

User Manual

1. Overview

The KC9652B is an instrument-grade medium-power microwave source, capable of providing continuous output power from 10 to 200 W (with a typical maximum of up to 250 W) and a setting accuracy of 1 W. It also features extremely high frequency stability and resolution, allowing precise frequency adjustment in 1 Hz steps within a range of 2.4–2.5 GHz.

The KC9652B delivers high-quality output, with low phase noise and parasitic amplitude modulation below 1%. Its signal can be accurately measured using a peak power meter. When integrated into a microwave measurement system, it can simplify the detection circuitry.

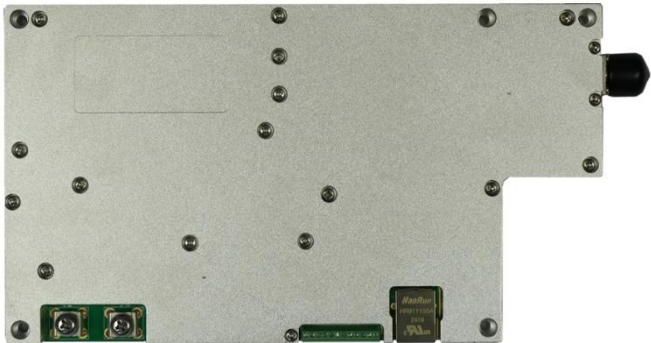
This product employs temperature compensation and closed-loop control, resulting in minimal drift over a cooling surface temperature range of 0–50°C, typically not exceeding 0.5 dB. The cooling method is flexible, with a large-area planar heat-dissipation

interface suitable for connection to an external water-cooling plate or air-cooled heatsink. The device provides a 12 V power output to drive a fan independently, without requiring an additional power supply.

The KC9652B is powered by a single 32 V supply and includes a built-in operational power unit.

Operation is straightforward. It can be controlled via analog or digital methods, supporting USB serial, RJ45 network, and RS485 serial interfaces.

It is suitable for scientific experiments and industrial applications with general reliability requirements and can serve as a driver for other microwave sources.



2. Technical Specifications

Parameter	Test Condition	Min	Typical	Max	Unit/Note
Frequency Range		2400		2500	MHz
Power Range ¹		40		53	dBm
Power Uncertainty	40~53dBm		0.5	1.0	dB, 25°C, 2450MHz
Temperature Drift	Cooling surface 0~50°C		5%	10%	
Freq Uncertainty			0.5	1.0	ppm/a, 25°C
Phase Noise	10kHz shift		-90		dBc/Hz
Input Voltage ¹		27.5	32.0	35	V
Supply Current			15	17	A
RF Connector		N-type connector			
VSWR Tolerance	At maximum output	3.0	∞		Continuous (not

	power				recommended)
Control Method		Analog voltage (0–5 V), RS485, USB, Ethernet			
Dimensions	L×W×H	236.7	135	24.2	mm, excluding connectors
Weight			1.2		kg, excluding heatsink

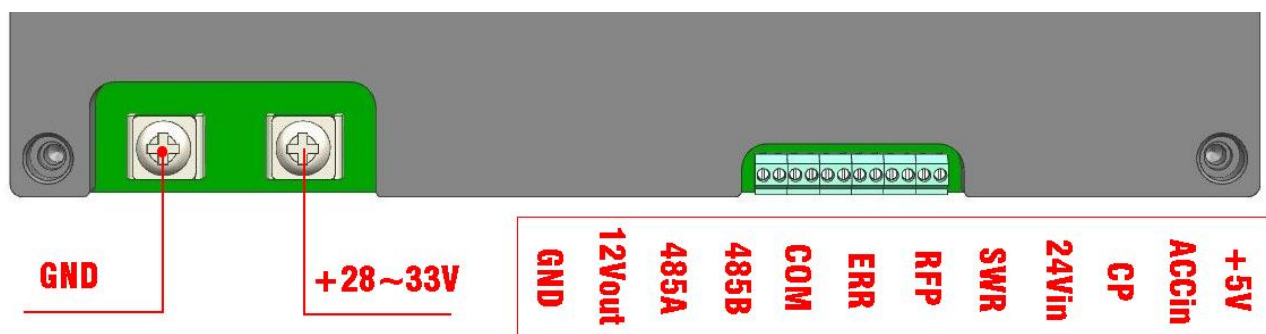
Note 1: When the input voltage is below 30 V, the maximum power specification is not guaranteed and derating should be applied.

