

B013-008



9KHz ... 22GHz KC901x

MEASALL®Network

Analyzer

Programming

Manual

Hardware version V0.2 Software version V0.1.0 (KC901K)
Official version for education, research and science enthusiasts

(first edition)

DEEPACE

April, 2024

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0. Overview

The KC901 uses text commands for data communication, commonly known as ASCII commands. The data is physically connected through the USB port or the network port, and is converted to serial data inside the KC901 for the CPU to recognize. Users can operate the KC901 directly using the command line method, or they can write additional application software to enable it to communicate with the instrument using the commands specified in this manual.

The current operating instructions of the KC901 are an ungraded description language that is simple to understand and can be quickly mastered without the need to learn about protocol logic.

In this manual, "Host computer" refers to the PC or other control unit used to operate the KC901. "Lower unit" refers to the KC901.

1. Command Format and Description

The host computer sends and the lower unit returns a packet as the basic data, and the packet header is represented by the symbol "\$", and the packet header is represented by the symbol "\$", and the packet header is represented by the symbol "\$".

The end of the package is represented by the line break "\n", and the elements in the package content are separated by the English comma ",". The description is as follows:

1.1 Send command format

```
$[Command],[Option],[Parameter 1],[Parameter n]\n
```

1.2 Return data format

The return data is formatted slightly differently from the send format for easy recognition by the host computer, and for illustration purposes, the semicolon ";" and its contents after the same line represent comments:

`$start, [package name]\n`; Each line starts with "\$" and ends with "\n".

The "start" stands for the beginning.

`[$[package content]\n`; package content elements are separated by comma ",",

`$end\n`; "end" stands for end of package

1.3 Format Description

1、Not every command must include options and parameters; use them as specified in the command table.

2、The double brackets [] are simply added in this manual for ease of presentation and do not actually need to be entered.

3、Unless otherwise specified, letter cases have the same meaning.

4. If there is an error in the content of the input command, KC901 will return an error message and discard the error packet immediately after the error is found.

5. If there is an error in the input command format, KC901 will discard all the wrong formats and extract only the correct ones.

1.4 Communication routines

If you need to get the system time, you should send the following

command:

```
[$[Command], [Option]]\n
```

```
$date, get\n
```

The following shows the whole process. Purple color means the upper unit sends, and blue color means the lower unit returns.

```
$date, get\n
```

```
$start, date\n
```

```
$2015, 4, 22, 10, 36, 39\n ;representing year, month, day, hour, minute  
and second in that order.
```

```
$end\n
```

1.5. Communication parameters

Baud rate: 115200

Data bits: 8 bits

Stop bit: 1 bit

No calibration.

Instruction cache: 32kb. Instructions entering the cache are executed sequentially and no new instructions are received when the cache is full. Programming should take into account the speed of execution to avoid congestion.

Data cache: 32 kb. Data entering the cache is sent out sequentially and execution is aborted when the cache is full.

Measurement data obtained by remote operation is not strictly trimmed and

requires rounding to the nearest valid digit.

2、 How the host computer connects with KC901

2.1 Installation of USB driver

If the USB port is used for connection, the USB driver should be installed. WINDOWS operating system usually comes with the driver, just connect the USB port of the KC901 to the PC, and the system can automatically install the driver. If the system fails to install it correctly, you can download the driver manually to install it.

Download links: <http://www.ftdichip.com/Drivers/VCP.htm>

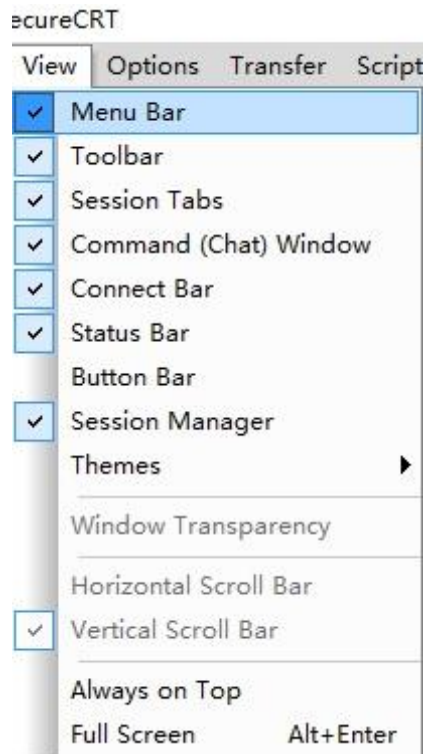
If a network port connection is used, there is no need to install a special driver.

2.2 Use of appropriate debugging software

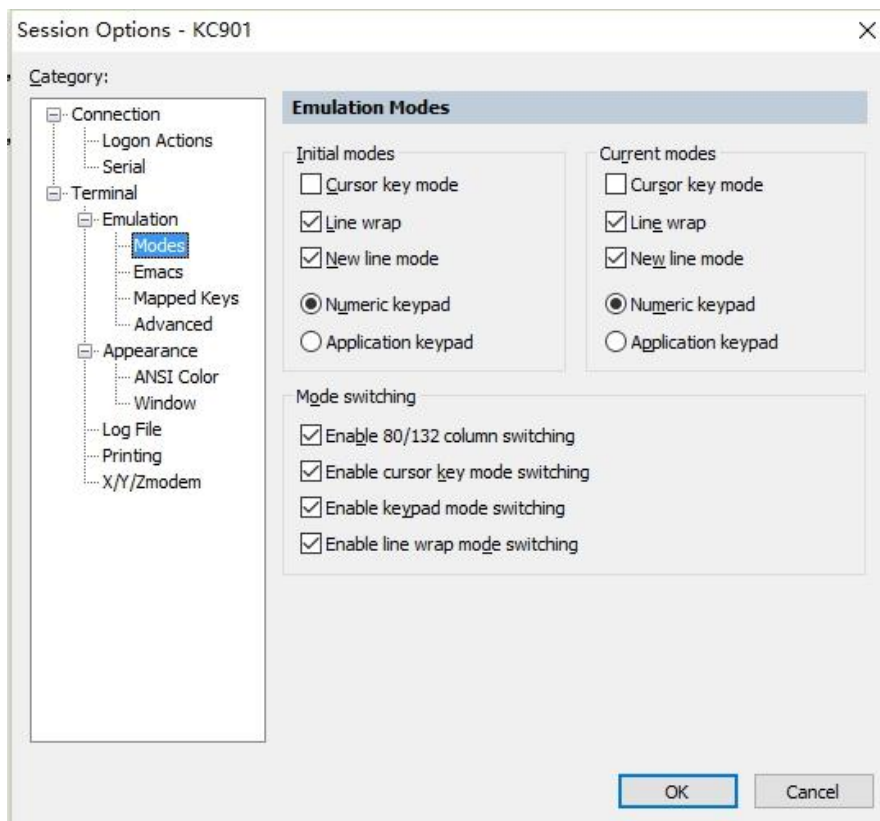
In order to simplify the programming of the host computer, we canceled the **command display**, and **the return character is only the new line character "\n"**. Therefore, if the debugging software is not set, it will affect the display effect.

It is recommended to use SecureCRT debugging tool, which can solve the above problems well. Specifically the following settings.

By checking the [View]->[Command(Chat)Window] option, the command line input window will be opened at the bottom, and you can send the commands by pressing "Enter" after inputting them. And you can use the "up and down arrow keys" to trace the commands you have entered.



By checking [New Line Mode] under [Options] -> [Session Options] -> [Terminal] -> [Emulation] -> [Modes], you can display "\n" as a carriage return. as a carriage return with line feed.



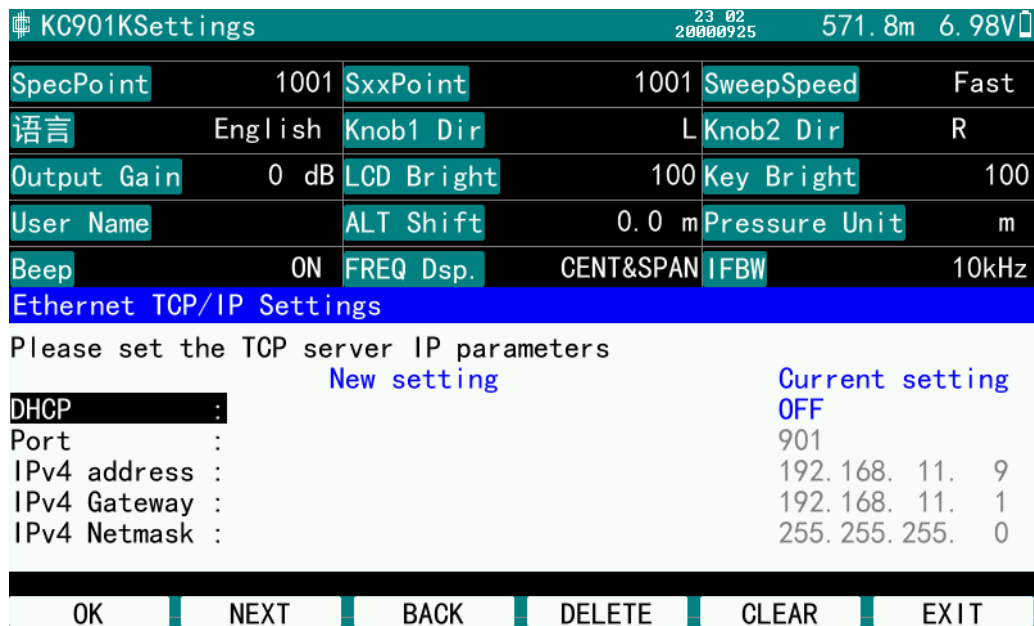
2.3 Operation of the network connection

2.3.1. Turn on the network function

Before connecting to the network, you should adjust the "Network" sub-menu under the "System Settings" (Settings, press **FUNC** to enter) interface to "On" (ON). The "Network" sub-menu under the "System Settings" (Settings, press **FUNC** to enter) interface is adjusted to "On" (ON) status (The fourth generation KC901 does not have this setting, and it will be turned on automatically when you plug in the Internet cable). When the network function is turned on, the yellow light on the network interface will be lit. Since **the network connection consumes more power, the network function should be turned off when the network is not in use.**

2.3.2 Configuring network parameters

Enter the "IP **SET**" submenu under the "System Setup" interface to set the IP parameters of KC901. After setting and saving, the green light on the network port will blink if you successfully connect to the network.



