

KDC200 PROGRAMMING MANUAL

Rev2.41



KoamTac
A New Wave in Auto ID

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Use only the power source specified in this manual or marked on the units

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO ANY TYPE OF MOISTURE

DO NOT LOOK DIRECTLY INTO LASER or point the laser into another person's eyes. Exposure to the beam MAY CAUSE EYE DAMAGE.



Caution RF EXPOSURE INFORMATION.

A minimum separation distance of 7.9 inches (20cm) must be maintained between the user and the external antenna of repeater to satisfy FCC RF exposure requirements. For more information about RF exposure, please visit the FCC

CAUTION

Changes or modifications not expressly approved by the manufacturer responsible for compliance could void the user's authority to operate the equipment

WARNING

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

INFORMATION TO USER:

This equipment has been tested and found to comply with the limit of a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation; if this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient / Relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help

CAUTION

RISK OF EXPLOSION IF BATTERY IS REPLACED AN INCORRECT TYPE.

DSPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS

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KoamTac KDC200 command set is provided to developers who wish to control the scanner and resulting data from within their application.

Internal data buffer

KDC200 has 200K bytes flash memory where it stores the read barcodes. Its capacity, in terms of number of barcodes, depends on the size of barcodes. Barcodes are stored sequentially as they are scanned in the internal flash memory. The maximum number of stored barcodes is 10,240 with 200K byte limitation.

Data format

KDC200 stores the read barcodes in the internal flash memory as the following data format:

| | | | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|---|---|---|---|----|----|----|----|
| C0 | Y0 | D0 | T0 | C1 | Y1 | D1 | T1 | . | . | . | . | Cn | Yn | Dn | Tn |
|----|----|----|----|----|----|----|----|---|---|---|---|----|----|----|----|

Where

C0, C1, ..., Cn : Total number of each barcode data(1 byte)

Y0, Y1, ..., Yn : Type of each barcode(1 byte)

D0, D1, ..., Dn : Actual barcode data of each barcode(variable size)

T0, T1, ..., Tn : Timestamp of each barcode(4 bytes)

Barcodes are stored sequentially as they are scanned in the internal flash memory. Since barcodes can have different lengths, we need to keep track of length information as well. For each barcode we first store the length of barcode plus 1 (1 byte), then the barcode type (1 byte), and then the barcode value (without the string terminator '\0').

The timestamp field has 6 sub-fields as follows:

LSB

MSB

| | | | | | |
|------------------|------------------|----------------|---------------|-----------------|----------------|
| Seconds (6 bits) | Minutes (6 bits) | Hours (5 bits) | Days (5 bits) | Months (4 bits) | Years (6 bits) |
|------------------|------------------|----------------|---------------|-----------------|----------------|

Note: The base year is 2000. It means the year is 2000 if Years field is 0.

How many barcodes can we store?

The number of barcodes that can be stored in these bytes depends upon the size of the barcodes

Example: If only UPCA barcodes are scanned and the check digit is not transmitted, then each barcode takes up 11 (barcode data) + 2 (length and type) + 4 (time stamp) = 17 bytes. The maximum number of UPCA barcodes that can be saved is $204,800/17 = 12,047$. However, the maximum number of barcodes can be stored is 10,240. Therefore, KDC200 can store 10,240 UPCA barcodes.

If different length barcodes are mixed, user cannot compute a priori what the maximum number of barcodes is.

What happens when this buffer is full?

When the internal flash memory is full, KDC200 displays buffer full message and ignores the command to scan barcodes.

Command Set

KDC200 has various commands and they are quite simple. They are shown in the following table.

