**Software integration and integration testing**

**Model: iDOLPHIN (iDOLPHIN-S & iDOLPHIN-View)**

**Document No. : Q4-29-015(06) Rev. 02**

This document valid from the date of approval

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| **META BIOMED CO., LTD.** |

**Revision History**

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| **Revision No.** | **Revision history** | **Date** |
| 0 | Initial release, alpha-test | 2013.09.06 |
| 1 | Modified according to EN 62366, Class A | 2014.07.03 |
| 2 | According to Non-conformity, Modify Class B | 2016.02.19 |
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# Code Review

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Software Requirement | Implemented? (Y/N) | Module | Remark |
| CR-M01 | System initialize | Y | Initial process  / Microprocessor | -Create SW components  -Connect to scan process & perform initialization  -Check DB status |
| CR-M02 | Task area switching | Y | Initial process  / Microprocessor | - Image view / Database task switching |
| CR-M03 | System option setting | Y | Initial process  / Microprocessor | -Save categorized system options to local files |
| CR-M04 | Time & disk status | Y | Initial process  / Microprocessor | -Refresh time & disk information according to predefined interval |
| CR-M05 | Scan status display | Y | Initial process  / Microprocessor | - Display status message and progress information |
| CR-M06 | Scan parameter management | Y | Initial process  / Microprocessor | -Create/delete/ modify parameters  -Import/export parameters  -Check parameter limit & display error message. |
| CR-M07 | Scan protocol management | Y | Initial process  / Microprocessor | -Create/delete/modify protocol information  -Import/export protocol parameters. |
| CR-M08 | Scan operation | Y | Initial process  / Microprocessor | -Scan load / start / stop  -Pre-scan functions  -Display real time |
| CR-M09 | Image reconstruction | Y | Initial process  / Microprocessor | -Independent Image reconstruction  -Support extensible post processing interface |
| CR-M10 | View result images | Y | UI  / Microprocessor | -Support various layout & view mode ( 250 by 250) |
| CR-M11 | Image processing | Y | UI  / Microprocessor | -Support basic tools for image processing (width/level, zoom, flip, inverse, rotation, 2D etc.) |
| CR-M12 | Send images to DB | Y | Initial process  / Microprocessor | -Independent process. -Support queuing function  -Show status. |
| CR-M13 | DB optimization | Y | UI  / Microprocessor | -DB compaction function |
| CR-D01 | HW status checking | Y | Initial process  / Memory Device | - Between hardware and memory status check |
| CR-D02 | Memory DB information | Y | Initial process  / Memory Device | Check the Database status. |
| CR-D03 | Raw data | Y | Initial process  / Memory Device | - First camera data values. |
| CR-D04 | Rom status checking | Y | Initial process  / Memory Device | - ‘bin’ file check |
| CR-D05 | Check initial operation. | Y | Initial process  / Memory Device | - Confirm the initial data values.  - Comparative data confirm the value. |
| CR-E01 | Camera initialize | Y | Initial process  / Energy sources | - Camera focusing  - Camera module initialize |
| CR-E02 | Camera ID / raw data | Y | Initial process  / Energy sources | - Camera ID  - Camera rf data |
| CR-E03 | Fiber Value | Y | Initial process  / Energy sources | - Brightness control (HW) |
| CR-S01 | Overcurrent | Y | Initial process  / Safety features | - Overcurrent protection.  - Equipment protection. |
| CR-S02 | Noise | Y | Initial process  / Safety features | -Minimize noise in the image. |
| CR-X01 | Interface Requirements (PC) | Y | Initial process  / External | - Confirm to the PC connection |
| Interface Requirements (Monitor) | Y | Initial process  / External | - Confirm to the Monitor connection |
| Interface Requirements (Mouse) | Y | Initial process  / External | - Confirm to the Mouse connection |
| Interface Requirements (Key Board) | Y | Initial process  / External | - Confirm to the Key Board connection |
| CR-C01 | Image Save | Y | Initial process  / Communication | * Save image |
| CR-C02 | Image Cine | Y | Initial process  / Communication | * Save Cine |
| CR-C03 | Rotation | Y | Initial process  / Communication | * Degree: 0 / 90 / 180 / 270 * Reverse |
| CR-C04 | Brightness | Y | Initial process  / Communication | * Input brightness value in the UI. |
| CR-C05 | Folder | Y | Initial process  / Communication | * Open the Folder |
| CR-C06 | Folder Check | Y | Initial process  / Communication | * Check if a folder exists. |
| CR-C07 | Zoom | Y | Initial process  / Communication | * Click to enlarge / reduce at UI. |
| CR-C08 | AEC | Y | Initial process  / Communication | * AEC values entered. |
| CR-HW01 | RGGB | Y | Initial process  / Image (H/W) | - Data coming from the camera is an RGGB data. |
| CR-T01 | Memory | Y | Initial process  / Timing | * Check memory usage and speed. (FPS) |
| CR-T02 | System booting | Y | Initial process  / Timing | * System boot time. |
| CR-T03 | Camera recognition time | Y | Initial process  / Timing | * Camera initialization time. |
| CR-SW01 | Bad Pixel Removal | Y | UI / Image Processing | * The more homogeneous the image will look |
| CR-SW02 | Reconstruction | Y | UI / Image Processing | * This color pre-gain algorithm will always be applied. |
| CR-SW03 | Color | Y | UI / Image Processing | * If the Apply option is set to true, the color reconstruction algorithm will be applied |
| CR-SW04 | Color Adjustment Matrix | Y | UI / Image Processing | * This function allows to give a little more saturation to the colors |
| CR-SW05 | Gamma | Y | UI / Image Processing | * This algorithm is applied with a certain gamma correction parameter. |
| CR-SW06 | Frames Mean | Y | UI / Image Processing | * This feature allows to remove some of the image noise |
| CR-SW07 | Skip Frames | Y | UI / Image Processing | * The skip frames is used in slower systems to prevent the high memory usage of the machine, and to assure that we don’t have image delay. |
| CR-SW08 | Brightness | Y | UI / Image Processing | * The brightness value is always applied |
| CR-SW09 | Show image | Y | UI / Image Processing | * Images displayed on the UI. |
| CR-SW10 | AEC | Y | UI / Image Processing | * This algorithm is AEC |