DHCP: Enable to get IP address and gateway dynamically from the router. It is generally recommended to disable DHCP.

Port: The port number set by the software of the host computer needs to be consistent with this parameter, pay attention to avoid conflict with the port of other programs. For the host computer installed with firewall, please release the corresponding port in the firewall.

IPv4 address: Please choose within the range allowed by the network you are accessing, and the address cannot conflict with other devices in the network.

IPv4 Gateway: Please set it according to the parameters of your router. For usual LAN, the gateway is 192.168.1.1 by default.

IPv4 Subnet Mask: Please set it according to the specific situation of the access network, usually 255.255.255.0.

It is usually best to have a router in the network. Both the KC901

and the host computer act as an endpoint in this network. If you wish to connect the KC901 directly to a computer, which is equivalent to a computer connecting directly to a computer, you need to assign different IPs in the same network segment to the computer and the KC901. For some earlier NICs, if the connection does not work, you can try a network cable in reverse order.

2.4 Handshake with KC901

Note: Please make sure that there is no window currently displayed on the KC901 (e.g., "About This Machine"). If handshaking is performed with the KC901 displaying a window, the KC901 will return a warning string:

```
$start,ConFail\n
```

```
$Please exit the window operation first.\n
```

```
$end\n
```

In this case, please exit the window display before performing the handshake operation.

Application control

Send capital C

Wait about 1 second for [KC901] and its serial number to be returned. At this point the KC901 enters telemetry mode.

2.5 Disconnect from KC901

There are two ways to disconnect:

1. The host computer sends a command to disconnect, see

details:3.2.19 Exiting Remote Control Mode .

2. Press [SHIFT]+[MODE] button on 901 to disconnect actively.

If the USB plug is accidentally unplugged during communication or if communication is interrupted for other reasons, the 901 will not be recognized automatically and still needs to be terminated by the [SHIFT]+[MODE] buttons. (The 4th generation KC901 disconnect button is [SHIFT]+[HOME])

2.6 Termination of data return

When the 901 has continuous data return, if you need to terminate the current operation, you need to use the key combination [Ctrl] + [C] (that is, 0x03 in hexadecimal) in the host computer, at this time, the 901 will terminate the execution of commands that have already been received, and send all the data that have been measured, but not yet sent, and then stop returning data.

Attention:

1. When the termination data is returned, the KC901 will completely return to the initial state. For example, if the key combination [Ctrl]+[C] is pressed during data acquisition using the sll RUN command, it is necessary to send sll init again before continuing to run sll run.

2, if you use SecureCRT to debug KC901, you need to use the mouse to click the data display window, and then you can directly [Ctrl]+[C].

3. Instruction Description

In the following, all the instructions of the KC901 are explained in detail and actual running routines are given. For the format of the routines, it is important to note:

1, Purple color represents the host computer sends, and blue color represents the lower unit returns.

2, send and return will be clearly marked carriage return "\n", the actual return invisible.

3. Note that commas are required to separate commands from options and parameters.

4. The use of the semicolon ";" and the content after the peer is a comment and is not part of the actual format.

3.1 Classification of instructions

Instructions can be categorized into the following 3 groups:

1. System Setup Commands

are downstream commands, such as setting LCD brightness and transmitter output attenuation.

2. Measurement control commands

It is a downstream command, e.g., to measure the S-parameter of the corresponding frequency point using the S11 mode.

3. warnings

are upstream commands, such as overload warnings and high temperature warnings.

3.2 System Instructions

3.2.1 System time

command	options (as in computer software settings)	clarification
date	get	Access time
	set	Set the time in the following format: Year Month Day Hour Minute Second xxxx-xx-xx, xx-xx-xx

Routine.

Get the KC901 system time:

```
$date, get\n
```

```
$start, date\n
```

```
$2015, 4, 22, 12, 22, 8\n ;year, month, day, hour, minute and second
```

in that order

```
$end\n
```

Setting time.

```
$date, set, 2016-4-22, 13-51-00 \n
```

Note: The input year should be between 2000 and 2099.

3.2.2 Setting the 901 LCD Language

command	options (as in computer software settings)	clarification
lang	en	Currently supports both Simplified Chinese and English languages
	ch	

Routine:

Setting the display language to English

`$lang, en\n`

3.2.3 Setting the Knob 1 Direction

command	options (as in computer software settings)	clarification
Encoder1	right	Toggle counterclockwise to increase the number
	left	Toggle clockwise to increase quantity

Routine:

Frequency data increases when the setting knob is toggled counterclockwise:

`$encoder1, right\n`

3.2.4 Setting the knob 2 direction

command	options (as in computer software settings)	clarification
Encoder2	right	Toggle counterclockwise to increase the number
	left	Toggle clockwise to increase quantity

Routine:

Frequency data increases when the setting knob is toggled counterclockwise:

`$encoder2, right\n`

3.2.5 Setting the output attenuation

command	options (as in computer software settings)	clarification
outAtt	not have	<p>The range of values for the parameter: kc901k, j, r, t, b :-30~30</p> <p>Unit: dB</p> <p>This output attenuation takes effect in the</p>

		following modes: S11 (reflection). S21 (transmission). S22 (reflective). S12 (Transmission). DTF (fault location).
--	--	---

Routine:

Output Attenuator Setting 10dB Attenuation

`$outAtt, 10\n`

3.2.6 Setting the brightness

command	options (as in computer software settings)	clarification
light	lcd	lcd value range 1-100
	key	The key value ranges from 0 to 100.

Routine:

Setting the monitor brightness to 100%

`$light, lcd, 100\n`

3.2.7 Barometers

command	options (as in computer software settings)	parameter s	clarification
press	set	numerical value	Set absolute height compensation in m, range: -999.9–999.9 Note: When altitude compensation is set, the altitude data read will slowly change to the compensated value (because the data has a sliding filter to ensure stability).
	get	not have	Reads barometric pressure data and returns hPa and m units in turn

Routine:

Altitude compensation plus 100 meters

```
$press, set, 100.0\n
```

Read barometric pressure test data and ask for the value in
hectopascals to be returned

```
$press, get\n
```

```
$start, press\n
```

```
$950.412, 536.802\n ;in order of barometric pressure (hPa) and  
elevation (m)
```

```
$end\n
```

3.2.8 Key Beeps

command	options (as in computer software settings)	clarification
beep	off	off->off
	on	on->open

Routine:

Turn on key beeps

`$beep, on\n`

3.2.9 S11 cable compensation

command	options (as in computer software settings)	clarification
cable	len	Cable length in meters, range 0-99.999
	loss	Cable attenuation in dB, range 0-99.99
	freq	Frequency corresponding to cable attenuation in MHz, range 1-10000

Routine:

Set the cable length compensation value to 10.123 meters

`$cable, len, 10.123\n`

3.2.10 S11 system calibration component parameters

The KC901K/RFMA uses a standard calibration model:

command	options (as in computer software settings)	clarification
kit_s11	not have	<p>Enter the short-circuit and open-circuit calibration device parameters in sequence.</p> <p>where the parameters of the short-circuited parts are in order:</p> <p>L0, L1, L2, L3, one-way electrical length (mm), total loss (GΩ/m)</p> <p>The parameters of the open-circuit calibration parts are in order:</p> <p>C0, C1, C2, C3, one-way electrical length (mm), total loss (GΩ/m)</p> <p>Range of values:</p> <p>L0~L3, C0~C3 range: -9999.999 - +9999.999, the index is the same as that displayed in the</p>

		<p>setting interface of the instrument calibration device, no need to set.</p> <p>One-way electrical length range: 0 – 999.999</p> <p>Total loss range: 0 – 9999.999</p> <p>Note: The setting here is the calibration data of the system calibration, which corresponds to the setting under the system calibration interface entered by pressing [SHIFT]+[7] in the [System Setup] interface (instead of the user calibration setting under the [System Setup] interface).</p>
--	--	--

Routine:

Setting the electrical length of short circuit, open circuit and load calibration parts in order: 5.25mm, 5.26mm

// L0,L1 , L2,L3, mm, GΩ/m C0, C1, C2, C3, mm, GΩ/m

\$kit_s11,10,125,-20,15,5.25,0.201,100,125,-800,15,5.26,0.200\n

The KC901K uses a simple calibration model:

command	options (as in computer software settings)	clarification
---------	--	---------------

kit_s11	not have	<p>Enter the short circuit, open circuit, and load calibrator electrical length parameters in sequence.</p> <p>Input range: 0–99.99 (unit: mm)</p> <p>Note: The setting here is the calibration data of the system calibration, which corresponds to the setting under the system calibration interface entered by pressing [SHIFT]+[7] in the [System Setup] interface (instead of the user calibration setting under the [System Setup] interface).</p>
---------	----------	--

Routine:

Setting short circuit, open circuit and load calibration device electrical length in order: 0.12mm, 0.34mm, 0.56mm

`$kit_s11,0.12,0.34,0.56\n`

3.2.11 Parameters of the S21 system calibrator

command	options (as in computer software settings)	clarification
---------	--	---------------

kit_s21	not have	<p>Enter the calibrator length and the calibrator attenuation in order.</p> <p>Length range:0-999.999(unit:mm)</p> <p>Attenuation range:0-99.9999(unit:dB)</p> <p>Frequency at which attenuation is located: 1-10000 (unit: MHz)</p>
---------	----------	--

Routine:

Set the length of the calibration piece to 100.00mm with 0.1dB attenuation, located at frequency 4567MHz

`$kit_s21,100,0.1,4567\n`

3.2.12 S11 user calibration parameters

The KC901K/RFMA uses a complex calibration model:

command	optio ns (as in compu ter softw are setti	clarification
---------	---	---------------

	ngs)	
userkit_s11	not have	<p>Enter the short-circuit and open-circuit calibration device parameters in sequence.</p> <p>where the parameters of the short-circuited parts are in order:</p> <p>L0,L1,L2,L3, one-way electrical length (mm), total loss (GΩ/m)</p> <p>The parameters of the open-circuit calibration parts are in order:</p> <p>C0,C1,C2,C3, one-way electrical length (mm), total loss (GΩ/m)</p> <p>Range of values:</p> <p>L0~L3, C0~C3 range: -9999.999 - +9999.999</p> <p>One-way electrical length range: 0 - 999.999</p> <p>Total loss range: 0 - 9999.999</p> <p>Note: The setting here is the calibration data for user calibration, which corresponds to the user calibration setting in the [System Settings] screen on the instrument interface.</p>