3. Interface Definition

To facilitate the following explanations, the interface definitions are introduced here first.

The microwave source requires a relatively large supply current. The power cable should be selected according to a peak current of 25 A, and cable terminals should be fastened with bolts. Please ensure the cable lugs are appropriately sized to avoid contact with the chassis, which may cause a short circuit.

SWR, RFP, and ERR are status output terminals; refer to Chapter 6 for details.



4. Analog Control

After powering on, the device defaults to analog control mode, with a default frequency of 2450 MHz. When any handshake method of the digital control mode (see below) is used, the device will automatically exit analog control. To re-enter analog control, the device must be powered off and then powered on again.

If the default Modbus protocol is enabled, the device will default to Modbus mode at power-on without requiring a handshake.

4.1. Output Enable

The enable switch is connected across +5 V and the CP pin; closing the switch activates power output. Alternatively, an external control signal can pull the CP pin high to 5 V (>3.5 V), with the negative level connected to COM. If the internal power supply is used, COM should be shorted to GND.

If the CP pin is already pulled high at power-on, the microwave source will not output. In this case, the CP pin must be disconnected and pulled high again to enable output.

4.2. Controlling Output Power with a Potentiometer

Connect a potentiometer with a resistance range of 10 kΩ–100 kΩ between +5 V and GND (not COM unless COM is connected to GND), and connect the wiper to the ACCin terminal. Adjusting the wiper voltage will control the output power.

When the voltage at ACCin is 0 V, the output power is at its minimum; when ACCin voltage is 5 V, the output power is at its maximum.

4.3. Controlling Output Power with a Voltage Signal

An external voltage signal (0–5 V) applied to ACCin (negative to GND) will adjust the RF output in approximately 1 W steps.

5. Digital Control

The data interfaces are primarily used by the user to set operational parameters such as frequency, power, and communication settings. The instrument provides multiple interfaces, among which the USB interface has the highest privilege. Before using the network interface, the USB port can be used to configure IP parameters.

5.1. USB Control

The USB interface is internally converted to a serial port on the device, which appears as a COM port on the computer. To use it, connect the USB (Type-C) port to the computer, open the Device Manager, and locate the port device. If an unknown USB-SERIAL device is found, double-click it and update the driver. Windows 10 and later versions will automatically install the driver. After installation, the system will display it as “USB-SERIAL CH340 (COM*)”. Remember this COM port number. For drivers on other operating systems, consult the supplier.

When using the USB interface to set parameters, the 32 V main power must be connected. Without the main power connected, the computer may detect the port, but the device CPU will not start, and there will be no response. Ensure that the computer and device share a common ground to avoid ground loops.

Install a serial debugging tool on the computer, such as XCOM or Sscom. In the serial tool, select the COM port corresponding to the instrument, set the baud rate to 921600, stop bits to 1, data bits to 8, and no parity. After configuring these settings, click “Open” to open the serial port.

After completing the above preparations, a handshake command must be sent first before any other operation. The handshake command does not include a read/write bit.

The handshake command is “usbcontrol”

Host Sends	usbcontrol\r\n
Device Replies	usbcontrol\r\n

Here, \r\n represents a carriage return and line feed.

After the handshake is completed, settings can be configured. The format of setting commands is as follows:

Write Command	WXXXXX=DDDD\r\n
Write Frame Format	W (write header) [command name]=[parameter]\r\n (carriage return and line feed)
Read Command	RXXXXX\r\n
Read Frame Format	R (read header) [command name]=[parameter]\r\n (carriage return and line feed)

Where W/R is the read/write bit (not included in the handshake command). XXXXX is the command and can be of any length. DDDD is the data and can also be of any length. \r\n is a carriage return and line feed, not characters. When using XCOM, the software does not automatically recognize and convert these characters, so they cannot be typed directly. Instead, select “Send New Line” to allow the software to send them automatically.

The table below lists the USB control commands and their data ranges.