| Command | Input | Output | Description | |
|---------|-----------------|-----------------|---|---|
| B | None | <i>value @</i> | Returns current battery capacity(value = 0-100) | |
| b | T0 | None | <i>value @</i> | Returns current settings of Bluetooth options. |
| | T1 | 0 | @ | Turns off Bluetooth power |
| | | 1 | @ | Turns on Bluetooth power |
| | T2 | None | @ or ! | Start Bluetooth pairing mode |
| | T3 | 0 | @ or ! | Disable auto connection mode of Bluetooth at power on |
| | | 1 | @ or ! | Enable auto connection mode of Bluetooth at power on |
| | T4 | 0 | @ | Disable Bluetooth auto power on function |
| | | 1 | @ | Enable Bluetooth auto power on function |
| | T5 | 0 | @ | Disable Bluetooth auto power off function |
| | | 1 | @ | Enable Bluetooth auto power off function |
| | T6 | 0 | @ | Disable beep warning when Bluetooth auto power off function is disabled |
| | | 1 | @ | Enable beep warning when Bluetooth auto power off function is disabled |
| T7 | 0 | <i>value @</i> | Returns current bluetooth auto power off timeout | |
| | 1 <i>value#</i> | @ | Set bluetooth auto power off timeout | |
| C | <i>YMDHmS</i> | @ | Setting new date and time of KDC200 | |
| c | None | <i>YMDHmS @</i> | Returns current date and time of KDC200 | |
| D | None | @ or ! | Reading barcode | |
| E | None | @ | Erase all stored barcodes | |
| F | None | @ | Set internal options to factory default setting | |
| H | <i>value #</i> | @ | Enable/Disable handshake while transferring packet data | |
| h | None | <i>value @</i> | Get handshake state | |
| V | None | <i>string @</i> | Get firmware version | |
| L | <i>value #</i> | @ or ! | Set minimum barcode length | |
| l | None | <i>value @</i> | Get minimum barcode length | |
| N | None | <i>value @</i> | Get number of barcode stored | |
| O | <i>value #</i> | @ or ! | Set scan options and flags | |
| o | None | <i>value @</i> | Get scan options and flags | |
| P | None | <i>data</i> | Upload whole stored barcode data | |
| p | <i>value #</i> | <i>data</i> | Upload N _{th} stored barcode | |
| S | <i>value #</i> | @ or ! | Set decoding symbologies | |
| s | None | <i>value @</i> | Get current decoding symbologies | |
| T | <i>value #</i> | @ or ! | Set decoding timeout | |
| t | None | <i>value @</i> | Get current barcode read timeout | |
| U | <i>value #</i> | @ or ! | Select barcode handling mode | |
| u | None | <i>value @</i> | Get barcode handling mode selected by command 'U' | |
| W | None | @ | Wake up KDC200 from sleep mode | |
| w | <i>value #</i> | @ or ! | Selects the data format of Wedge mode | |
| Z | <i>value #</i> | @ or ! | Set security level | |
| z | None | <i>value @</i> | Get current security level | |

'B' command

Parameters: None

Format: 'B'

Output: 'xxxx@' where *xxxx* is the capacity of battery (0 – 100) in hex and @ means the end of data

Purpose: Read the battery capacity of KDC200.

'bT0' command

Parameters: None

Format: 'bT0'

Output: 'xx@' where *xx(1 byte)* is the current selected Bluetooth options.

. bit 0 : Not used

. bit 1 : Bluetooth module power is on(1)/off(0)

. bit 2 : Not used

. bit 3 : Auto connection mode is enabled(1)/disabled(0)

. bit 4 : Auto power on is enabled(1)/disabled(0)

. bit 5 : Auto power off is enabled(1)/disabled(0)

. bit 6: Beep warning is enabled(1)/disabled(0)

Purpose: Gets current Bluetooth options.

'bT1' command

Parameters: 0 or 1

Format: 'bT10' or 'bT11'

Output: '@' all the time

Purpose: Turns on(1)/off(0) KDC200 Bluetooth module power.

'bT2' command

Parameters: None

Format: 'bT2'
Output: '@' if successful pairing. '!' if pairing is failed within 90 seconds.
Purpose: KDC200 starts pairing mode.

'bT3' command

Parameters: 0 or 1
Format: 'bT30' or 'bT31'
Output: '@' if successful. '!' if failed. This command is failed if sent when KDC200 is connected to HOST.
Purpose: Enables(1)/Disables(0) KDC200 to try to connect to Bluetooth HOST automatically after power on.

'bT4' command

Parameters: 0 or 1
Format: 'bT40' or 'bT41'
Output: '@' all the time
Purpose: Enables(1)/Disables(0) KDC200 to turns on Bluetooth module power when scan button is pressed.

'bT5' command

Parameters: 0 or 1
Format: 'bT50' or 'bT51'
Output: '@' all the time
Purpose: Enables(1)/Disables(0) KDC200 to turns off Bluetooth module power when KDC200 is disconnected from Bluetooth host for 15 minutes.

'bT6' command

Parameters: 0 or 1
Format: 'bT60' or 'bT61'
Output: '@' all the time
Purpose: Enables(1)/Disables(0) KDC200 to beeps on every 15 minutes when Bluetooth power is on and Bluetooth is disconnected, but Auto power off option is disabled. KDC200 beeps 5 times with

short intervals.

'bT70' command

Parameters: None

Format: 'bT70'

Output: '*value*@' where *value* is the timeout value of bluetooth module auto power off

Purpose: Getting current bluetooth auto power off timeout value

'bT71' command

Parameters: *value*

Format: 'bT71 *value*#' where *value* is the timeout value of bluetooth module auto power off

Output: '@' all the time.