Routine:

Setting the electrical length of short circuit, open circuit and load calibration parts in order: 5.25mm, 5.26mm

// L0,L1 , L2,L3, mm, GΩ/m C0, C1, C2, C3, mm, GΩ/m

`$userkit_s11,10,125,-20,15,5.25,0.201,100,125,-800,15,5.26,0.200\n`

3.2.13 S21 user calibration parameters

command	options (as in computer software settings)	clarification
userkit_s21	not have	Enter the calibrator length and the calibrator attenuation in order. Length range:0-999.999 (unit:mm) Attenuation range:0-99.9999 (unit:dB) Frequency at which attenuation is located: 1-10000 (unit: MHz)

Routine:

Set the length of the calibration piece to 100.00mm with 0.1dB attenuation,
located at frequency 4567MHz

`$userkit_s21,100,0.1,4567\n`

3.2.14 Obtaining equipment information

Send command	options (as in computer software settings)	clarification
device	not have	will return the string description

Description:

When this test command is received, the KC901 returns in the following format:

```

$start, device\n
$<-----KC901 network analyzer----->\n
$<-User @ :Instrument Owner Name>\n
$<-SoftWare Ver:Software Version Number ----->\n
$<-HardWare Ver:Hardware version number ----->\n
$<-Serial num:Serial number ----->\n
$<-Copyright:KeXinShe Co., Ltd & KeChuang measurement association>\n
$<----->\n
$end\n

```

Example:

`$device\n`

```

$start, device\n
$<-----KC901 network analyzer----->\n
$<-User @ :BBBB567895>\n

```

```

$<-Software ver:V2.0.8----->\n
$<-Hardware ver:MB-V1.2 RB-V1.1----->\n
$<-Serial num:002015123456----->\n
$<-Copyright:KeXinShe Co., Ltd & KeChuang measurement association>\n
$<----->\n
$end\n

```

3.2.15 Obtaining voltage

command	options (as in computer software settings)	Data description
voltage	not have	Returns the external voltage and the battery voltage in turn, in V

Routine:

Read battery voltage

```
$voltage\n
```

```
$start, voltage\n
```

```
$10.82, 8.06\n ;external voltage and battery voltage in that order
```

```
$end\n
```

3.2.16 Obtaining the temperature inside the machine

Send command	options (as in computer software settings)	Data description
temp	not have	Unit: ° C

Routine:

Read the temperature inside the machine

`$temp\n`

`$start, temp\n`

`$44.2\n`

`$end\n`

3.2.17 Obtaining the 901 time parameter

Send command	options (as in computer software settings)	Data description
times	not have	The number of times it has been turned on, the

		current running time, and the total time it has been used, in that order.
--	--	---

Routine:

Read time parameters

\$times\n

\$start,times\n

\$1223,2,52,51,2,2,52,51\n ;in order of the number of times the power is turned on, the time of the power on (hours, minutes, seconds).

; Time of use (days, hours, minutes, seconds)

\$end\n

3.2.18 Setting the Reference Level in Spectrum Mode

command	options (as in computer software settings)	clarification
specref	not have	Parameter value range (+10) - (-50), unit: dBm

Routine:

Set the reference level to -10dBm

\$specref, -10 \n

3.2.19 Exiting Remote Control Mode

command	options	clarification
---------	---------	---------------

	(as in computer software settings)	
local	not have	Disconnect upper control

Routine:

`$local\n`

Processing.

Upon receiving the command, KC901 will immediately stop all current actions and hand over the control to KC901 itself.

3.2.20 Setting Network Parameters

command	options (as in computer software settings)	clarification
netinfo	not have	View current network settings
ip	not have	device address
gw	not have	gateway address
msk	not have	subnet mask
port	not have	Port number (less than 65535)

Routine:

To view current network settings.

```
$netinfo\n
```

```
$start,NetInfo\n
```

```
$192,168,1,2\n ;IP address
```

```
$192,168,1,1\n ;Gateway address
```

```
$255,255,255,0\n ;Submask code
```

```
$901\n ;Port number
```

```
$end\n
```

Set the IP address:

```
$ip,192.168.1.2\n
```

Set the gateway address:

```
$gw,192.168.1.1\n
```

Sets the submask code:

```
$msk,255.255.255.0\n
```

Set the port number:

```
$port,901\n
```

3. 2. 21 Setting the bandwidth

command	options (as in computer software settings)	clarification
---------	--	---------------

bw	1k	Setting the IF filter bandwidth
	3k	
	10k	
	30k	

Routine:

Set the bandwidth to 10kHz

`$bw,10k\n`

3.2.22 Remote upgrade (USB serial connection only)

Send command	options (as in computer software settings)	clarification
update	not have	Upgrade code via SD card

Description:

Before sending this command, **please make sure the upgrade program has been loaded in the SD card.** After sending the command, KC901 will automatically reboot into remote upgrade mode. During the upgrade process, it will return to the upgrade process through the serial port, from which you can see whether the upgrade is successful or failed.

Caution.

- 1、 When in the process of remote upgrade, if there is an accident that causes

the device to die and other circumstances. **Restart the instrument can automatically re-upgrade.**

Routine:

`$update\n`

2. During the upgrade process, the baud rate of the serial port is **fixed** at **115200!**

3. 2. 23 Restoring factory settings

Send command	options (as in computer software settings)	clarification
reset	not have	Restore all settings and replace system calibration with factory calibration

Routine:

`$reset\n`

`$start,reset\n` ;for the host computer programming, only need to recognize the packet header [reset] can be, do not need to match the content of the string

`$Restore the factory settings,confirm?[Yes/no]\n` ;Wait for the user to confirm.

`$end\n`

`$yes\n` or `$no\n`

Caution.

After restoring to factory settings, the network configuration parameters will

also be factory settings and may need to be reconfigured.

3.2.24 S11 system calibration

Send command	options (as in computer software settings)	clarification
cal_sys_s11	not have	S11 system calibration

Description:

After sending this command, the KC901 will interact with the user via the serial or network port to realize the SOL calibration. This calibration data will be recalled by default in all future applications. The user can use the [Reset] command to restore the factory calibration by default. There will be several interactions in this process, and for the host computer programming, it only needs to recognize the packet header name, no need to do the content string matching.

Note: This calibration can only be performed once after each initialization, if a re-calibration is required, run \$S11, STOP\n and re-initialize (\$S11, INIT\n).

Below is the exact process:

```
$ cal_sys_s11 \n
```

```
$start,s11_SysCal_confirm\n
```

```
$*****S11 System calibration*****\n
```

```
$ Do you want to calibrate the device? [Yes/no]\n
```

```
$end\n
```

```
$yes\n
```

```
$start,s11_syscal_wait\n
```

```
$ waiting for the circuit to be stability... \n
```

```
$end\n
```

```
$start,port_polarity\n
```

```
$Enter female or male to specify the polarity of the PORT1:\n
```

```
$end\n
```

```
$female\n
```

```
$start,cal_open\n
```

```
$Step 1:Please connect the OPEN module to PORT1 then send 'yes'. \n
```

```
$end\n
```

```
$yes\n
```

```
$start,cal_short\n
```

```
$Step 2:Please connect the SHORT module to PORT1 then send 'yes'. \n
```

Send\n

\$yes\n

\$start,cal_load\n

\$Step 3:Please connect the LOAD module to PORT1 then send 'yes'. \n

Send\n

\$yes\n

\$start,cal_completed\n

\$Calibration completed!\n

Send\n

While the lower unit is waiting for confirmation from the upper unit, the user can exit the calibration mode by entering 'exit\n'. As shown below:

\$exit\n

\$start,exit\n

\$Exit calibration\n

Send\n

3. 2. 25 S21 system calibration

Send command	options (as in computer software	clarification
--------------	----------------------------------	---------------

	re settin gs)	
cal_sys_s21	not have	S21 System Calibration

Description:

After sending this command, the KC901 will interact with the user via the serial port or the network port to realize the short-circuit calibration. This calibration data will be recalled by default in all future applications. The user can use the [Reset] command to restore the factory calibration by default. There will be several interactions in this process, and **for the host computer programming, it only needs to recognize the packet header name, no need to do the content string matching.**

Note:This calibration **can only be performed once after each initialization**, if recalibration is required, run \$S21,STOP\n and reinitialize (\$S21,INIT\n).

Below is the exact process:

```
$ cal_sys_s21 \n
```

```
$start,s21_SysCal_confirm\n
```

```
$*****S21 System calibration*****\n
```

```
$ Do you want to calibrate the device? [Yes/no]\n
```

\$end\n

\$yes\n

\$start,s21_syscal_wait\n

\$ waiting for the circuit to be stability... \n

\$end\n

\$start,port_polarity\n

\$Enter female,male or f_m to specify the polarity of the PORTS:\n

\$end\n

\$female\n

\$start,cal_connect\n

\$Step 1:Please connect PORT1 and PORT2 then send 'yes'. \n\$Step 1:Please connect PORT1 and PORT2 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_completed\n

\$Calibration completed!\n

\$end\n

While the lower unit is waiting for confirmation from the upper unit, the user can exit the calibration mode by entering 'exit\n'. As shown below:

\$exit\n

\$start,exit\n

\$Exit calibration.\n

\$end\n

3.2.26 S22 system calibration

Send command	options (as in computer software settings)	clarification
cal_sys_s22	not have	S22 System Calibration

Description:

After sending this command, the KC901 will interact with the user via the serial or network port to realize the SOL calibration. This calibration data will be recalled by default in all future applications. The user can use the [Reset] command to restore the factory calibration by default. There will be several interactions in this process, and for the host computer programming, it only needs to recognize the packet header name, no need to do the content string matching.

```
$cal_sys_s22\n
```

```
$start,s22_SysCal_confirm\n
```

```
$*****S22 System calibration*****\n
```

```
$Do you want to calibrate the device? [Yes/no]\n
```

```
$end\n
```

```
$yes\n
```

```
$start,s22_syscal_wait\n
```

```
$ waiting for the circuit to be stability... \n
```

```
$end\n
```

```
$start,port_polarity\n
```

```
$Enter female or male to specify the polarity of the PORT2:\n
```

\$end\n

\$female\n

\$start,cal_open\n

\$Step 1:Please connect the OPEN module to PORT2 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_short\n

\$Step 2:Please connect the SHORT module to PORT2 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_load\n

\$Step 3:Please connect the LOAD module to PORT2 then send 'yes'. \n

\$end\n

\$start,cal_completed\n

\$Calibration completed!\n

\$end\n

While the lower unit is waiting for confirmation from the upper unit, the user can exit the calibration mode by entering 'exit\n'. As shown below:

\$exit\n

\$start,exit\n

\$Exit calibration\n

\$end\n

3. 2. 27 S12 system calibration

Send command	options (as in computer software are settings)	clarification
cal_sys_s12	not have	S12 system calibration

Description:

After sending this command, the KC901 will interact with the user via the serial or network port to realize the SOL calibration. This calibration data will be recalled by default in all future applications. The user can use the [Reset] command to restore the factory calibration by default. There will be several interactions in this process, and for the host computer programming, it only needs to recognize the packet header name, no need to do the content string matching.

