**B3VDU software resource specification**

# Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Date | Reason For Changes | Version |
| Chen Yong | Jan 14, 2022 | Initial draft | 1.0.1 |
| Chen Yong | Jul 14, 2022 | NUC mode | 1.0.2 |
| Chen Yong | Aug 14, 2023 | Append Version control List | 1.0.3 |

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# Scope

## Identification

## System overview

## Document overview

Chapter 1: Scope

Chapter 2: Referenced documents

Chapter 3: Requirements

Chapter 4: Requirements traceability

Chapter 5: Notes

chapter 6: Appendixes.

# Referenced documents

# Requirements

## Required states and modes

### verbose information mode

Run application with option ‘-v’, then it will enter into the print verbose information mode. It will print out the verbose information of the VDU and exit.

The verbose information includes: the device info, the configuration data, the error recording data and the working information data.

* The device info:(refer 3.5.2)

Main Version:x.x.x (the whole system version)

App Version:x.x.x (the firmware version)

SN:B3VDU-xxx (the VDU serial Number)

date:xx-xx-xxxx (manufacturing date)

* The Configuration [data: (refer](data:(refer) 3.5.1)

Configuration: tick=xxxxx night dim=xx mode=x

birghtness=xx contrast=xx color=xx

video source mode=x

* the error recording <data:(refer> 3.5.1)

Recording:

timestamp=xxxxx info=0xhhhhhhhh desc=xxxxxxxxxxx

....

-------Over----------

* the working information <data:(refer> 3.4.6)

Power Current: raw=xxx.xxx scale=x.xxx current=x.xxxx

PS temp:raw=xxx.xxx scale=x.xxx offset=xxx.xxx temp=xx.xxx

### Normal working mode

Defaut system booting up, the application will run in this normal working mode. The system script file is in /*etc*/init.d/loaduserapp.sh.

It has a configuration file. The default configuration file is /*etc*/b3vdu.conf. It can be assign a special configuration file by option(-f filename). The configuration file data format refer to 3.5.2

## CSCI capability requirements

### Booting up

The maxium system booting up time is less than 20 seconds.

### Watchdog enable

Enable watchdog and the application refresh the watchdog timer. The watchdog can restart the system if the application cannot refresh the watchdog.

### Video latency

The video latency from the SDI input to the LCD display is less than 50 ms.

### Video Error monitor

Keep monitoring the video input. Disable the LCD display output if any error in the video input is found.

## CSCI external interface requirements

### USB3.0

### LCD

.lvds

.(LCD DIM) PWM output

.(LED DIM) PWM output

output control reference 3.4.2

### UART

***Format****: RS422*

***Device name****: /dev/ttyS1*

***working mode****:Duplex*

***data****: 115200n8*

***flow control****: no*

### Ethernet

1**0/100/1000 BASE-T**

### KeyPad

**Interface**: axi\_gpio\_0 (0xa0130000)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Key No | Gpio port | Key name | Linux code |  |
| KEY\_DIN\_1 | <axi\_gpio\_0 0> | key1 | KEY\_1(2) | FRONT |
| KEY\_DIN\_2 | <axi\_gpio\_0 1> | key2 | KEY\_2(3) | REAR |
| KEY\_DIN\_3 | <axi\_gpio\_0 2> | key3 | KEY\_3(4) | IR |
| KEY\_DIN\_4 | <axi\_gpio\_0 3> | key4 | KEY\_4(5) | NUC |
| KEY\_DIN\_5 | <axi\_gpio\_0 4> | key5 | KEY\_5(6) | NIGHT |
| KEY\_DIN\_6 | <axi\_gpio\_0 5> | key6 | KEY\_6(7) | MINUS |
| KEY\_DIN\_7 | <axi\_gpio\_0 6> | key7 | KEY\_7(8) | PLUS |
| KEY\_DIN\_8 | <axi\_gpio\_0 7> | key8 | KEY\_8(9) | MENU |

### SDI Input

*control reference 3.4.2*

### CAN

## CSCI internal interface requirements

### I2C

**device name**: /*dev*/i2c-0

**slave chip**: mb85rc256vfp **slave address**: 0x50

**description**: log data storage

### Video Registers

Registers Physical address: 0xa0000000

Registers Physical size: 0x2000

Registers data: 32bits

|  |  |  |  |
| --- | --- | --- | --- |
| registers | W/R | items | value |
| 0x0000 | W/R | brightness | 0 - 100 |
| 0x0004 | W/R | NVG brightness | 0 - 100  default 10 |
| 0x0008 | W/R | NVG mode | 0 – normal mode  1 – NVG mode |
| 0x000C | W/R | auto\_manu | 0 – auto select video  1 – manual select video |
| 0x0010 | W/R | osdCtrl | 0 – no OSD  1 – overlay OSD |
| 0x0014 | W/R | video source | 0 – video source 0  1 -  video source 1 |
| 0x0018 | W/R | contrast value | 0 – 100 convert to -255 ~ 255  (x- 50) x 255 /50 |
| 0x001C | W/R | color value | 0 – 100 convert to -255 ~ 255  (x- 50) x 255 /50 |
| 0x0100 | read only | status | bit 3-0 -- sdi 4 inputs: 0 normal, 1 no signal  bit 4 -- ddr read: 0 normal, 1 no read operation  bit 5 -- ddr write: 0 normal, 1 no write operation  bit 7-6 – display: 00 normal, 01 no signal, 10 error |

