal, please check it through the following steps:

- 1) Check whether the RF input cable is properly connected, and whether the connector is loose.
- 2) Check whether the RF input power conforms to the requirements.
- 3) Check whether the power meter probe and source module are properly connected, and whether there is any looseness.

If the fault still exists, contact the after-sales service or the manufacturer for repair.

Section II Repair method

If the instrument shall be returned to us for repair, please contact our service consultation center according to the contact information specified in the foreword. And please send the detailed data of the fault and error information of the instrument or the copy of the test report of the instrument with the original packing case to us. If the original packing case is unavailable, you are recommended to repack the instrument with the general commercial steps as follows:

- a) Attach a complete service mark on the instrument.
- b) Install a panel protection cover for the instrument. If the panel protection cover is unavailable, use a cardboard for protection.
- c) To prevent static damage, the instrument shall be placed in an anti-static bag.
- d) Use solid transportation boxes, such as double folded cardboard boxes. The cardboard boxes shall be sufficiently large and solid, and there shall be a space of at least 3~4 inches between different surfaces of the cardboard boxes and the instruments for filling the packaging materials.
- e) Reinforce the transportation boxes with strong adhesive tape. Mark "Fragile! No Touch! Handle With Care" on the box.
- f) Keep copies of all the shipping documents.