\$cal_sys_s12\n

\$start,s12_SysCal_confirm\n

\$*****S12 System calibration***** \n

\$Do you want to calibrate the device? [Yes/no]\n

\$end

\$yes\n

\$start,s12_syscal_wait\n

\$ waiting for the circuit to be stability... \n

\$end\n

\$start,port_polarity\n

\$Enter female,male or f_m to specify the polarity of the PORTS:\n

\$end\n

\$female\n

\$start,cal_connect\n

\$Step 1:Please connect PORT1 and PORT2 then send 'yes'. \n\$Step 1:Please connect PORT1 and PORT2 then send 'yes'.

\$end\n

\$yes\n

\$start,cal_completed\n

\$Calibration completed!\n

\$end\n

While the lower unit is waiting for confirmation from the upper unit, the user can exit the calibration mode by entering 'exit\n'. As shown below:

\$exit\n

\$start,exit\n

\$Exit calibration\n

\$end\n

3.2.28 S11 calibration

Send command	Parameter 1	Parameter 2	Parameter 3	Parameter 4
cal_user_s11	check numbers	Frequency mode	Center frequency/ starting frequency	Sweep width/termination frequency

Description:

After sending this command, the KC901 will interact with the user via the serial or network port to realize SOL calibration. In future applications, if it is specified to call S11 user calibration, the calibration data will be called by default, but if the frequency range is out of the calibration range, the system calibration will be called. There will be several interactions during the calibration process, and **only the packet header name needs to be recognized for the host computer programming, there is no need to do content string matching.**

```
$cal_user_s11,10,cs,901000000,10000000\n
```

```
$start,s11_Cal_confirm\n
```

```
$*****S11 calibration*****\n
```

```
$Do you want to calibrate the device? [Yes/no]\n
```

```
$end
```

```
$yes\n
```

\$start,s11_cal_wait\n

\$ waiting for the circuit to be stability... \n

\$end\n

\$start,port_polarity\n

\$Enter female or male to specify the polarity of the PORT1:\n

\$end\n

\$female\n

\$start,cal_open\n

\$Step 1:Please connect the OPEN module to PORT1 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_short\n

\$Step 2:Please connect the SHORT module to PORT1 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_load\n

\$Step 3:Please connect the LOAD module to PORT1 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_completed\n

\$Calibration completed!\n

\$end\n

While the lower unit is waiting for confirmation from the upper unit, the user can exit the calibration mode by entering 'exit\n'. As shown below:

\$exit\n

\$start,exit\n

\$Exit calibration\n

\$end\n

3.2.29 S22 calibration

Send command	Parameter 1	Parameter 2	Parameter 3	Parameter 4
cal_user_s22	check numbers	Frequency mode	Center frequency/ starting frequency	Sweep width/termination frequency

Description:

After sending this command, the KC901 will interact with the user via the serial or network port to realize SOL calibration. In future applications, if it is specified to call S22 user calibration, the calibration data will be called by default, but if the frequency range is out of the calibration range, the system calibration will be called. There will be several interactions during the calibration process, and for the host computer programming it is only necessary to recognize the packet header name, no need to do content string matching.

```
$cal_user_s22,10,cs,901000000,10000000\n
```

```
$start,s22_Cal_confirm\n
```

```
$*****S22 calibration***** \n
```

```
$Do you want to calibrate the device? [Yes/no]\n
```

```
$end
```

```
$yes\n
```

```
$start,s22_cal_wait\n
```

```
$ waiting for the circuit to be stability... \n
```

```
$end\n
```

\$start,port_polarity\n

\$Enter female or male to specify the polarity of the PORT2:\n

\$end\n

\$female\n

\$start,cal_open\n

\$Step 1:Please connect the OPEN module to PORT2 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_short\n

\$Step 2:Please connect the SHORT module to PORT2 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_load\n

\$Step 3:Please connect the LOAD module to PORT2 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_completed\n

\$Calibration completed!\n

\$end\n

While the lower unit is waiting for confirmation from the upper unit, the user can exit the calibration mode by entering 'exit\n'. As shown below:

\$exit\n

\$start,exit\n

\$Exit calibration\n

\$end\n

3.2.30 S21 response calibration

Send command	Parameter 1	Parameter 2	Parameter 3	Parameter 4
response_s21_cal	check number s	Frequency mode	Center frequency/starting frequency	Sweep width/termination frequency

Description:

After sending this command, the KC901 will interact with the user

via the serial or network port to realize SOL calibration. In future applications, if it is specified to call S21 in response to calibration, the calibration data will be called by default, but if the frequency range is out of the calibration range, the system calibration will be called. There will be several interactions during the calibration process, and for the host computer programming it is only necessary to recognize the packet header name, no need to do content string matching.

```
$response_s21_cal,10,cs,901000000,10000000\n
```

```
$start,s21_Cal_confirm\n
```

```
$*****S21 Response calibration*****\n
```

```
$Do you want to calibrate the device? [Yes/no]\n
```

```
$end
```

```
$yes\n
```

```
$start,s21_response_cal_wait\n
```

```
$ waiting for the circuit to be stability... \n
```

```
$end\n
```

```
$start,port_polarity\n
```

```
$Enter female,male or f_m to specify the polarity of the PORTS:\n
```

\$end\n

\$female\n

\$start,cal_connect\n

\$Step 1:Please connect PORT1 and PORT2 then send 'yes'. \\\\$Step 1:Please connect PORT1 and PORT2 then send 'yes'.

\$end\n

\$yes\n

\$start,cal_completed\n

\$Calibration completed!\n

\$end\n

While the lower unit is waiting for confirmation from the upper unit, the user can exit the calibration mode by entering 'exit\n'. As shown below:

\$exit\n

\$start,exit\n

\$Exit calibration\n

\$end\n

3.2.31 S21 response plus isolation calibration

Send command	Parameter 1	Parameter 2	Parameter 3	Parameter 4
iso_response_s21_cal	check numbers	Frequency mode	Center frequency/ starting frequency	Sweep width/termination frequency

Description:

After sending this command, the KC901 will interact with the user via the serial or network port to realize the SOL calibration. In future applications, if it is specified to call S21 response + isolation calibration, it will call this calibration data by default, but if the frequency range is beyond the calibration range, it will call the system calibration. There will be several interactions during the calibration process, and for the host computer programming it is only necessary to recognize the packet header name, no need to do content string matching.

```
$iso_response_s21_cal,10,cs,901000000,10000000\n
```

```
$start,s21_Cal_confirm\n
```

```
$*****S21 Response+Isolation calibration*****\n
```

```
$Do you want to calibrate the device? [Yes/no]\n
```

Send\n

Yes\n

\$start,s21_response_isolation_cal_wait\n

\$ waiting for the circuit to be stability... \n

Send\n

\$start,port_polarity\n

\$Enter female,male or f_m to specify the polarity of the PORTS:\n

Send\n

female\n

\$start,cal_load\n

\$Step 1:Please connect the LOAD module to PORT1 then send 'yes'. \n

Send\n

Yes\n

\$start,cal_connect\n

\$Step 2:Please connect PORT1 and PORT2 then send 'yes'. \n\$Step 2:Please connect PORT1 and PORT2 then send 'yes'. \n

Send\n

\$yes\n

\$start,cal_completed\n

\$Calibration completed!\n

\$end\n

While the lower unit is waiting for confirmation from the upper unit, the user can exit the calibration mode by entering 'exit\n'. As shown below:

\$exit\n

\$start,exit\n

\$Exit calibration\n

\$end\n

3. 2. 32 S21 Enhanced Response Calibration

Send command	Parameter 1	Parameter 2	Parameter 3	Parameter 4
enresponse_s21_cal	check numbers	Frequency mode	Center frequency/ starting frequency	Sweep width/termination frequency

Description:

After sending this command, the KC901 will interact with the user via the serial or network port to implement the SOL calibration. In future applications, if it is specified to call S21 Enhanced Response Calibration, this calibration data will be called by default, but if the frequency range is out of the calibration range, the system calibration will be called. There will be several interactions during the calibration process, and for the host computer programming it is only necessary to recognize the packet header name, no need to do content string matching.

```
$enresponse_s21_cal,10,cs,901000000,10000000\n
```

```
$start,s21_Cal_confirm\n
```

```
$*****S21 Enhance Response calibration*****\n
```

```
$Do you want to calibrate the device? [Yes/no]\n
```

```
$end\n
```

```
$yes\n
```

```
$start,s21_enhance_response_cal_wait\n
```

```
$ waiting for the circuit to be stability... \n
```

```
$end\n
```

\$start,port_polarity\n

\$Enter female or male to specify the polarity of the PORT1:\n

\$end\n

\$female\n

\$start,cal_open\n

\$Step 1:Please connect the OPEN module to PORT1 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_short\n

\$Step 2:Please connect the SHORT module to PORT1 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_load\n

\$Step 3:Please connect the LOAD module to PORT1 then send 'yes'. \n

\$end\n

\$yes\n

\$start,port_polarity\n

\$Enter female,male or f_m to specify the polarity of the PORTS:\n

\$end\n

\$female\n

\$start,cal_connect\n

\$Step 4:Please connect PORT1 and PORT2 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_completed\n

\$Calibration completed!\n

\$end\n

While the lower unit is waiting for confirmation from the upper unit, the user can exit the calibration mode by entering 'exit\n'. As shown below:

\$exit\n

\$start,exit\n

\$Exit calibration\n

\$end\n

3.2.33 S12 Response Calibration

Send command	Parameter 1	Parameter 2	Parameter 3	Parameter 4
response_s12_cal	check number s	Frequency mode	Center frequency/starting frequency	Sweep width/termination frequency

Description:

After sending this command, the KC901 will interact with the user via the serial or network port to realize SOL calibration. In future applications, if it is specified to call S12 in response to calibration, the calibration data will be called by default, but if the frequency range is out of the calibration range, the system calibration will be called. There will be several interactions during the calibration process, and for the host computer programming it is only necessary to recognize the packet header name, no need to do content string matching.

```
$response_s12_cal,10,cs,901000000,10000000\n
```

```
$start,s12_Cal_confirm\n
```

```
$*****S12 Response calibration*****\n
```

```
$Do you want to calibrate the device? [Yes/no]\n
```

\$end\n

\$yes\n

\$start,s12_response_cal_wait\n

\$ waiting for the circuit to be stability... \n

\$end\n

\$start,port_polarity\n

\$Enter female,male or f_m to specify the polarity of the PORTS:\n

\$end\n

\$female\n

\$start,cal_connect\n

\$Step 1:Please connect PORT1 and PORT2 then send 'yes'. \n\$Step 1:Please
connect PORT1 and PORT2 then send 'yes'.