### OSD

Osd physcial address: 0x70000000

Osd Resolution: 1920x1080

Osd format: RGBA32

### iio sensor

CPU:/sys/bus/iio/devices/iio\:device0

Power Current Sensor:/sys/bus/iio/devices/iio\:device1

### Watchdog

**Device**: /dev/watchdog0, /dev/watchdog1

watchdog0 is controlled by OS.

Watchdog1 can be controoled by the user.

## CSCI internal data requirements

### Log data

Log data is stored in the Log FRAM chip. It includes two configuration data structrue and the error recording data array. The error recording data array can fill the space of the log chip except the configuration data area.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| conf[2]  (logdata\_conf\_data\_t) | header  (guint32) | 0x5555aaaa | Configuration data header ID |
| timestamp  (guint32) |  | Linux epoch time(unit:s) |
| totaltick  (guint32) |  | Totoal power on time(unit:s) |
| dim  (guint8) | 0-100 | Dim value when in night mode |
| mode  (guint8) | 0/1 | 0: normal mode  1: night mode |
| brightness  (guint8) | 0-100 |  |
| contrast  (guint8) | 0-100 |  |
| color  (guint8) | 0-100 |  |
| video\_srcmode  (guint8) | 0-2 | 0: video source auto  1: video source 0  2: video source 1 |
| chk  (guint16) |  | CRC16 checksum(modbus) |
| rec[]  (logdata\_rec\_data\_t) | header  (guint32) | 0x66669999 | Recording data header ID |
| timestamp  (guint32) |  | Linux epoch time(unit:s) |
| infocode  (guint32) |  | 0x80000001: memory error  0x80000002:temperature error  0x80000003:power error  0x80010001:log chip error  0x80010002:sensor error  0x80010003:pwm error  0x80010004:key error  0x80010005:sdi device error  0x80010006:lcd device error  0x80010007:serial device error |
| desc[34]  (guint8) |  | Error info description |
| chk  (guin16) |  | CRC16 checksum(modbus) |

### Configuration file data

Default Configuration file: /*etc/b3vdu.conf*

*file data format based on “libconfig”*

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Type** | **Value** | **descritpion** |
| device.version | String | “x.x.x” | Whole system version |
| device.SN | String | “B3VCU-xxx” | Device Serial Number |
| device.date | String | “xx-xx-xxxx” | Manufacturing Date |
| DISABEL\_WATCHDOG | Boolean | true: disable watchdog  false: enable watchdog | Firmware watchdog enable/disable |
| DISABEL\_NUCDEVMODE | Boolean | True: auto mode  false: development mode | NUC mode |
| VIDEO\_SOURCE | Integer | 0: auto(video0/video1)  1: video0  2: video1 | Video source selection mode. |

### global parameters

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| PGParam (glb\_priv\_data\_t) | Sysbits (guint32) | Bit0: memory  bit1: logdata  bit2: snsor  bit3: current  bit4: temperature  bit5: pwm0  bit6: pwm1  bit7: keypad  bit8: video out  bit9: video in0  bit10: video in1  bit11: osd  bit12: serial  bit13: host | System BIT information:  0: pass  1: fail |
|  |  |  |  |
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|  |  |  |  |
|  |  |  |  |

# Requirements traceability

# Note

# Appendixes

## Version Log

|  |  |  |
| --- | --- | --- |
| **Vesrion** | **Date** | **content** |
| 1.0.1 | 30 Jun 2022 | initial version |
| 1.0.2 | 14 Jul 2022 | add "NUC mode" in menu  add "NUC mode" bit in sending key package  based on STK document "VDU View Switching 13072022.pptx" |
| 1.0.3 | 11 Aug 2022 | Modify OSD based on STK document "VDU View Switching 25072022.pptx" |
| 1.0.4 | 17 Aug 2022 | Modify OSD based on STK document "VDU Software V0.5\_16082022.pptx" |
| 1.0.5 | 20 Sep 2022 | insert "VDU software Version", "Reset to Default" item into menu.  the lowest contrast value is 10.  based on STK doucunent "VDU Software V0.6\_20092022.pptx" |
| 1.0.6 | 1 Nov 2022 | change RS422 protocol (move "elapsetime" from "DEV" package to "KEY" package)  based on STK document "VCU\_IDS\_V0.4.xlsx" |
| 2.0.1 | 15 Nov 2022 | rebuild system by Petalinux 2022.2  Add Font into system.  Add brightness value under brightness bar base on "VDU Software V0.7\_31102022.pptx" |
| 2.0.2 | 8 Feb 2023 | Change NUC protocol base on "VDU Software V0.8\_0602023.pptx" |