Purpose: Setting current bluetooth auto power off timeout value from 1 minute to 30 minutes. It will be set to 5 minute if *value* is 0 and 30 if *value* is greater than 30.

'C' command

Parameters: Date and Time value to be set in KDC200

Format: 'CYMDHmS' where Y is year(0 means 2000), M is month(1-12), D is day(1-31), H is hour(0-23), m is minute(0-59) an S is second(0-59).

Output: '@' all the times

Purpose: Set Date and Time of KDC200.

'c' command

Parameters: None

Format: 'c'

Output: 'YMDHmS@' where Y is year(0 means 2000), M is month(1-12), D is day(1-31), H is hour(0-23), m is minute(0-59) an S is second(0-59).

Purpose: Read current Date and Time of KDC200.

'D' command

Parameters: None

Format: 'D'

Output: '!' – KDC200 internal flash memory is full or Reading failure
'@' – Barcode reading success

Purpose: Turns the motor on, then turns the laser on and starts scanning. When a barcode is found or if timeout occurred, it stops the motor and turns off laser.

'E' command

Parameters: None

Format: 'E'

Output: '@' – all the times.

Purpose: Erases the internal flash memory completely. All scanned data is lost.

Remarks: Should be issued after the upload commands ('P' or 'p').

'F' command

Parameters: None

Format: 'F'

Output: '@' – all the times.

Purpose: Set KDC200 internal options and flags to the factory default setting.

The factory default settings are:

- All symbologies are enabled.
- All options are disabled except
 - . UPCE_ReturnCheckDigit
 - . UPCA_ReturnCheckDigit
 - . EAN8_ReturnCheckDigit
 - . EAN13_ReturnCheckDigit

- Minimum barcode length is set to 4.
- Time-out is set to 2 seconds.
- Security Level is set to 2.
- Select wide scan angle.
- Sleep timeout is set to 5 seconds.
- Send the read data to HOST and save into flash when pressing scan button.
- Send PAYLOAD(only barcode) data when pressing scan button.

'H' command

Parameters: 0 or 1

Format: "Hxxxx#" where xxxx is the value of parameter in hex.

Output: '!' – invalid parameter.

'@' – all other times.

Purpose: Selects if KDC200 need(1)/doesn't need(0) to handshake with HOST while sending packet data.
KDC200 doesn't do handshake if sending barcode only.

'h' command

Parameters: None

Format: 'h'

Output: 'xxxxxxx@' where xxxxxxxx is the value sent to KDC200 by command 'H'.

Purpose: Get the current setting of handshaking mode. 0 means disabled and 1 means enabled.

'V' command

Parameters: None

Format: "V"

Output: 'string@' where string is a F/W version string and @ means the end of data.

Purpose: Read the F/W version of KDC200.

'L' command

Parameters: Minimum length of barcode (valid values: 2 to 36)

Format: "Lxx#" or "lxx#" where xx is the value of parameter in hex.

Output: '!' – invalid parameter.

'@' – all other times.

Purpose: Set the minimum length of barcodes.

Examples: To set the length to 20, send command "L14#". "L4#" sets the minimum length to 4. If you send "LFFF#", then the returned value will be '!' and the minimum length will be unchanged.

'I' command

Parameters: None

Format: 'I'

Output: 'xxxxxxx@' where xxxxxxx is the minimum length of barcodes and @ means the end of data

Purpose: Read the minimum length of barcodes

'N' command

Parameters: None

Format: 'N'

Output: 'xxxxxxx@' where xxxxxxx is the number of stored barcodes and @ means the end of data

Purpose: Read the number of stored barcodes in KDC200 internal flash memory

'O' command

Parameters: The options (it is unsigned 32-bit number)

Format: 'Oxxxxxxx#' where xxxxxxx is the value of parameter in hex.

Output: '!' – invalid parameter.

'@' – all other times.

Purpose: Enables the selected options.

Example: Sending "O0#" disables all the options.

N : Total number of bytes to be sent(3 bytes)
 C0, C1, ..., Cn : Total number of each barcode data(1 byte)
 Y0, Y1, ..., Yn : Type of each barcode(1 byte)
 D0, D1, ..., Dn : Actual barcode data of each barcode(variable size)
 T0, T1, ..., Tn : Timestamp of each barcode(4 bytes)

The first 3 bytes specify the total number of bytes being sent. Then the entire populated contents of the internal flash memory are sent as is.

After the 3rd byte, the message can be thought of in terms of variable size blocks with each block of bytes representing information on a single barcode. These blocks are placed next to each other with no “empty” bytes between them.