\$end\n

\$yes\n

\$start,cal_completed\n

\$Calibration completed!\n

\$end\n

While the lower unit is waiting for confirmation from the upper unit, the user can exit the calibration mode by entering 'exit\n'. As shown below:

\$exit\n

\$start,exit\n

\$Exit calibration\n

\$end\n

3. 2. 34 S12 Response Plus Isolation Calibration

Send command	Parameter 1	Parameter 2	Parameter 3	Parameter 4
iso_response_s12_cal	check numbers	Frequency mode	Center frequency/ starting frequency	Sweep width/termination frequency

Description:

After sending this command, the KC901 will interact with the user via the serial or network port to realize the SOL calibration. In future applications, if it is specified to call S12 response + isolation calibration, it will call this calibration data by default,

but if the frequency range is out of the calibration range, it will call the system calibration. There will be several interactions during the calibration process, and for the host computer programming it is only necessary to recognize the packet header name, no need to do content string matching.

```
$iso_response_s12_cal,10,cs,901000000,10000000\n
```

```
$start,s12_Cal_confirm\n
```

```
$*****S12 Response+Isolation calibration*****\n
```

```
$Do you want to calibrate the device? [Yes/no]\n
```

```
$end\n
```

```
$yes\n
```

```
$start,s12_response_isolation_cal_wait\n
```

```
$ waiting for the circuit to be stability... \n
```

```
$end\n
```

```
$start,port_polarity\n
```

```
$Enter female,male or f_m to specify the polarity of the PORTS:\n
```

```
$end\n
```

```
$female\n
```

\$start,cal_load\n

\$Step 1:Please connect the LOAD module to PORT2 then send 'yes'. \nStep 1:Please connect the LOAD module to PORT2 then send 'yes'.

\$end\n

\$yes\n

\$start,cal_connect\n

\$Step 2:Please connect PORT1 and PORT2 then send 'yes'. \nStep 2:Please connect PORT1 and PORT2 then send 'yes'.

\$end\n

\$yes\n

\$start,cal_completed\n

\$Calibration completed!\n

\$end\n

While the lower unit is waiting for confirmation from the upper unit, the user can exit the calibration mode by entering 'exit\n'. As shown below:

\$exit\n

\$start,exit\n

\$Exit calibration\n

\$end\n

3. 2. 35 S12 Enhanced Response Calibration

Send command	Parameter 1	Parameter 2	Parameter 3	Parameter 4
enresponse_s12_cal	check numbers	Frequency mode	Center frequency/ starting frequency	Sweep width/termination frequency

Description:

After sending this command, the KC901 will interact with the user via the serial or network port to realize the SOL calibration. In future applications, if it is specified to call S12 Enhanced Response Calibration, the calibration data will be called by default, but if the frequency range is out of the calibration range, the system calibration will be called. There will be several interactions during the calibration process, and for the host computer programming it is only necessary to recognize the packet header name, no need to do content string matching.

\$enresponse_s12_cal,10,cs,901000000,10000000\n

\$start,s12_Cal_confirm\n

\$*****S12 Enhance Response calibration*****\n

\$Do you want to calibrate the device? [Yes/no]\n

\$end\n

\$yes\n

\$start,s12_enhance_response_cal_wait\n

\$ waiting for the circuit to be stability... \n

\$end\n

\$start,port_polarity\n

\$Enter female or male to specify the polarity of the PORT2:\n

\$end\n

\$female\n

\$start,cal_open\n

\$Step 1:Please connect the OPEN module to PORT2 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_short\n

\$Step 2:Please connect the SHORT module to PORT2 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_load\n

\$Step 3:Please connect the LOAD module to PORT2 then send 'yes'. \n

\$end\n

\$yes\n

\$start,port_polarity\n

\$Enter female,male or f_m to specify the polarity of the PORTS:\n

\$end\n

\$female\n

\$start,cal_connect\n

\$Step 4:Please connect PORT1 and PORT2 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_completed\n

\$Calibration completed!\n

\$end\n

While the lower unit is waiting for confirmation from the upper unit, the user can exit the calibration mode by entering 'exit\n'. As shown below:

\$exit\n

\$start,exit\n

\$Exit calibration\n

\$end\n

3.2.36 Full Dual Port Calibration

Send command	Parameter 1	Parameter 2	Parameter 3	Parameter 4
full2port_cal	check numbers	Frequency mode	Center frequency/ starting frequency	Sweep width/termination frequency

Description:

After sending this command, the KC901 will interact with the user via the serial or network port to realize SOL calibration. In future

applications, if it is specified to call full two-port calibration, the calibration data will be called by default, but if the frequency range is out of the calibration range, the system calibration will be called. There will be several interactions during the calibration process, and for the host computer programming it is only necessary to recognize the packet header name, no need to do content string matching.

```
$full2port_cal,10,cs,901000000,10000000\n
```

```
$start,full2port_Cal_confirm\n
```

```
$*****Full 2-Port calibration*****\n
```

```
$Do you want to calibrate the device? [Yes/no]\n
```

```
$end\n
```

```
$yes\n
```

```
$start,full2port_cal_wait\n
```

```
$ waiting for the circuit to be stability... \n
```

```
$end\n
```

```
$start,port_polarity\n
```

```
$Enter female or male to specify the polarity of the PORT1:\n
```

\$end\n

\$female\n

\$start,cal_open\n

\$Step 1:Please connect the OPEN module to PORT1 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_short\n

\$Step 2:Please connect the SHORT module to PORT1 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_load\n

\$Step 3:Please connect the LOAD module to PORT1 then send 'yes'. \n

\$end\n

\$yes\n

\$start,port_polarity\n

\$Enter female or male to specify the polarity of the PORT2:\n

\$end\n

\$female\n

\$start,cal_open\n

\$Step 4:Please connect the OPEN module to PORT2 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_short\n

\$Step 5:Please connect the SHORT module to PORT2 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_load\n

\$Step 6:Please connect the LOAD module to PORT2 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_connect\n

\$Step 7:Please connect PORT1 and PORT2 then send 'yes'. \n

\$end\n

\$yes\n

\$start,cal_completed\n

\$Calibration completed!\n

\$end\n

While the lower unit is waiting for confirmation from the upper unit, the user can exit the calibration mode by entering 'exit\n'. As shown below:

\$exit\n

\$start,exit\n

\$Exit calibration\n

\$end\n

3.2.37 Getting system warning messages

Send command	options (as in computer software	clarification
-----------------	---	---------------

	settings)	
getstatus	not have	Get System Warning Information

Description:

After sending this command, KC901 will return the system warning message once via serial port or network port if there is a warning message, and no return when there is no warning message.

Routine:

\$getstatus\n

\$start,err_BatVolLow

\$error:Low battery!

\$end

3.2.38 Clearing the System Warning Message Flag Bit

Send command	options (as in compute r softwar e setting s)	clarification
clearstatus	not have	Clear system warning message flag bit

Description:

This command returns nothing.

Routine:

`$clearstatus\n`

3.3 Control instructions

3.3.1 Obtaining S11 measurement parameters

There are also parameters associated with this function as well:

[3.2.5 Setting output attenuation](#), [3.2.9 Cable compensation](#)

command	options (as in computer software settings)	Parameter 1	Parameter 2	Parameter 3	Parameter 4	Parameter 5	Parameter 6
S11	init	s11cal	ri				
	run	full2portcal syscal cal0ff	ma VSWR	**	CS SS	**	**

	stop		z loss				
--	------	--	-----------	--	--	--	--

Description:

1、 Options:

init->initialize S11 function (**this command must be used before using the S11 function**)

run->run S11 for sweep acquisition

stop->Stop and disable S11 function (**this command must be used before using other working modes**)

2、 Parameter 1:

sl1cal-> turn on sl1 calibration

full2portcal-> turn on full dual port calibration

syscal-> turn on system calibration

caloff->Disable system calibration

3、 Parameter 2:

ri->return data in real and imaginary parts

ma->return data with reflection coefficient and angle

vswr->returns data in voltage standing wave ratio

z->return data in impedance

loss->return data as return loss (logarithmic value)

4、 Parameter 3 is used to set the number of points to be scanned, which supports a maximum of 10001 points at present. If the number of points to be scanned is more than 10001, the S11 command can be

used several times to perform segmented scanning.

It is possible to measure only 1 point, in which case the measurement is performed continuously and the instrument continuously sends the measurement result of one frequency to the host computer.

5、Parameter 4:

cc→ Determine the sweep range in terms of cent and span

ss→ Determine sweep range in terms of start and stop

If parameter 3 is set to scan only 1 frequency point, both cs and ss can be selected for parameter 4, and only parameter 5 needs to be entered (cent \ start is fine), and parameter 6 will be parsed by the KC901 as a new command.

6、Parameters 5 and 6 are used to set the center frequency and sweep width (cs) or the start and stop frequencies (ss) in Hz. Depending on the setting of parameter 4, the data only needs to be entered in one of these ways.