Command	Function	Value Range	Function
usbcontrol	USB Control Handshake		Write
ipaddr	IP Address		Read/Write
gwipaddr	Gateway		Read/Write
maskaddr	Subnet Mask		Read/Write
port	Port		Read/Write
gem	Device Model		Read
software	Software Version		Read
baudrate	Set Baud Rate	1~5 integer, where: 1: 38400; 2: 57600; 3: 115200; 4: 921600; 5: 1382400	Read/Write
errorcode	Error Code		Read
outen	Output Enable	0~1 integer, where: 0: Disable power output; 1: Enable power output	Read/Write
temperature	Temperature		Read
temperaturewh	Temperature Warning Threshold	30~80 integer	Read/Write
clock	Select Clock Source	0~1 integer, where: 0: Internal clock source; 1: External clock source This item does not require configuration. The clock interface is not connected by default, and the internal clock is enabled upon power-up. If an external clock is needed, please contact the supplier.	Read/Write
voltage	Main Power Supply Voltage		Read
freq	Output Frequency	2400000000~2500000000 integer	Read/Write
power	Output Power	1~250 integer	Read/Write
fwdpower	Forward Output Power		Read
fwdpoweradc	Forward Power ADC		Read
revpower	Reverse Power		Read
revpoweradc	Reverse Power ADC		Read
fwdpowerwt	Forward Power	1~250 integer	Read/Write

	Warning Threshold		
revpowerwt	Reverse Power Warning Threshold	1~250 integer	Read/Write
lowvoltagecheck	Low Voltage Check 1.	0~1 integer, where: 0: Disable the check 1: Enable the check	Read/Write

Note 1: When low-voltage monitoring is enabled, if the main power falls below 24 V for a period of time, the RF output will be disabled, and an error code will be returned. After the voltage recovers, the enable command must be resent to resume RF output. When low-voltage monitoring is disabled, the device will not automatically shut down if the supply voltage is low; as the voltage decreases, the device may behave abnormally or fail to start. The typical minimum startup voltage is around 15 V.

Example

To set the output to 2450MHz and 30W, perform the following operations:

a. Handshake connection

Host sends: `usbcontrol\r\n`

Device replies: `usbcontrol\r\n`

b. Set output frequency to 2.45GHz

Host sends: `wfreq=2450000000\r\n`

Device replies: `wfreq=2450000000\r\n`
`set freq:2450000000Hz\r\n`

c. Set output power to 30W

Host sends: `wpower=30\r\n`

Device replies: `wpower=30\r\n`
`set power:30\r\n`

d. Enable output

Host sends: `wouten=1\r\n`

Device replies: `wouten=1\r\n`
`Source:ON\r\n`

5.2. Ethernet Control

Connect the KC9652B network port to the local area network or directly to the host computer. The default IP address is 192.168.11.100, the default gateway is 192.168.11.1, the default subnet mask is 255.255.255.0, and the default port is 901. If the default values are not suitable, the IP parameters must be modified via a USB connection.

After connecting the cables, a handshake command must be sent first before performing any other operations. The handshake command does not include a read/write bit.

The handshake command is “`ethcontrol\r\n`”

Host Sends	<code>ethcontrol\r\n</code>
Device Replies	<code>ethcontrol\r\n</code>

Here, \r\n represents a carriage return and line feed.

After the handshake is completed, settings can be configured. The format of setting commands is as follows:

Write Command	WXXXXX=DDDD\r\n
Write Frame Format	W (write header) [command name]=[parameter]\r\n (carriage return and line feed)
Read Command	RXXXXX\r\n
Read Frame Format	R (read header) [command name]=[parameter]\r\n (carriage return and line feed)

Where W/R is the read/write bit (not included in the handshake command). XXXXX is the command and can be of any length. DDDD is the data and can also be of any length. \r\n is a carriage return and line feed.

Other commands and formats are the same as for USB control. Unless absolutely necessary, avoid modifying IP parameters via the Ethernet interface. Errors may cause loss of connection, which can only be corrected using the USB interface.

The KCSDI software can be used to configure and operate the instrument.

The download address for KCSDI: <https://deepace.net/products/software/kcsdi-software/>.

KCSDI supports controlling the KC9652B via USB or Ethernet. When using an Ethernet connection, the IP address must first be configured via USB.

The operation process of KCSDI is straightforward; after installing the software and becoming familiar with it, the configuration methods can be easily found, so detailed instructions are omitted.

