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PIXELPLUS

SURROUND VIEW MONITORING SYSTEM

PI5008K On Board Calibration User Guide

Rev 0.4

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1. On-board Calibration user guide

1.1. Introduction

This guide explains how to performs On-Board Calibration. On Board Calibration can be divided into 3 steps as below.

1) Offline Calibration
2) Section View Generation
3) LUT Sampling & Update

PI5008K SDK generates and save 52ea Luts (7 Static Section view modes and 45 swing Section view modes)

Section Num	Section Name
1	2D TOP
2	SD FRONT
3	SD LEFT
4	SD RIGHT
5	SD REAR
6	SD FRONT WIDE
7	SD REAR WIDE
8	SWING 3D VIEW 0 degree
9	SWING 3D VIEW 8 degree
10	SWING 3D VIEW 16 degree
...	...
52	SWING 3D VIEW 352 degree

Table 1 View Mode Instruction

PI5008 has two cores. One is called core0(main core) and the rest is called core1(sub core).

the same section view generation algorithm is built into both cores.

core0 generate from section 1 to 27, and core1 generate from section 28 to 52.
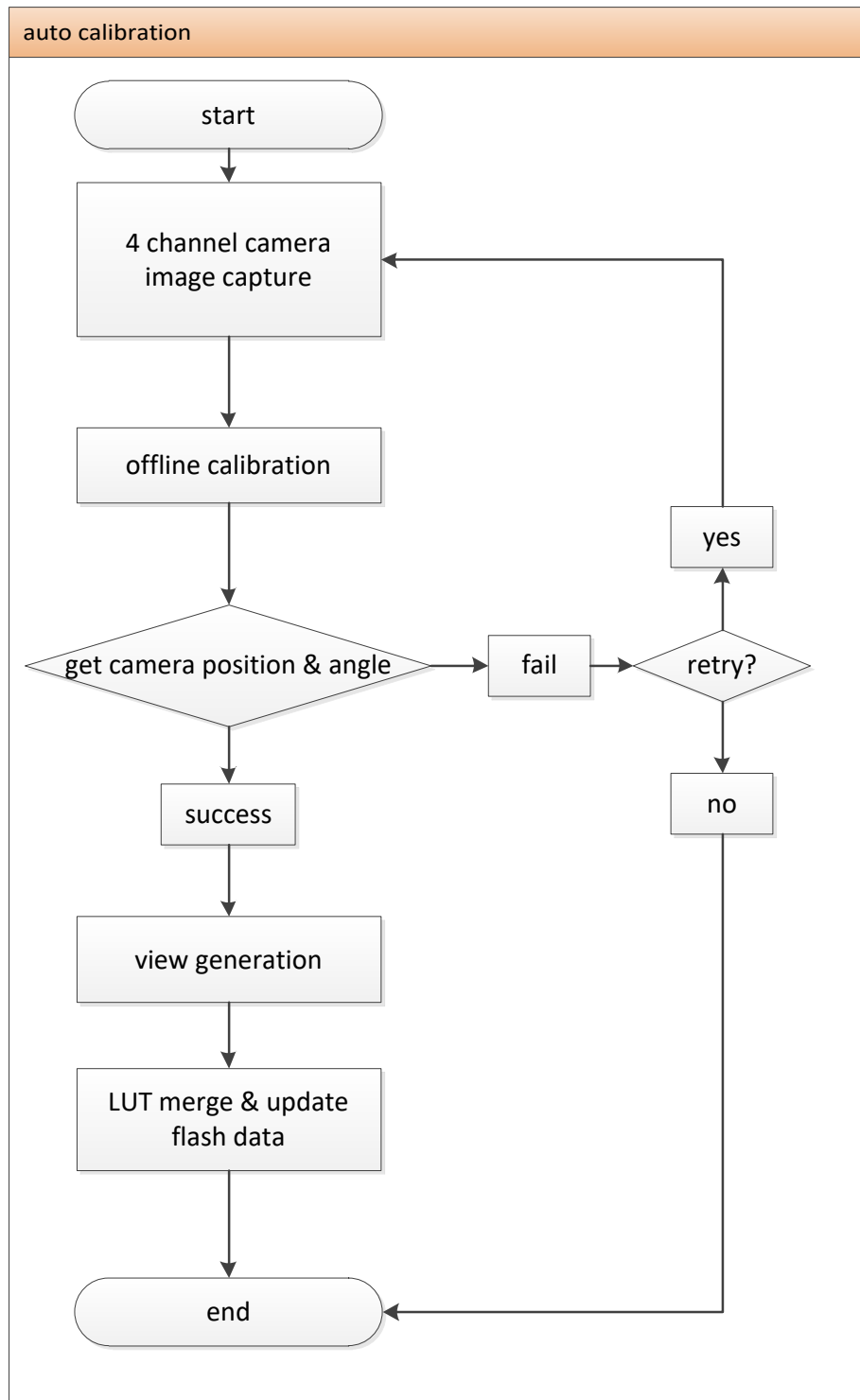
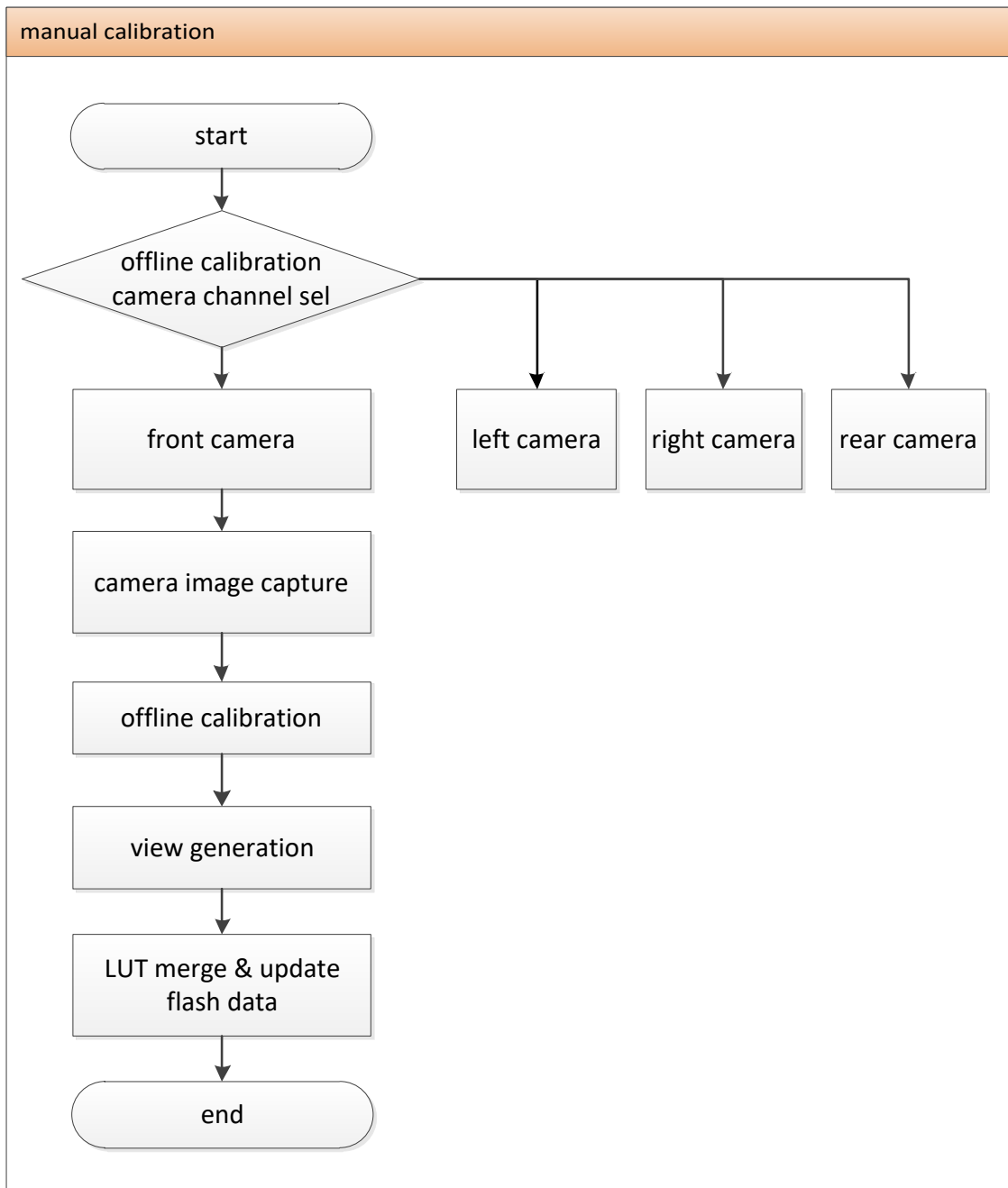## 1.2. Operation Flow Chart