The frequency operable range varies depending on the equipment, as shown in the table below:

Center frequency range	
KC901M (RFMA)	9500Hz-9999999500Hz (10GHz-500Hz)
KC901V	5500Hz-6999999500Hz (7GHz-500Hz)
KC901S+	5500Hz-4099999500Hz (4.1GHz - 500Hz)
Sweep Range	

KC901M	1000Hz-9999991000Hz (10GHz-9KHz)
KC901V	1000Hz-6999995000Hz (7GHz-5KHz)
KC901S+	1000Hz-4099995000Hz (4.1GHz - 5KHz)
Starting frequency range	
KC901M	9000Hz-9999999000Hz (10GHz-1KHz)
KC901V	5000Hz-69999999000Hz (7GHz-1KHz)
KC901S+	5000Hz-4099999000Hz (4.1GHz-1KHz)
Termination frequency range	
KC901M	10000Hz-10000000000Hz (10GHz)
KC901V	6000Hz-7000000000Hz (7GHz)
KC901S+	6000Hz-4100000000Hz (4.1GHz)
KC901K	9000Hz-4100000000Hz (4.1GHz)

7. Routines:

When the number of scan points is greater than 1:

```
$s11,run,caloff,ri,2,cs, 100000000,50000000 \n
```

```
$start,s11,ri\n
```

```
$75000000,0.528e0,-0.269e0\n ;in order of frequency, real part,  
imaginary part
```

```
$125000000,0.370e0,-0.475e0\n
```

```
$end\n
```

```
$s11, run, caloff, ma, 2, cs, 100000000, 50000000\n
```

```
$start, s11, ma\n
```

```
$75000000, 5.847e-2, -26.497\n ;in order of frequency, reflection  
coefficient, phase
```

```
$125000000, 5.934e-2, -51.820\n
```

```
$end\n
```

```
$s11, run, caloff, vswr, 2, cs, 100000000, 50000000 \n
```

```
$start, s11, vswr\n
```

```
$75000000, 3.7347\n ;in order of frequency, voltage VSWR
```

```
$125000000, 3.7658\n
```

```
$end\n
```

```
$s11, run, caloff, z, 2, cs, 100000000, 50000000\n
```

```
$start, s11, z\n
```

```
$75000000, 137.9871, 109.6309, -83.7945\n ;in order of frequency, mode  
of impedance, resistance, reactance
```

```
$125000000, 91.2070, 52.7077, -74.4354\n
```

```
$end\n
```

```
$s11, run, caloff, loss, 2, cs, 100000000, 50000000\n
```

```
$start, s11, loss\n
```

```
$75000000, -0.409\n In order of frequency,
```

```
return loss
```

```
$125000000, -0.574\n
```

```
$end
```

When the number of scan points is equal to 1:

S11 belongs to cyclic sampling, and the result of each sample is a packet as follows:

```
$s11, run, caloff, ri, 1, cs, 100000000\n
```

```
$start, s11, ri\n
```

```
$100000000, 0.456e0, -0.391e0\n
```

```
$end\n
```

```
$start, s11, ri\n
```

```
$100000000, 0.458e0, -0.392e0\n
```

```
$end\n
```

3.3.2 Obtaining S21 measurement parameters

Note: There are other parameters associated with this function: [3.2.5](#)

Setting the output attenuation

com man d	opti ons (as in	Parameter 1	Param eter 2	Paramet er 3	Parame ter 4	Parame ter 5	Paramet er 6	Parame ter 7
-----------------	--------------------------	-------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------

	comp uter soft ware sett ings)							
S21	init	rescal	ri					
	run	resisocal	ma	lowlo	**	CS	**	**
		enrescal	vswr	highlo		SS	**	**
stop	full2portcal	z						
		syscal	Loss					
		caloff						

Description:

1. Options:

init->initialize S21 function (**this command must be used before using S21**)

run-> Run S21 function for sweep acquisition

stop->Stop and turn off S21 function (**this command must be used before using other working modes**)

2. Parameter 1:

rescal-> turn on response calibration

resisocal-> turn on response plus isolation calibration

enrescal-> turn on enhanced response calibration

full2portcal-> turn on full dual port calibration

syscal-> turn on system calibration

caloff->Disable system calibration

3. Parameter 2:

ri->return data in real and imaginary parts

ma->return data in transfer coefficients and angles

loss->returns the data as insertion loss (logarithmic value)

4. Parameter 3:

lowlo->Scan at low local oscillations

highlo->Scanning at high local oscillations

5. Parameter 4 is used to set the number of scanning points, currently supporting a maximum of 10001 points. If you need to scan more frequency points, it can be divided into multiple commands and scanned in segments. It can be set to scan 1 point, at this time the instrument will work continuously.

6, Parameter 5:

cs->Determine the sweep range in cent and span

ss-> Determine sweep range in terms of start and stop

If parameter 4 is set to scan only 1 frequency point, both cs and ss can be selected for parameter 5, and only parameter 6 needs to be entered (cent \ start is fine), and parameter 7 will be parsed by the KC901 as a new command.

7、Parameters 6 and 7 are used to transmit specific frequencies in

Hz. Depending on the setting of parameter 5, only one of these formats is required.

The frequency operable range varies depending on the equipment, as shown in the table below:

Center frequency range	
KC901M	500Hz-9999999500Hz (10GHz-500Hz)
KC901V	500Hz-699999999500Hz (7GHz-500Hz)
KC901S+	500Hz-4099999500Hz (4.1GHz -500Hz)
Sweep Range	
KC901M	1000Hz-10000000000Hz (10GHz)
KC901V	1000Hz-7000000000Hz (7GHz)
KC901S+	1000Hz-4100000000Hz (4.1GHz)
Starting frequency range	
KC901M	0-9999999000Hz (10GHz-1KHz)
KC901V	0-699999999000Hz (7GHz-1KHz)
KC901S+	0-4099999000Hz (4.1GHz-1KHz)
Termination frequency range	
KC901M	10000Hz-10000000000Hz (10GHz)
KC901V	1000Hz-7000000000Hz (7GHz)
KC901S+	1000Hz-4100000000 (4.1GHz)
KC901K	9000Hz-4100000000Hz (4.1GHz)

The termination frequency should be greater than the start frequency.

If parameter 4 is set to scan only 1 frequency point, parameter 6 is the value of that frequency point and parameter 7 does not need to be entered.

8. Routines:

When the number of sampling points is greater than 1:

```
$ s21, run, caloff, ri, lowlo, 3, cs, 100000000, 50000000 \n
```

```
$start, s21, ri\n
```

```
$75000000, -0.442e-1, 0.000e0\n ;in order of frequency, real part,  
imaginary part
```

```
$100000000, -0.419e-1, 0.174e-2\n
```

```
$125000000, -0.418e-1, 0.219e-2\n
```

```
$end\n
```

```
$s21, run, caloff, ma, lowlo, 3, cs, 100000000, 50000000\n
```

```
$start, s21, ma\n
```

```
$75000000, 7.097e-1, 180.000\n in order of frequency, interpolation  
loss, phase
```

```
$100000000, 6.758e0, 157.210\n
```

```
$125000000, 6.402e0, 150.816\n
```

```
$end\n
```

```
$s21, run, caloff, vswr, lowlo, 3, cs, 100000000, 50000000
```

```
$start, s21, vswr
```

75000000, 1.001

100000000, 1.001

125000000, 1.001

\$end

\$s21, run, caloff, z, lowlo, 3, cs, 100000000, 50000000

\$start, s21, z

75000000, 49.985, 49.985, -0.040

100000000, 49.987, 49.987, 0.006

125000000, 49.949, 49.949, -0.030

\$end

\$s21, run, caloff, loss, lowlo, 3, cs, 100000000, 50000000

\$start, s21, loss

\$75000000, -116.130 ; in order of frequency, callback loss

\$100000000, -102.054

\$125000000, -112.225

\$end

When the number of scan points is equal to 1:

S21 belongs to cyclic sampling, and the result of each sampling is a packet as follows:

\$s21, run, caloff, ma, lowlo, 1, cs, 100000000 \n

\$start, s21, ma\n

\$100000000, 6. 744e-1, 156. 693\n

\$end\n

\$start, s21, ma\n

\$100000000, 6. 766e0, 156. 762\n

\$end\n

\$start, s21, ma\n

\$100000000, 6. 773e0, 156. 731\n

\$end\n

3.3.3 Obtaining S22 measurement parameters

There are also parameters associated with this function as well:

[3.2.5 Setting output attenuation](#), [3.2.9 Cable compensation](#)

com man d	opti ons (as in comp uter soft ware sett	Parameter 1	Parameter 2	Parameter 3	Parameter 4	Parameter 5	Parameter 6
-----------------	--	-------------	-------------	-------------	-------------	-------------	-------------

	ings)						
S22	init		ri				
	run	s22cal full2portcal syscal	ma vswr	**	CS SS	**	**
	stop	caloff	z loss				

Description:

1. Options:

init->initialize S22 function (**this command must be used before using the S22 function**)

run->run S22 for sweep acquisition

stop->Stop and turn off S22 function (**this command must be used before using other working modes**)

2. Parameter 1:

s22cal -> turn on s22 calibration

full2portcal-> turn on full dual port calibration

syscal-> turn on system calibration

caloff->Disable system calibration

3. Parameter 2:

ri->return data in real and imaginary parts

ma->return data with reflection coefficient and angle

vswr->returns data in voltage standing wave ratio

z->return data in impedance

loss->return data as return loss (logarithmic value)

4. Parameter 3 is used to set the number of points to be scanned, which supports a maximum of 10001 points at present. If the number of points to be scanned is more than 10001, the S22 command can be used several times for segmented scanning.

It is possible to measure only 1 point, in which case the measurement is performed continuously and the instrument continuously sends the measurement result of one frequency to the host computer.

5, Parameter 4:

cc-> Determine the sweep range in terms of cent and span

ss-> Determine sweep range in terms of start and stop

If parameter 3 is set to scan only 1 frequency point, both cs and ss can be selected for parameter 4, and only parameter 5 needs to be entered (cent \ start is fine), and parameter 6 will be parsed by the KC901 as a new command.

6. Parameters 5 and 6 are used to set the center frequency and sweep width (cs) or the start and stop frequencies (ss) in Hz. According to the setting of parameter 4, only one of these methods is required for data input.