# Module Review

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| --- | --- | --- | --- | --- | --- |
|  | Software Specifications | | | Implemented? (Y/N) | Remark |
|  | Module | Function | Function related |
| MR-I01 | Initialization | Camera\_ini | Camera\_s  ProcessingWrapper.pr[0]  CtrFiber.value | Y | Initialize camera, and check identification |
| MR-I02 | Initialization | Memory\_ini | CSystemOptionsDlg  ::SaveDBDataToFile  ::WriteDataToMIFFile  CRomCheck | Y | Check memory status  Load and execute ‘bin file’ of FPGA. |
| MR-I03 | Initialization | Timing\_ini | STime\_F  Timefor  Con\_P | Y | Check initialization and work |
| MR-I04 | Initialization | Image\_ini | Boot\_S  Con\_S | Y | Initialize image  Load setting register value on memory  Obtain image from load data |
| MR-I05 | Initialization | ViewBox\_ini | CHwCtrl  FpgaFilesDirectory  CMainSystem  CtrFiber.value | Y | Operate to display obtained image |
| MR-P01 | Processing | Image\_Recon | colorReconstruction  Brightness | Y | Rearrange and constitute image |
| MR-P02 | Processing | Image\_Color | colorReconstruction  colorAdjustmentMatrix  videoBox | Y | Adjust color brightness, gain value. |
| MR-P03 | Processing | Image\_improv | RemoveBadPixel  GammaCorrection  framesMean  skipFrames  AEC | Y | It is used for improvement of image  Eliminate and reduce inappropriate value through fileter  Offers better image through AEC |
| MR-U01 | Interface | SImage  SCine | SaveDir  SaveImg  SaveCine | Y | Save image and video |
| MR-U02 | Interface | RArrange | RRotation  Zoomin | Y | Rotate and Zoom-in/out image |
| MR-U03 | Interface | InValue | RBright  AEC.greyvalue | Y | Adjust brightness value and AEC value |
| MR-E01 | External | UseSystem | Using System  System.IO | Y | Execute algorithm on external linkage system |

# Integration Review

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| --- | --- | --- | --- | --- | --- |
|  | Software Specifications | | | Implemented? (Y/N) | Remark |
|  | Status | Function | Module |
| IR-01 | Initialization | SysInitialization | Camera\_ini  Memory\_ini  Timing\_ini  Image\_ini  Image\_ini  ViewBox\_ini | Y | Initialize overall system  - Connect camera and check connection status  - Check the operation status of the device on setting timer  - Set image initialization based on register value  - Check the memory  If there are errors, it display error message and inform to user |
| IR-02 | Processing | ImagingProcessing | Image\_Recon  Image\_Color  Image\_improv | Y | Processing for image improvement  - Rearrange image  - Provide each gain value of RGGB |
| IR-03 | Interface | UserInterface | SImage  SCine  RArrange  InValue | Y | Direct control by user interface  - Save image and video  - Image is saved as .jpeg format, video is saved as .avi format  - Rearrange image  - Input AEC value |
| IR-04 | External | ExternalDev | UseSystem | Y | Connect with external device |