‘p’ command

Parameters: The number which indicates the position of barcode data to be sent.

Format: ‘pxxxxxx#’ where xxxxxx is the number of barcode data stored in the internal flash to upload.

Output: A multi-byte string (see below). KDC200 sends only one barcode data at one time.

Purpose: Read the Nth barcodes data stored in KDC200 internal flash memory. Does **not** erase the barcode.

| | | | | | | |
|---|---|---|---|---|---|---|
| S | N | C | Y | D | T | K |
|---|---|---|---|---|---|---|

Where:

S : Start byte 0x03(1 byte)
 N : Total number of bytes to be sent(3 bytes)
 C : Total number of each barcode data(1 byte)
 Y : Type of each barcode(1 byte)
 D : Actual barcode data of each barcode(variable size)
 T : Timestamp of each barcode(4 bytes)
 K : Check sum byte(1 byte). All sum except S should be 0.

Note: To upload all stored barcode data by using this command, it is required to call this command N times

'S' command

Parameters: The symbology selection (it is unsigned 32-bit number)

Format: 'Sxxxxxxx#' where xxxxxxxx is the value of parameter in hex.

Output: '!' – invalid parameter.

'@' – all other times.

Purpose: Enables the selected symbologies.

Example: Sending "Sffffff#" enables all the symbologies.

To select a symbology, set the appropriate bit to '1' in the parameter.

| Symbology | bit# | Symbology | bit# |
|-----------|------|----------------|------|
| EAN13 | 0 | EAN128 | 9 |
| EAN8 | 1 | Code93 | 10 |
| UPCA | 2 | Code35 | 11 |
| UPCE | 3 | BooklandEAN | 12 |
| Code39 | 4 | EAN13withAddon | 13 |
| ITF14 | 5 | EAN8withAddon | 14 |
| Code128 | 6 | UPCAwithAddon | 15 |
| I2of5 | 7 | UPCEwithAddon | 16 |
| Codabar | 8 | PDF417 | 31 |

's' command

Parameters: None

Format: 's'

Output: 'xxxxxxx@' where xxxxxxxx is the selected symbologies and @ means the end of data

Purpose: Read the selected symbologies. Please see the table of command 'S' for detailed explanation of each symbology.

'T' command

Parameters: Time in msec. Valid range is 100msec to 10sec.

Format: "Txxxx#" where xxxx is the value of parameter in hex.

Output: '!' – invalid parameter.

'@' – all other times.

Purpose: Set the timeout for barcode read operation.

Example: Sending "T3e8#" sets the timeout to 1sec.

't' command

Parameters: None

Format: 't'

Output: 'xxxxxxx@' where xxxxxxxx is the timeout value for barcode read operation and @ means the end of data

Purpose: Get the current read timeout setting.

'U' command

Parameters: 0, 1,2 or 3

Format: "Uxxxx#" where xxxx is the value of parameter in hex.

Output: '!' – invalid parameter.

'@' – all other times.

Purpose: Selects how KDC200 handles scanned barcode.

If the value xxxx is 0: KDC200 doesn't store scanned barcode in the memory and just transmits it to the host.

1: KDC200 stores scanned data in the memory and transmits it to the host.

2: KDC200 stores scanned data in the memory but doesn't transmit it to the host.

3: KDC200 stores scanned data in the memory only if succeeded to send read barcode to host.

'u' command

Parameters: None

Format: 'u'

Output: 'xxxxxxx@' where xxxxxxx is the value sent to KDC200 by command 'U'.

Purpose: Get the current setting of barcode handling mode.

'W' command

Parameters: None

Format: "W"

Output: '@' – all the times.

Purpose: Wake up KDC200 from sleep mode.

To ensure that KDC200 woke up from sleep, it is required to send 'W' command many times.

If KDC200 replied with '@', then KDC200 is already woke up from sleep mode.

'w' command

Parameters: 0 or 1

Format: 'zxxx#' where xxx is the value of parameter in hex,

Output: '!' – invalid parameter.

'@' – all other times.

Purpose: When SCAN button is pressed, select whether KDC200 sends PAYLOAD data only or sends PACKET

data and waiting for response from HOST.

If the value xxx is 0: KDC200 sends only PAYLOAD to HOST

1:KDC200 sends PACKET data and wait for response('@') from HOST.

If KDC200 doesn't get response from HOST within 100msec, KDC200 sends the same data to HOST again. KDC200 will attempt 10 times until it gets a response from HOST.