7. Routines:

When the number of scan points is greater than 1:

```
$s22, run, caloff, ri, 2, cs, 100000000, 50000000\n
```

```
$start, s22, ri
```

```
75000000, -4.035, 2.880
```

```
125000000, -2.610, 4.357
```

```
$end
```

```
$s22, run, caloff, ma, 2, cs, 100000000, 50000000\n
```

```
$start, s22, ma
```

```
75000000, 144.468
```

```
125000000, 120.888
```

```
$end
```

```
$s22, run, caloff, vswr, 2, cs, 100000000, 50000000\n
```

```
$start, s22, vswr.
```

```
75000000, -1.505
```

```
125000000, -1.490
```

```
$end
```

```
$s22, run, caloff, z, 2, cs, 100000000, 50000000\n
```



```
$start, s22, z
```

```
75000000, 36.089, -35.058, 8.566
```

```
125000000, 41.068, -38.743, 13.623
```

```
$end
```

```
$s22, run, caloff, loss, 2, cs, 100000000, 50000000\n
```

```
$start, s22, loss
```

```
75000000, 13.915
```

```
125000000, 14.116
```

```
$end
```

When the number of scan points is equal to 1:

S22 belongs to cyclic sampling, and the result of each sample is a packet as follows:

```
$s22, run, caloff, ri, 1, cs, 100000000\n
```

```
$start, s22, ri
```

```
100000000, -3.143, 3.035
```

```
$end
```

```
$start, s22, ri
```

```
100000000, -3.166, 3.028
```

\$end

3.3.4 Obtaining S12 Measurement Parameters

Note: There are other parameters associated with this function: [3.2.5](#)

Setting the output attenuation

com man d	opti ons (as in comp uter soft ware sett ings)	Parameter 1	Param eter 2	Paramet er 3	Parame ter 4	Parame ter 5	Paramet er 6	Parame ter 7
	S12	rescal resisocal enrescal full2portcal syscal caloff	ri ma vswr z Loss	lowlo highlo	**	CS SS	** **	** **

Description:

1. Options:

init->initialize S12 function (**this command must be used before using S12**)

run-> Run S12 function for sweep acquisition

stop->Stop and turn off S12 function (**this command must be used before using other working modes**)

2. Parameter 1:

rescal-> turn on response calibration

resisocal-> turn on response plus isolation calibration

enrescal-> turn on enhanced response calibration

full2portcal-> turn on full dual port calibration

syscal-> turn on system calibration

caloff->Disable system calibration

3. Parameter 2:

ri->return data in real and imaginary parts

ma->return data in transfer coefficients and angles

loss->returns the data as insertion loss (logarithmic value)

4. Parameter 3:

lowlo->Scan at low local oscillations

highlo->Scanning at high local oscillations

5. Parameter 4 is used to set the number of scanning points, currently supporting a maximum of 10001 points. If you need to scan more frequency points, it can be divided into multiple commands and scanned in segments. It can be set to scan 1 point, at this time the

instrument will work continuously.

6, Parameter 5:

cs→Determine the sweep range in cent and span

ss→ Determine sweep range in terms of start and stop

If parameter 4 is set to scan only 1 frequency point, both cs and ss can be selected for parameter 5, and only parameter 6 needs to be entered (cent \ start is fine), and parameter 7 will be parsed by the KC901 as a new command.

7. Parameters 6 and 7 are used to transmit specific frequencies in Hz. Depending on the setting of parameter 5, only one of these formats is required.

8. Routines:

When the number of sampling points is greater than 1:

```
$s12,run,caloff,ri,lowlo,3,cs,100000000,50000000\n
```

```
$start,s12,ri
```

```
75000000,0.0004,0.0000
```

```
125000000,0.0006,-0.0000
```

```
$end
```

```
$s12,run,caloff,ma,lowlo,3,cs,100000000,50000000\n
```

```
$start,s12,ma
```

75000000, -176.583

125000000, 114.414

\$end

\$s12, run, caloff, vswr, lowlo, 3, cs, 100000000, 50000000

\$start, s12, vswr.

75000000, 1.003

100000000, 1.001

125000000, 1.001

\$end

\$s12, run, caloff, z, lowlo, 3, cs, 100000000, 50000000

\$start, s12, z

75000000, 50.020, 50.020, 0.055

100000000, 49.997, 49.997, 0.019

125000000, 50.002, 50.002, -0.050

\$end

\$s12, run, caloff, loss , lowlo, 3, cs, 100000000, 50000000\n

\$start, s12, loss

75000000, -66.792

125000000, -71.941

\$end

When the number of scan points is equal to 1:

S12 belongs to cyclic sampling, and the result of each sample is a packet as follows:

```
$s12,run,caloff,ri,lowlo,1,cs,100000000\n
```

```
$start,s12,ri
```

```
$ 100000000,0.0003,0.0005
```

```
$end
```

```
$start,s12,ri
```

```
$ 100000000,0.0003,0.0002
```

```
$end
```

3.3.5 Obtaining Spectrum Measurement Parameters

Note: There are also parameters associated with this function:

[Setting the reference level for spectrum mode 3.2.18.](#)

comm and soft	opti ons (as in comp uter soft	Parame ter 1	Parame ter 2	Parame ter 3	Parame ter 4	Param eter 5	Param eter 6	Parame ter 7

	ware sett ings)							
spec	init	calon	lowlo	**	cs	**	**	port1
	run	caloff	highlo		ss			port2
	stop							

Description:

1. Options:

init->initialize SPEC function (**this command must be used before using SPEC**)

run->run SPEC for sweep acquisition

stop->Stop and disable SPEC function (**this command must be used before using other modes**)

2. Parameter 1:

calon->Turn on system calibration

caloff->Disable system calibration

3. Parameter 2:

lowlo->Scan at low local oscillations

highlo->Scanning at high local oscillations

4. Parameter 3 is used to set the number of scanning points, which currently supports a maximum of 1000 points. If you need to exceed this number of points, you can use this command several times. If

only 1 frequency needs to be scanned, it can be set to 1. The difference with the field strength function is that the reference level can be specified, while the field strength function cannot specify the reference level. It is recommended to specify the reference level when an accurate measurement of the relative value is required.

5, Parameter 4:

cs→ Determine the sweep range in terms of Cent and Span

ss→ Determine the sweep range in terms of Start and Stop

If parameter 3 is set to scan only 1 frequency point, parameter 4 should be set to CS.

5、Parameters 5 and 6 set the center frequency and sweep width in Hz

The frequency operable range varies depending on the equipment, as shown in the table below:

Center frequency range	
KC901M	500Hz-9999999500Hz (10GHz-500Hz)
KC901V	500Hz-699999999500Hz (7GHz-500Hz)
KC901S+	500Hz-4099999500Hz (4.1GHz-500Hz)
Sweep Range	
KC901M	1000Hz-10000000000Hz (10GHz)
KC901V	1000Hz-7000000000Hz (7GHz)
KC901S+	1000Hz-4100000000Hz (4.1GHz)

Starting frequency range	
KC901M	0-99999999000Hz (10GHz - 1KHz)
KC901V	0-699999999000Hz (7GHz - 1KHz)
KC901S+	0-409999999000Hz (4.1GHz - 1KHz)
Termination frequency range	
KC901M	10000Hz-10000000000Hz (10GHz)
KC901V	1000Hz-7000000000Hz (7GHz)
KC901S+	1000Hz-4100000000Hz (4.1GHz)
KC901K	9000Hz-4100000000Hz (4.1GHz)

The termination frequency should be greater than the start frequency.

If parameter 3 is set to scan only 1 frequency point, both cs and ss can be selected for parameter 4, and only parameter 5 needs to be entered (cent \ start is fine), and parameter 6 will be parsed by the KC901 as a new command.

7. Parameter 7.

Port1-> Select the input port as Port 1 (PORT1)

Port2 -> Select the input port as Port 2 (PORT2)

8. Routines:

When the number of sampling points is greater than 1:

`$spec, run, caloff, lowlo, 10, cs, 100000000, 50000000 , port1\n`

`$start, spec\n`

```
$75000000,-74.166\n ;Frequency and amplitude in order (dBm)
$80,000,000,-74.385\n
$85000000,-74.228\n
$90000000,-74.249\n
$95000000,-74.125\n
$100000000,-74.456\n
$105000000,-74.422\n
$110000000,-74.147\n
$115000000,-74.077\n
$120000000,-74.295\n
$125000000,-74.314\n
$end\n
```

When the number of scan points is equal to 1:

SPEC belongs to cyclic sampling, and the result of each sample is a package as follows:

```
$spec,run,caloff,lowlo,1,cs,100000000,port1\n
```

```
$start,spec\n
```

```
$100000000,-74.307\n
```

```
$end\n
```

```
$start,spec\n
```

```
$100000000,-74.540\n
```

```
$end\n
```

\$start, spec\n

\$100000000, -74.310\n

\$end\n

3.3.6 Obtaining field strength measurement parameters (not yet available)

Note: There are also parameters associated with this function: [3.2.4](#)

Setting the output attenuation

command	options (as in computer software settings)	Parameter 1	Parameter 2	Parameter 3	Parameter 4
field	init	lowlo highlo	port1	**	**
	run		port2		
	stop				

Description:

1. Options:

init->initialize FIELD function (**this command must be used before using FIELD**)

run->run FIELD for sweep acquisition

stop->Stop and turn off the FIELD function (**this command must be used before using other working modes**)

2. Parameter 1:

lowlo->Tested at low local oscillations

highlo->Tested with high intrinsic oscillations

3. Parameter 2:

port1->Select input port as port 1 output (PORT 1)

port2->Select the input port as port 2 output (PORT 2)

4. Parameter 3: Antenna gain in dBi.

Antenna gain range: -100.00...+100.00dBi

8. Parameter 4: Scanning single point frequency in Hz, can be accurate to 0.1Hz.

The frequency operable range varies depending on the equipment, as shown in the table below:

frequency range	
KC901M	0Hz-10000000000Hz (10GHz)
KC901V	0-7000000000Hz (7GHz)
KC901S+	0-4100000000Hz (4.1GHz)
KC901K	0-4100000000Hz (4.1GHz)

5. Routines:

The field strength data is scanned cyclically, so each time it is received it is a separate packet, for example:

```
$field,run,lowlo,10,100000000 \n
```

```
$start,field\n
```

```
$100000000.0,-18.115,-121.917\n ; in order of frequency, field
```

strength, absolute strength (dBm)

\$end\n

\$start,field\n

\$100000000.0,-18.875,-122.337\n

\$end\n

\$start,field\n

\$100000000.0,-18.667,-122.087\n

\$end\n

3.3.7 Controlling RF signal source outputs

command	options (as in computer software settings)	Parameter 1	Parameter 2	Parameter 3	Parameter 4	Parameter 5	Parameter 6
rfSource	init	off	port1				
	run	ask	port2	**	**	**	**
	stop	fm					

Description:

1. Options:

init->initialize RfSource (you must use this command before using RfSource)

run->run RfSource and output signals

stop->Stop and disable RfSource function (this command must be used before using other working modes)

2. Parameter 1:

off->Disable the modulation function, at this time parameter 4 and parameter 5 do not need to be entered

ask->Turn on ASK modulation

fm->Use FM modulation

3. Parameter 2: ()

port1->Select output port as port 1 output (PORT 1)

port2->Select the output port as port 2 output (PORT 2)

3, Parameter 3:

Depending on the equipment, the carrier frequency operable range varies as shown in the table below:

Carrier frequency range	
KC901M	0Hz - 10000000000Hz (10GHz)
KC901V	0-7000000000Hz (7GHz)
KC901S+	0-4100000000Hz (4.1GHz)
KC901K	0-4100000000Hz (4.1GHz)

However, when switching to audio output, the frequency range is 0-60,000,000Hz (60MHz).