5.3. RS485 Control

When using an RS485 connection, connect the 485A and 485B terminals to the corresponding terminals on the PLC. Note that the A and B terminals may be defined differently by different PLC manufacturers; if communication fails, try swapping them. Depending on the length of the RS485 line and the number of devices, appropriate terminating resistors may be required.

The default baud rate of the RS485 interface is 115200. If the baud rate or address is unknown, polling must be performed across all valid addresses and baud rates. Possible baud rates include 9600, 19200, 38400, 57600, and 115200. The valid address range is 1~247.

RS485 operation of the microwave source also requires pulling the CP pin high to enable microwave output. If using the internal power supply, COM must also be shorted to GND.

5.3.1. Command Format

The RS485 interface communicates using Modbus RTU and does not support combined read/write operations. The command format is as follows:

Write Frame:

Downlink frame: Device Address (1B), Function Code (1B), Register Address (2B), Write Data (2B), CRC Check (2B), total 8 bytes.

Successful uplink frame: Returns the same data as the downlink frame with recalculated CRC.

Failed uplink frame: Device Address (1B), Function Code (1B | 0x80), Exception Code (1B), CRC Check (2B), total 5 bytes.

Read Frame:

Downlink frame: Device Address (1B), Function Code (1B), Register Address (2B), Number of Registers to Read (2B) (only current address, 0x0001), CRC Check (2B), total 8 bytes.

Successful uplink frame: Device Address (1B), Function Code (1B), Byte Count (1B), Data (2B) (only current address, 0x0001), CRC Check (2B), total 7 bytes.

Failed uplink frame: Device Address (1B), Function Code (1B | 0x80), Exception Code (1B), CRC Check (2B), total 5 bytes.

Where:

1) Valid device addresses are 1–247; 247 (0xF7) is the default address, 0 is the broadcast address, and others are invalid. Broadcast has no function.

2) Command codes: 03 represents query (read), 06 represents set (write).

3) Data format: All data in the protocol uses 2-byte signed integer (short). Power is in W, temperature is in 0.1°C (multiply the temperature value by 10). Example: 16# 00 00 12 35=4661 may represent 4661 W or 466.1°C depending on the address. Frequency is set through a selection register in either 32-bit or 16-bit mode. Writing 1 sets 32-bit mode, writing 0 sets 16-bit mode. In 32-bit mode, the unit is Hz. First write the high 16 bits (0x11 address), then the low 16 bits (0x12 address). After writing the low 16 bits, the device automatically combines with the high 16 bits to form the 32-bit value. Writing only the high 16 bits is invalid. Writing only the low 16 bits beyond the range will cause an error. In 16-bit mode, writing takes effect immediately and only requires writing the frequency high-byte register (0x11). Units in 16-bit mode are MHz.

4) In the communication protocol, RR RR represents the 2-byte CRC check (pay attention to endianness; manual calculation may require swapping the two bytes). XX XX represents an error code, YY YY represents the set or read value, ZZ ZZ represents arbitrary numbers, and UU UU represents the exception code.

5) When the solid-state source fails, the upper computer is notified through a logic level output and queries the fault code for further action.

6) RS485 default baud rate is 115200, half-duplex mode.

Communication Address List

Register Address	Function	Settable	Queryable
0x 01	Device Model	No	Yes
0x 02	Software Version	No	Yes
0x 03	Device Address (485 Address)	Yes	Yes
0x 04	Baud Rate	Yes	Yes
0x 05	Error Code	No	Yes
0x 06	RF Output Enable	Yes	Yes
0x 07	Lock/Unlock	Yes	Yes
0x 08	RS485 Control	Yes	Yes
0x 09	Temperature	No	Yes
0x 0A	Temperature Warning Threshold	Yes	Yes
0x 0B	Set Default Communication Mode to Modbus	Yes	Yes
0x 0C	Set Clock Source	Yes	Yes
0x 0D	Read Power Supply Voltage	No	Yes
0x 0E	Power Supply Voltage Check	Yes	Yes
0x 0F	Restart MCU		
0x 10	Frequency 32-bit or 16-bit Selection and Enable	Yes	Yes
0x 11	Frequency High Byte	Yes	Yes
0x 12	Frequency Low Byte	Yes	Yes

0x 20	Set Power	Yes	Yes
0x 21	Forward Power	No	Yes
0x 22	Forward Power ADC	No	Yes
0x 23	Reverse Power	No	Yes
0x 24	Reverse Power ADC	No	Yes
0x 25	Forward Power Warning Threshold	Yes	Yes
0x 26	Reverse Power Warning Threshold	Yes	Yes

5.3.2. Setting Commands

1)Set Address

- i. PLC sends command: F7 06 00 03 00 YY RR RR
- ii. Normal reply: F7 06 00 03 00 YY RR RR
- iii. Error reply: F7 86 UU RR RR

After this command, the device address is changed from the default 0xF7 to the set value (YY). For example, if changed to 0x01, the next communication must use 0x01 as the slave address.