Figure 1 Auto Calibration Flow Chart
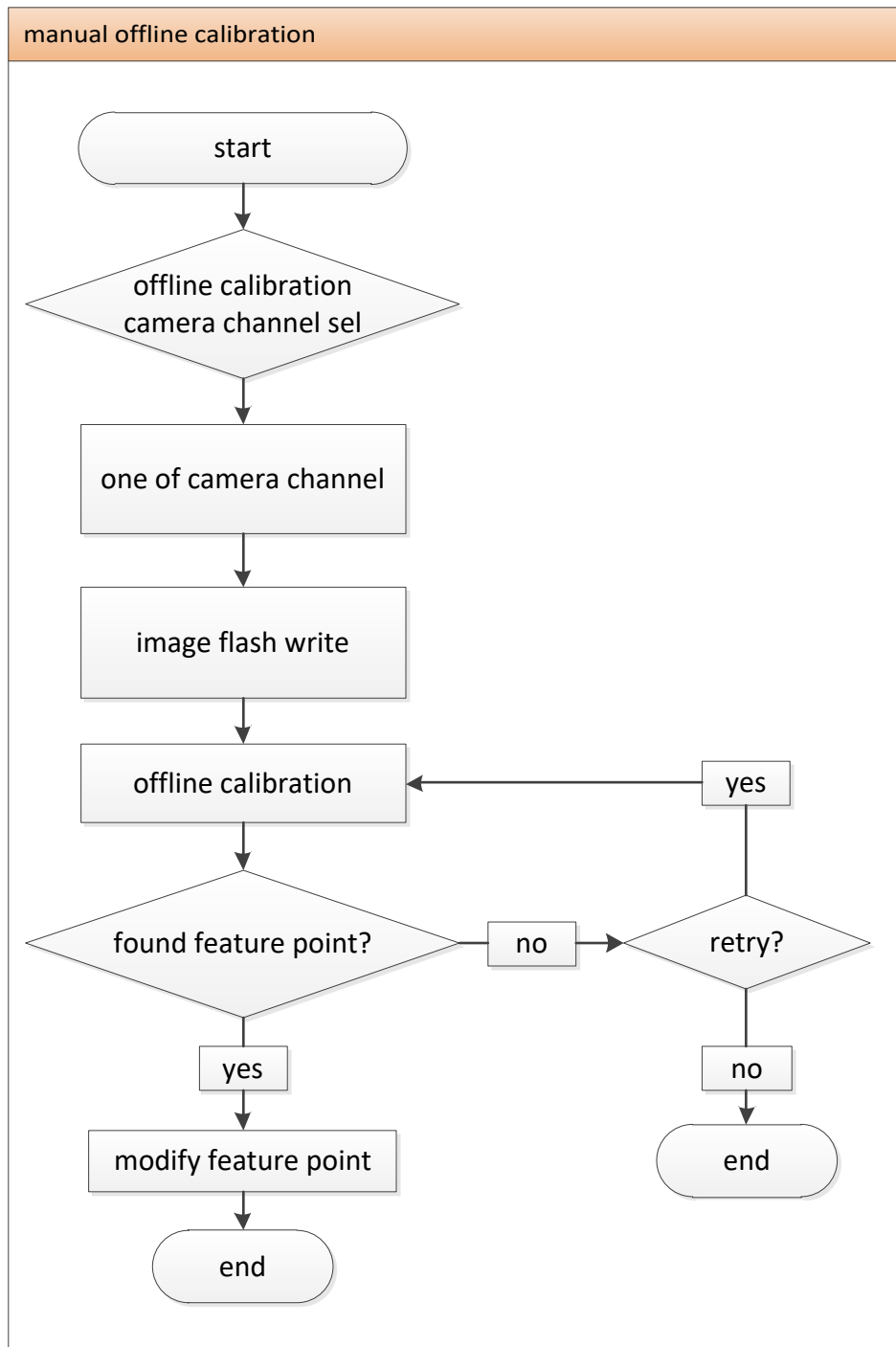
Figure 2 Manaul Calibration Flow Chart