4, Parameter 4:

Carrier output amplitude Unit dBm, accuracy 1dB

The output amplitude of the port varies depending on the frequency.

When the user input amplitude is higher than the maximum value that can actually be output, the lower unit returns a warning and outputs at the maximum value.

```
$start, warn_gtr\n ;User input is greater than  
maximum value  
$warn:It is greater than the maximum output!\n  
$end\n
```

When the user input amplitude is lower than the maximum value that can actually be output, the lower unit returns a warning and outputs the minimum value.

```
$start, warn_lt\n ;User input is greater than the  
maximum value  
$warn:It is less than the minimum output!\n  
$end\n
```

When the output port is "port2", the approximate range is: +10 to -30dBm

When the output port is "port1" and the RF board version is not lower than "1.0.5", the value range is from +10 to -60dBm, otherwise the value range is still from +10 to -30dBm.

5, Parameter 5:

Modulation frequency Unit Hz Value range: 0–3000Hz

6, Parameter 6:

The modulation depth, when commissioned for ASK, has only a few fixed values: 0, 5, 10, 15, 20, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90.

When it is FM modulation, its adjustable depth varies with frequency as shown in the following table

0 – 60M (excluding 60M)	0 – 10MHz
60M – 106.25M (excluding 106.25M)	0 – 312.5kHz
106.25M – 212.5M (excluding 212.5M)	0 – 625kHz
212.5M – 425M (excluding 425M)	0 – 1.25MHz
425M – 850M (excluding 850M)	0 – 2.5MHz
850M – 1700M (excluding 1700M)	0 – 5MHz
1700M – 3400M (excluding 3400M)	0 – 10MHz
3400M – 7000M	0 – 20MHz

7. Routines:

Controls the output of the RF signal source, requiring modulation to be turned on, carrier frequency of 1 GHz, no attenuation of the output, modulation frequency of 1 KHz, and modulation depth of 90%.

Step 1 Initialize the RfSource function:


```
$rfsource, init \n
```

Step 2 Start the run and setup:

```
$rfsource, run, ask, port1, 1000000000, 0, 1000, 90 \n
```

Step 3 If you need to use other functions, you need to exit the RF signal source first:

```
$rfsource, stop\n
```

8. Processing:

(1) When the input option is Init, the KC901 immediately initializes the circuitry associated with the RF signal source.

(2) When the input option is STOP, the KC901 shuts down the circuitry associated with the RF signal source.

(3) When the input option is RUN, the KC901 outputs according to the user setting at this time.

(4) When the signal source is outputting, the signal source continues to output if other commands are issued that do not explicitly require termination of the signal source output.

3.3.8 Controlling the Audio Source Outputs

command	option s (as in comput er	Parame ter 1	Paramet er 2	Parame ter 3	Parame ter 4	Paramet er 5	Paramet er 6
---------	---------------------------------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------

	software settings)						
afsource	init	off	afout	**	**	**	**
	run	ask	port1				
	stop	fm	port2				
		pm					

Description:

1. Options:

init->initialize AfSource (you must use this command before using AfSource)

run->run AfSource function for audio output

stop->Stop and disable AfSource function (this command must be used before using other working modes)

2. Parameter 1: (Generation 4 KC901 currently has no PM modulation)

off->Disable the modulation function, at this time parameter 4 and parameter 5 do not need to be entered

ask->ASK modulation

fm->FM modulation

pm->PM modulation

3. Parameter 2: (Generation 4 KC901 outputs are currently audio outputs only)

afout->Select the output port as audio output (AF OUT)

port1->Select output port as port 1 output (PORT 1)

port2->Select the output port as port 2 output (PORT 2)

3, Parameter 3:

Carrier frequency, unit Hz, value range: 0-2000000000Hz

4, Parameter 4:

When the output port is "afout", the unit mV (VPP), the value range:
0-3000mV.

When the output port is "port1" or "port2", it represents the
carrier output amplitude Unit: dBm, precision: 1dB.

The output amplitude of the port varies depending on the
frequency.

When the user input amplitude is higher than the maximum value
that can actually be output, the lower unit returns a warning and
outputs at the maximum value.

```
$start, warn_gtr\n ;User input is greater than  
maximum value
```

```
$warn:It is greater than the maximum output!\n
```

```
$end\n
```

When the user input amplitude is lower than the maximum value that
can actually be output, the lower unit returns a warning and outputs
the minimum value.

```
$start, warn_lt\n ;User input is greater than the
```

maximum value

```
$warn:It is less than the minimum output!\n
```

```
$end\n
```

When the output port is "port2", the approximate range is +10 to -81dBm.

When the output port is "port1" and the RF board version is not lower than "1.0.5", the value range is from +10 to -111dBm, otherwise the value range is still from +10 to -81dBm.

5, Parameter 5:

Modulation frequency in Hz.

Under ASK, value range: 0-3000Hz

In FM as well as PM, the range of values is 16-10000 Hz.

6, Parameter 6:

Modulation depth/modulation frequency offset

Under ASK, the modulation depth ranges from 0 to 100 percent

In FM, the modulation frequency bias is 0-1 MHz

Under PM, the modulation phase shift is -180° - $+180^\circ$

7. Routines:

Controls the output of an audio signal source requiring ASK modulation with a carrier frequency of 10MHz, an output of 1.3V (VPP), a modulation frequency of 1KHz, and a modulation depth of 100%.

Step 1 Initialize the AfSource function:

```
$afsource, init\n
```

Step 2 Start the run and setup:

```
$afsource, run, ask, afout, 10000000, 1300, 1000, 100 \n
```

Step 3 If you need to use other functions, you should exit this mode first.

```
$afsource, stop \n
```

8. Processing:

(1) When the input option is Init, the KC901 immediately initializes the circuitry associated with the audio signal source.

(2) When the input option is STOP, the KC901 immediately shuts down the circuitry associated with the audio signal source.

(3) When the input option is RUN, the KC901 outputs according to the user settings.

(4) When the signal source is outputting, the signal source continues to output if other commands are given that do not explicitly require termination of the signal source output.

3.4 Uplink instructions

The instructions actively returned by the system are generally used for warnings and hints, and each warning is a package. **When the host computer is programmed, the type of error can be determined by the packet header, and there is no need to match the contents of the packet.** The instructions are as follows:

3.4.1 Returning a string when an instruction is sent in error

```
$start, err_cmd\n
```

`$error:Command input error!\n`

`$end\n`

3.4.2 Returning a string when an option is sent in error

`$start,err_opt\n`

`$error:Option input error!\n`

`$end\n`

3.4.3 Return this string when parameter X is sent in error

`$start,err_parx\n ;parameter x input error, here x is a variable,
the value range is 1-6`

`$error:Parameterx input error!\n`

`$end\n`

3.4.4 A mode must be initialized before it can be used.

`$start,err_uninit\n`

`$error:Please initialize the mode first!\n`

`$end\n`

3.4.5 Transmitter Loss of Lock (active reading required, see 3.2.23)

`$start,err_RfUnlock\n`

`$error:RF PLL unLock!\n`

`$end\n`

3.4.6 Receiver Home Oscillation Loss of Lock (active reading required, see 3.2.23)

`$start,err_LoUnlock\n`

`$error:Lo PLL unLock!\n`

\$end\n

3. 4. 7 When using a mode, other running modes must be stopped first.

\$start,err_S11Stop\n ;Need to stop S11 mode before using other scanning modes

\$error:Please stop S11 mode first!\n

\$end\n

\$start,err_S22Stop\n ;Need to stop S22 mode before using other scanning modes

\$error:Please stop S22 mode first!\n

\$end\n

\$start,err_S21Stop\n ;Need to stop S21 mode before using other scanning modes

\$error:Please stop S21 mode first!\n

\$end\n

\$start,err_S12Stop\n ;Need to stop S12 mode before using other scanning modes

\$error:Please stop S12 mode first!\n

\$end\n

\$start, err_SpecStop\n ;SPEC mode needs to be stopped before using
other scanning modes

\$error:Please stop Spec mode first!\n

\$end\n

\$start, err_FieldStop\n ;Need to stop FIELD mode before using other
scanning modes

\$error:Please stop Field mode first!\n

\$end\n

\$start, err_RfStop\n ;need to stop RFSource mode before using other
scanning mode

\$error:Please stop RFSource mode first!\n

\$end\n

\$start, err_AfStop\n ;need to stop AFSource mode before using other
scanning modes

\$error:Please stop AFSource mode first!\n

\$end\n

3.4.8 Low battery voltage (active reading required, see 3.2.37)

\$start, err_BatVolLow\n

\$error:Low battery!\n

\$end\n

3.4.9 High external voltage (active reading required, see 3.2.37)

```
$start, err_ExVolHigh\n
```

```
$error:External Voltage is too high!\n
```

```
$end\n
```

3.4.10 High temperature (active reading required, see 3.2.37)

```
$start, err_TempHigh\n
```

```
$error:Temperature is too high!\n
```

```
$end\n
```

4. Imprint

This manual applies to firmware versions V1.5.6(KC901V/M) , 1.2.9(KC901C+/S+) , 1.2.1(KC901Q), 0.1.0(KC901K) and above. For firmware below this version, please refer to the old manual.

This manual does not specifically indicate the functional differences between different models of equipment. If a device does not have a certain function, the corresponding command is invalid. For example, the KC901V does not have the S22 test function or the full two-port calibration function, so specifying any combination of these two functions is an invalid command.

[Ends]