2)Set Baud Rate

- i. PLC sends command: 01 06 00 04 00 YY RR RR
- ii. Normal reply: 01 06 00 04 00 YY RR RR
- iii. Error reply: 01 86 UU RR RR
- iv. Supported baud rates: 9600 (default, write 1), 19200 (write 2), 38400 (write 3), 57600 (write 4), 115200 (write 5).

3)Set Output ON/OFF

- i. PLC sends command: 01 06 00 06 00 YY RR RR
- ii. Normal reply: 01 06 00 06 00 YY RR RR
- iii. Error reply: 01 86 UU RR RR
- iv. Data value 0x00 disables output, 0x01 enables output.

4)Set Lock/Unlock

- i. PLC sends command: 01 06 00 07 00 YY RR RR
- ii. Normal reply: 01 06 00 07 00 YY RR RR
- iii. Error reply: 01 86 UU RR RR
- iv. To lock the line, write 0x01 to YY. In this state, RS485 write functions are disabled; only read operations are allowed. To use RS485 for writing, first write 0x00 to unlock.

5)Set Control Mode (485 Handshake Frame)

- i. PLC sends command: 01 06 00 08 00 01 RR RR
- ii. Normal reply: 01 06 00 08 00 01 RR RR
- iii. Error reply: 01 86 UU RR RR

6)Set Temperature Warning Threshold

- i. PLC sends command: 01 06 00 0A YY YY RR RR
- ii. Normal reply: 01 03 00 0A YY YY RR RR
- iii. Error reply: 01 86 UU RR RR
- iv. The temperature warning threshold can be set from 30 to 80.

7)Set Default Communication Mode to Modbus

- i. PLC sends command: 01 06 00 0B 00 YY RR RR
- ii. Normal reply: 01 03 00 0B 00 YY RR RR
- iii. Error reply: 01 86 UU RR RR
- iv. YY=0x01: set default mode to Modbus, YY=0x00: set to manual. Other values cause an error.

8)Set Frequency Mode

- i. PLC sends command: 01 06 00 10 00 YY RR RR
- ii. Normal reply: 01 06 00 10 00 YY RR RR
- iii. Error reply: 01 86 UU RR RR
- iv. High byte controls frequency mode: 0x00 = 16-bit, 0x01 = 32-bit.

9)Set Frequency High Byte

- i. PLC sends command: 01 06 00 11 YY YY RR RR
- ii. Normal reply: 01 06 00 11 YY YY RR RR
- iii. Error reply: 01 86 UU RR RR
- iv. In 16-bit mode, YYYY is in MHz. In 32-bit mode, YYYY is the high 16 bits; combine with the next

address's low 16 bits to form Hz.

10) Set Frequency Low Byte

- i. PLC sends command: 01 06 00 12 YY YY RR RR
- ii. Normal reply: 01 06 00 12 YY YY RR RR
- iii. Error reply: 01 86 UU RR RR
- iv. Invalid in 16-bit mode. In 32-bit mode, YYYY is the low 16 bits; combine with the previous high

16 bits to form Hz.