○ Data Format

KDC200 supports two kind of data format when sending data to HOST as the following:

■ PAYLOAD only

| | | |
|---------------------|-----------|-----------|
| <i>Barcode data</i> | <i>CR</i> | <i>LF</i> |
|---------------------|-----------|-----------|

Where: *Barcode data* is the actual read barcode data

CR is 0x0d(‘\r’)

LF is 0x0a(‘\n’)

■ PACKET DATA

| | | | | | | |
|---|---|---|---|---|---|---|
| S | N | C | Y | D | T | K |
|---|---|---|---|---|---|---|

Where:

S : Start byte 0x03(1 byte)

N : Total number of bytes to be sent(3 bytes)

C : Total number of each barcode data(1 byte)

Y : Type of each barcode(1 byte)

D : Actual barcode data of each barcode(variable size)

T : Timestamp of each barcode(4 bytes)

K : Check sum byte(1 byte). All sum except S should be 0.

‘Z’ command

Parameters: Security level (valid values: 1 to 5)

Format: “Zx#” where *x* is the value of parameter in hex.

Output: ‘!’ – invalid parameter.

‘@’ – all other times.

Purpose: Set the security level.

‘z’ command

Parameters: None

Format: ‘z’

Output: ‘xxxxxxx@’ where *xxxxxxx* is the current security level and @ means the end of data

Purpose: Read the current security level value

Packet Data

KDC200 supports user selectable two data formats:

- Barcode only and
- Packet data.

By default, KDC200 sends data with Barcode. If KDC200 is configured to send Barcode only data, KDC200 doesn't do handshake with host application. However, if KDC200 is configured to send packet data, KDC200 needs to do handshake with host application to make sure that HOST receives read barcode correctly. There are two cases of sending packet data to host:

- synchronization mode and
- Wedge mode

HOST response to KDC200 after receiving data command

KDC200 expects the HOST to send two kinds of response to KDC200 once HOST received packet data from KDC200:

- Success response or
- Failure response.

HOST is required to send a success response if it receives a packet data successfully by sending a character '@'. If HOST detected an error while receiving a packet data from KDC200, HOST should send a failure response to KDC200 by sending a character '!'.

Wedge mode

If KDC200 read a barcode and configured to send packet data, KDC200 waits for 1 second to get a response from HOST after sending a read barcode data to HOST. KDC200 goes to ready mode upon receiving either success or failure response. KDC200 goes to ready mode if there is no response from Host in 1 second. KDC200 doesn't resend the data either receiving failure response or 1 second time out. The following is detail steps between HOST and KDC200.

- a) HOST configures KDC200 to send packet data
- b) User presses SCAN button
- c) KDC200 reads barcode data
- d) If reading is success, KDC200 sends a packet data leading a character 0x03 and ending with checksum.
- e) KDC200 goes to waiting state.
- f) HOST receives a packet data from KDC200.
- g) HOST checks if it receives a packet data without error.
- h) HOST sends a success response by sending a character '@' to KDC200 or a failure response by sending a character '!'.

- i) KDC200 exits waiting state if it receives any response from HOST. KDC200 replies to HOST with sending '@' for a success response.
- j) KDC200 waits for 1 second and exits waiting state with sending '!' to HOST if there is no response from HOST.
- k) KDC200 goes to ready state.

Synchronization mode

Synchronization mode is initiated by HOST with sending a command to KDC200 to read a barcode stored in KDC200 internal flash memory. There is no difference from HOST side handling a packet data either Synchronization or Wedge mode. However, KDC200 sends a barcode up to 10 times repeatedly until it receives a success response from HOST. The following is detailed steps between the HOST and KDC200.

- a) HOST configures KDC200 to send packet data
- b) HOST sends a command('P' and index) to KDC200 to read stored barcode
- c) KDC200 sends a stored barcode to HOST with packet data format
- d) KDC200 goes to waiting state.
- e) HOST receives a packet data from KDC200.
- f) HOST checks if it receives a packet data without error.
- g) HOST sends a success response by sending a character '@' to KDC200 or a failure response by sending a character '!'.
- h) KDC200 exits waiting state with sending '@' if it receives a success response and returns to ready mode. However, if KDC200 got a failure response, it repeats to send the same barcode 10 times until getting a success response. KDC200 sends a '!' character to HOST if it couldn't get any responses from HOST during 1 second.

Miscellaneous

KDC200 sends "?" character.

"?" is sent by KDC200 when the device receives undefined character (command) from Host. Application would ignore "?" character

KDC200 sends one to three leading "NULL" bytes with barcode payload or packet

KDC200 Bluetooth module goes to sleep mode if not used for a while. KDC200 sends out one to three NULL bytes to wake up Bluetooth module before sending out barcode payload or packet. Application should ignore these leading "NULL" bytes.

Contact Information

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