Figure 3 Manaul Offline Calibration Flow Chart

1.3. Offline Calibration Process

1.3.1. Pre-condition for Offline Calibration

- 4 Cameras are installed at correct position of vehicle and the vehicle is located on the pattern. Please refer to 1.3.2 for more details.
- Camera Intrinsic Parameter should be correct. (If it is incorrect, the result of calibration will be also incorrect.)

1.3.2. Pattern specification and installation

Below is a Description of the pattern shape of defined by pixelplus.
Please contact us if User has Another pattern shape that want to use.

pixelplus provides eight types of pattern recognition algorithms.
This document describes only 3 patterns. For more details, please refer to " PI5008K_Off Line Calibration Pattern_20181015.pdf" file.

The pattern has to be made according to the specification.

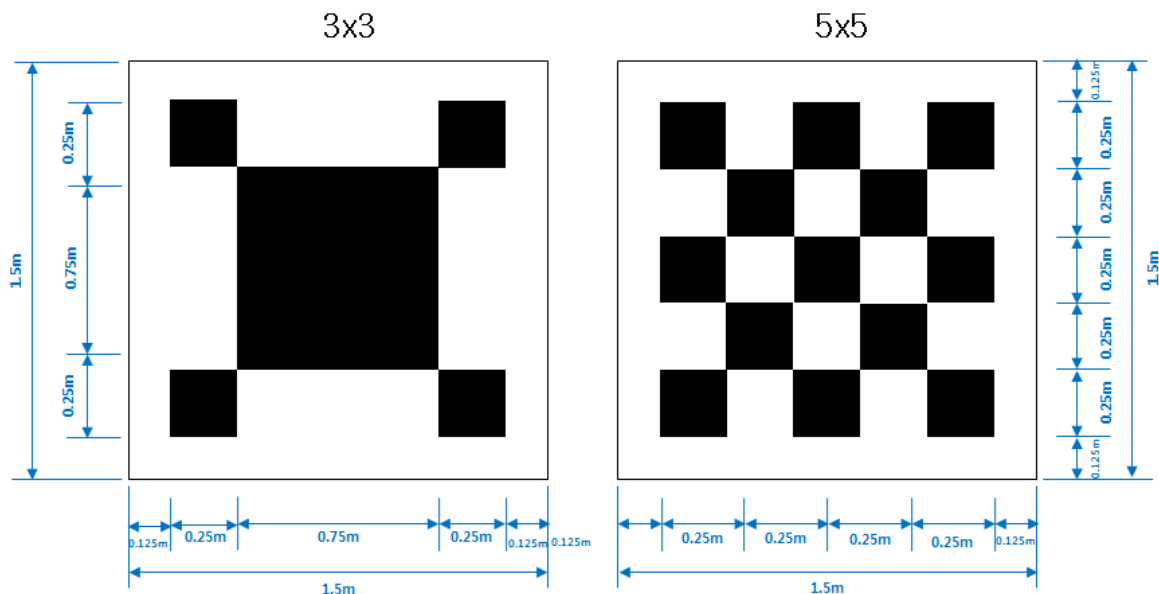**Figure 4 Pattern Spec**

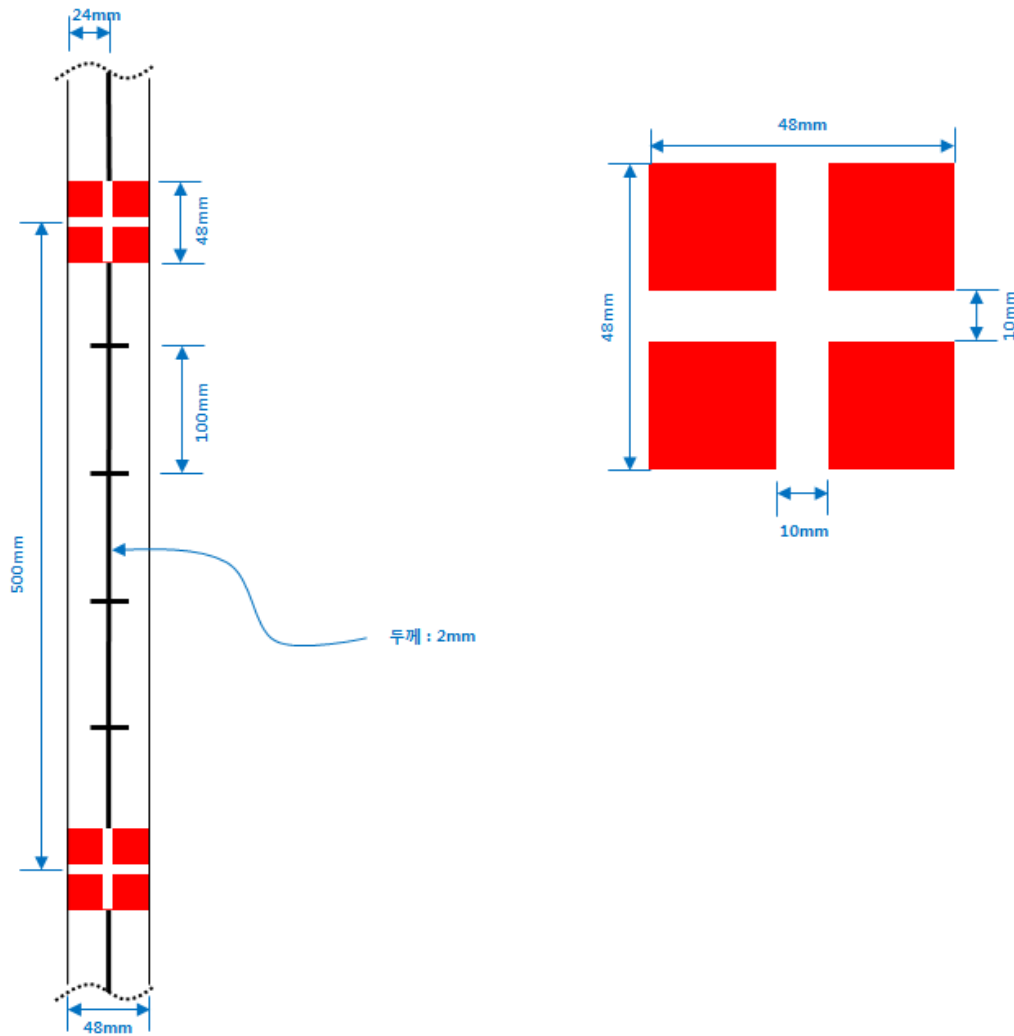Guide tape is used to install Pattern easily.
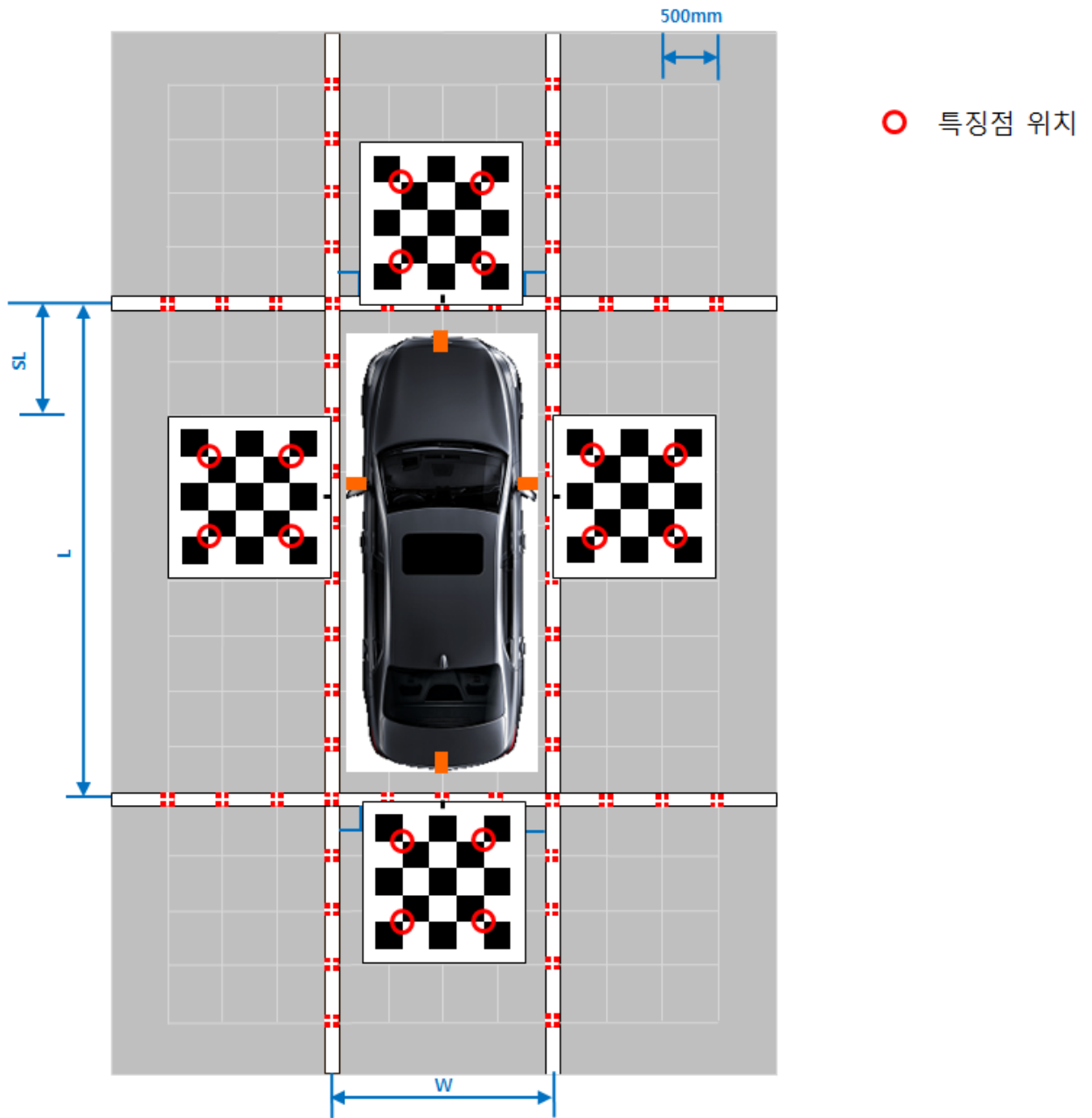