11)Set Power

- i. PLC sends command: 01 06 00 20 00 YY RR RR
- ii. Normal reply: 01 06 00 20 00 YY RR RR
- iii. Error reply: 01 86 UU RR RR
- iv. Allowed power range: 10–250 W

12)Forward Power Warning Threshold

- i. PLC sends command: 01 06 00 25 YY YY RR RR
- ii. Normal reply: 01 06 00 25 YY YY RR RR
- iii. Error reply: 01 86 UU RR RR
- iv. Allowed range: 10~300

13)Reverse Power Warning Threshold

- i. PLC sends command: 01 06 00 26 YY YY RR RR
- ii. Normal reply: 01 06 00 26 YY YY RR RR
- iii. Error reply: 01 86 UU RR RR
- iv. Allowed range: 10~300

5.3.3. Query Commands

1)Query Device Model

- i. PLC sends command: 01 03 00 01 00 01 RR RR

ii. Normal reply: 01 03 02 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

2)Query Software Version

i. PLC sends command: 01 03 00 02 00 01 RR RR

ii. Normal reply: 01 03 02 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

3)Query Software Version

i. PLC sends command: 01 03 00 03 00 01 RR RR

ii. Normal reply: 01 03 02 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

4)Query Baud Rate

i. PLC sends command: 01 03 00 04 00 01 RR RR

ii. Normal reply: 01 03 02 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

5)Query Error Code

i. PLC sends command: 01 03 00 05 00 01 RR RR

ii. Normal reply: 01 03 02 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

6)Query RF Output Status

i. PLC sends command: 01 03 00 06 00 01 RR RR

ii. Normal reply: 01 03 02 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

iv. In the returned solid-state source status, 01 indicates output active, and 00 indicates the solid-state source output is off.

7)Query RS485 Lock Status

i. PLC sends command: 01 03 00 07 00 01 RR RR

ii. Normal reply: 01 03 00 07 00 YY RR RR

iii. Error reply: 01 83 UU RR RR

iv. In the returned solid-state source status, 01 indicates the line is locked and writing is disabled, while 00 indicates the line is unlocked and writing is allowed.

8)Query Control Mode

i. PLC sends command: 01 03 00 08 00 01 RR RR

ii. Normal reply: 01 03 02 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

9)Query Temperature

i. PLC sends command: 01 03 00 09 00 01 RR RR

ii. Normal reply: 01 03 02 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

10)Query Temperature Warning Threshold

i. PLC sends command: 01 03 00 0A 00 01 RR RR

ii. Normal reply: 01 03 02 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

11)Query Frequency Mode

i. PLC sends command: 01 03 00 10 00 01 RR RR

ii. Normal reply: 01 03 02 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

12)Query Frequency High Byte

i. PLC sends command: 01 03 00 11 00 01 RR RR

ii. Normal reply: 01 03 02 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

13)Query Frequency Low Byte

i. PLC sends command: 01 03 00 12 00 01 RR RR

ii. Normal reply: 01 03 02 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

14)Query Power

i. PLC sends command: 01 03 00 20 00 01 RR RR

ii. Normal reply: 01 03 00 20 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

15)Query Forward Power

i. PLC sends command: 01 03 00 21 00 01 RR RR

ii. Normal reply: 01 03 02 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

16)Query Forward Power ADC

i. PLC sends command: 01 03 00 22 00 01 RR RR

ii. Normal reply: 01 03 02 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

17)Query Reverse Power

i. PLC sends command: 01 03 00 23 00 01 RR RR

ii. Normal reply: 01 03 02 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

18)Query Reverse Power ADC

i. PLC sends command: 01 03 00 24 00 01 RR RR

ii. Normal reply: 01 03 02 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

19)Query Forward Power Warning Threshold

i. PLC sends command: 01 03 00 25 00 01 RR RR

ii. Normal reply: 01 03 02 YY YY RR RR

iii. Error reply: 01 83 UU RR RR

20)Query Reverse Power Warning Threshold

i. PLC sends command: 01 03 00 26 00 01 RR RR

- ii. Normal reply: 01 03 02 YY YY RR RR
- iii. Error reply: 01 83 UU RR RR

Example

Taking the setting of 2450 MHz and 200 W output as an example, the following operations should be performed:

a.Handshake Connection

PLC sends command: F7 06 00 08 00 01 DD F4

Device Replies: F7 06 00 08 00 01 DD F4

b.Set Frequency Mode to 32-bit

PLC sends command: F7 06 00 10 00 01 49 CF

Device Replies: F7 06 00 10 00 01 49 CF

c.Set Frequency High Byte

PPLC sends command: F7 06 00 11 92 08 A1 55

Device Replies: F7 06 00 11 92 08 A1 55

d.Set Frequency Low Byte

PLC sends command: F7 06 00 12 08 80 3B 93

Device Replies: F7 06 00 12 08 80 3B 93

e.Set Output Power to 200 W

PLC sends command: F7 06 00 20 00 C8 9D 00

Device Replies: F7 06 00 20 00 C8 9D 00

f.Set Output Enable

PLC sends command: F7 06 00 06 00 01 BC 37

Device Replies: F7 06 00 06 00 01 BC 37

5.3.4. Error Codes

Error codes are 2 bytes long. To facilitate effective distinction, the high byte represents the error category, and the low byte represents the specific error code. Categories include MCU errors, setting errors, calculation errors, communication errors, etc.

1)Error Categories

Category Code	Category Description
0x10xx	Communication Failure
0x20xx	Warning
0x30xx	Error

2)Error Code List

Error Code ¹	Category	Error Description	Solution
0x1001	0x10xx	Address Not Writable	Resend the correct command
0x1002	0x10xx	Local Write Locked	Send unlock command first
0x1004	0x10xx	Read/Write Command Error	Resend the correct command
0x1008	0x10xx	Register Address Error	Resend the correct command
0x1010	0x10xx	Data Out of Range	Resend the correct command
0x2001	0x20xx	Temperature Out of Range	Reduce output power/ enhance cooling/ raise warning threshold
0x2002	0x20xx	Reverse Power Out of Range	Check output matching/ raise warning

			threshold
0x2008	0x20xx	Forward Power Out of Range	Reduce output power / raise warning threshold
0x3001	0x30xx	Temperature Over-Time ²	Enhance cooling / raise warning threshold, then restart
0x3002	0x30xx	Reverse Power Over-Time ²	Check output matching / raise warning threshold, then restart
0x3004	0x30xx	Loss of Lock	Check clock, restart, and contact supplier if error persists
0x3008	0x30xx	Forward Power Over-Time	Reduce output power / increase threshold, then restart

Note 1: For codes 0x2000 and 0x3000, each bit is unique; multiple warnings/errors within the same category can be summed and output. During parsing, they should be separated. Warnings and errors cannot be combined. Note 2: Timeout duration defaults to 24 seconds.

6. Status Outputs

The KC9652B status outputs (SWR, RFP, ERR) are optically isolated. When the reflected power exceeds the “Reverse Power Warning Threshold” set by the host, the SWR terminal is enabled. When output power exceeds 10 W, the RFP terminal is enabled. When an error occurs, the ERR terminal is enabled. When enabled, these terminals show low resistance ($\sim 1\text{ k}\Omega$) to COM; when not enabled, they show low resistance ($\sim 10\text{ k}\Omega$) to 24 Vin and high resistance ($>1\text{ M}\Omega$) to COM. Users can monitor the working status of the device using the continuity between these terminals and COM or 24 Vin.

The KC9652B does not actively output high levels. If high-level output is needed, an external power supply can be connected to the 24 Vin terminal. Although labeled 24 Vin, it can accept 5–24 V depending on the control system requirements.

7. Power Outputs

The KC9652B supports 12 V and 5 V outputs. The 12 Vout is protected by a 500 mA self-resetting fuse (default; for higher currents, specify when ordering, maximum 2 A). Overcurrent causes the fuse to blow, which can self-reset, but with limited lifespan. The +5 V output is for control only and cannot supply high current; do not use it to drive other loads.

8. Installation Instructions

The KC9652B chassis has four screw holes at the corners, typically using M4 screws for mounting. If the screw holes do not align with your equipment, use adapter plates (aluminum/copper); do not drill holes in the power source.

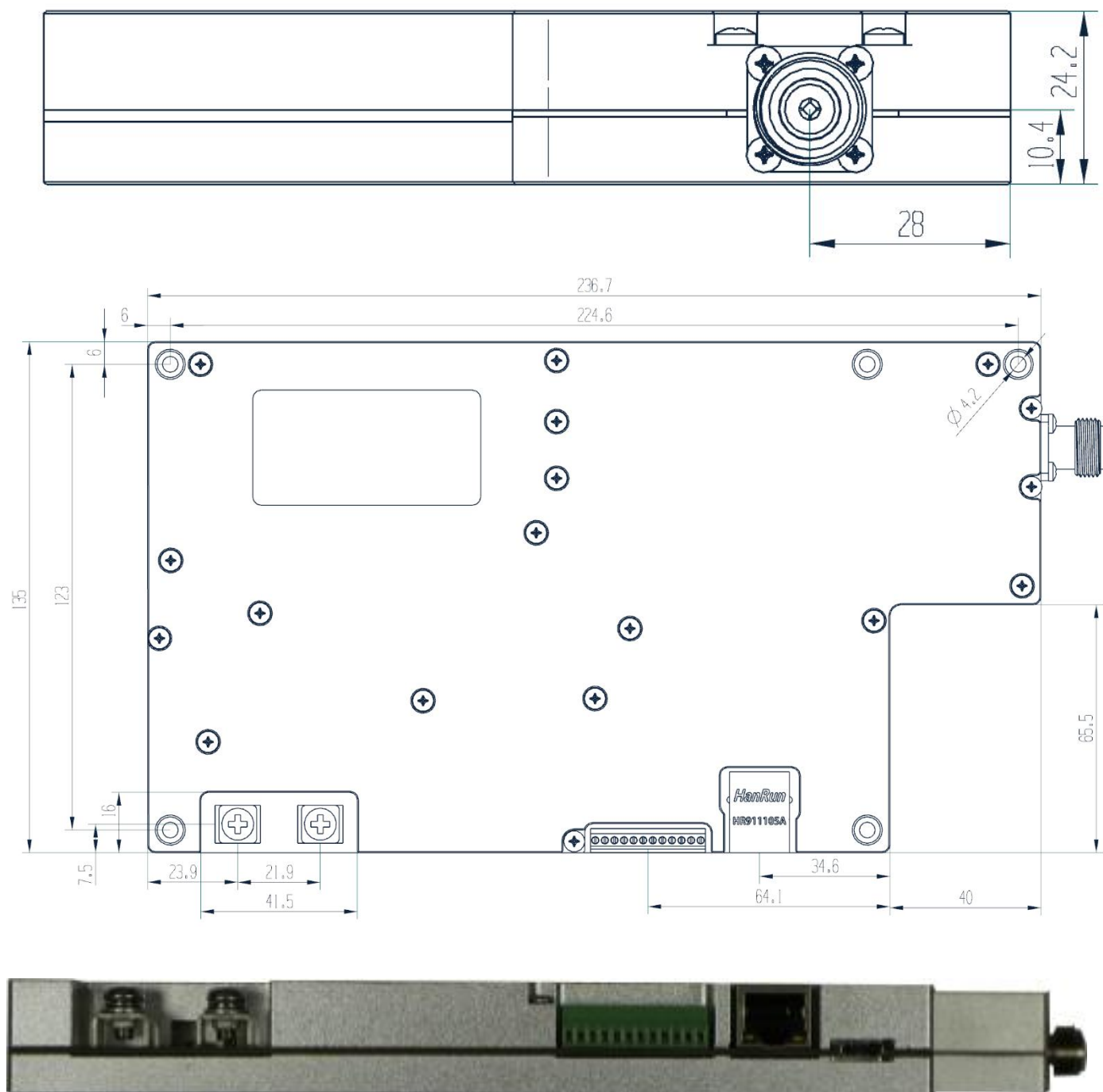
Pay special attention to heat dissipation. The KC9652 is shipped without a heatsink; an external heatsink is required. The entire bottom surface serves as a heat-dissipation surface and must fully contact the heatsink. Apply thermal grease evenly on the contact surface (recommend thermal conductivity $>6\text{ W/m}\cdot\text{K}$). For water cooling, channels must be placed below the RF connector centerline. For air cooling, ensure sufficient base material thickness: aluminum $\geq 8\text{ mm}$, copper $\geq 5\text{ mm}$.

The mounting surface must be flat and clean, with a temperature not exceeding 45°C, ideally below 30°C. To prevent thermal runaway with an open load, the heatsink should be designed for at least 600 W thermal load, with temperature rise $\leq 0.03^{\circ}\text{C}/\text{W}$. For high ambient temperature, higher thermal requirements should be considered.

In high-vibration environments, use flexible coaxial cables for RF connections. Cables introduce attenuation; use short cables and compensate for power loss. Avoid overly thick cables to prevent connector stress.

Microwave power leakage can be significant; to avoid interference, use shielded control cables and ensure proper grounding.

Mechanical dimensions related to installation are shown in the accompanying diagrams



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KC9652

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