Figure 5 Guide Tape Spec

Figure 6 Pattern Type 1 Installation Guide
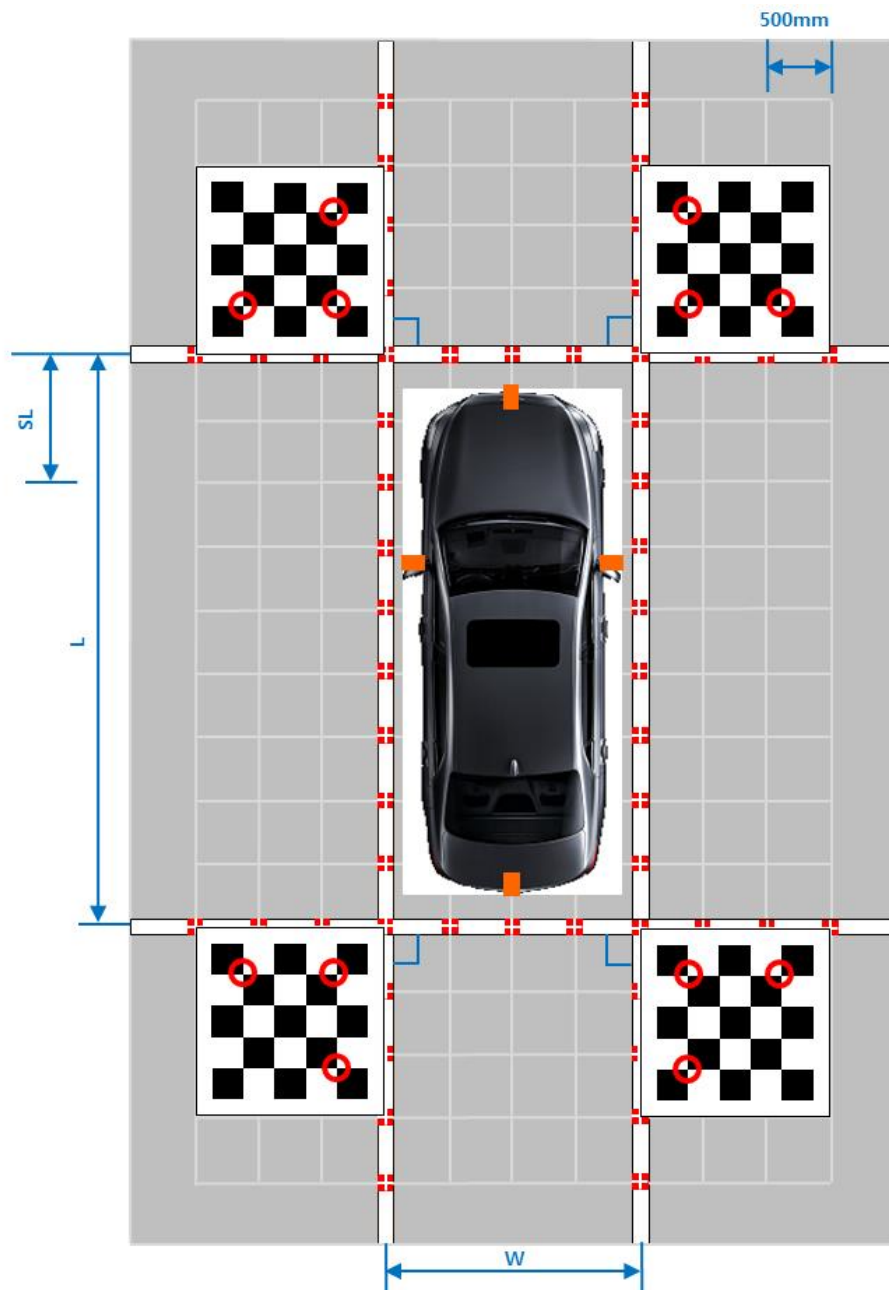
Figure 7 Pattern Type 2 Installation Guide
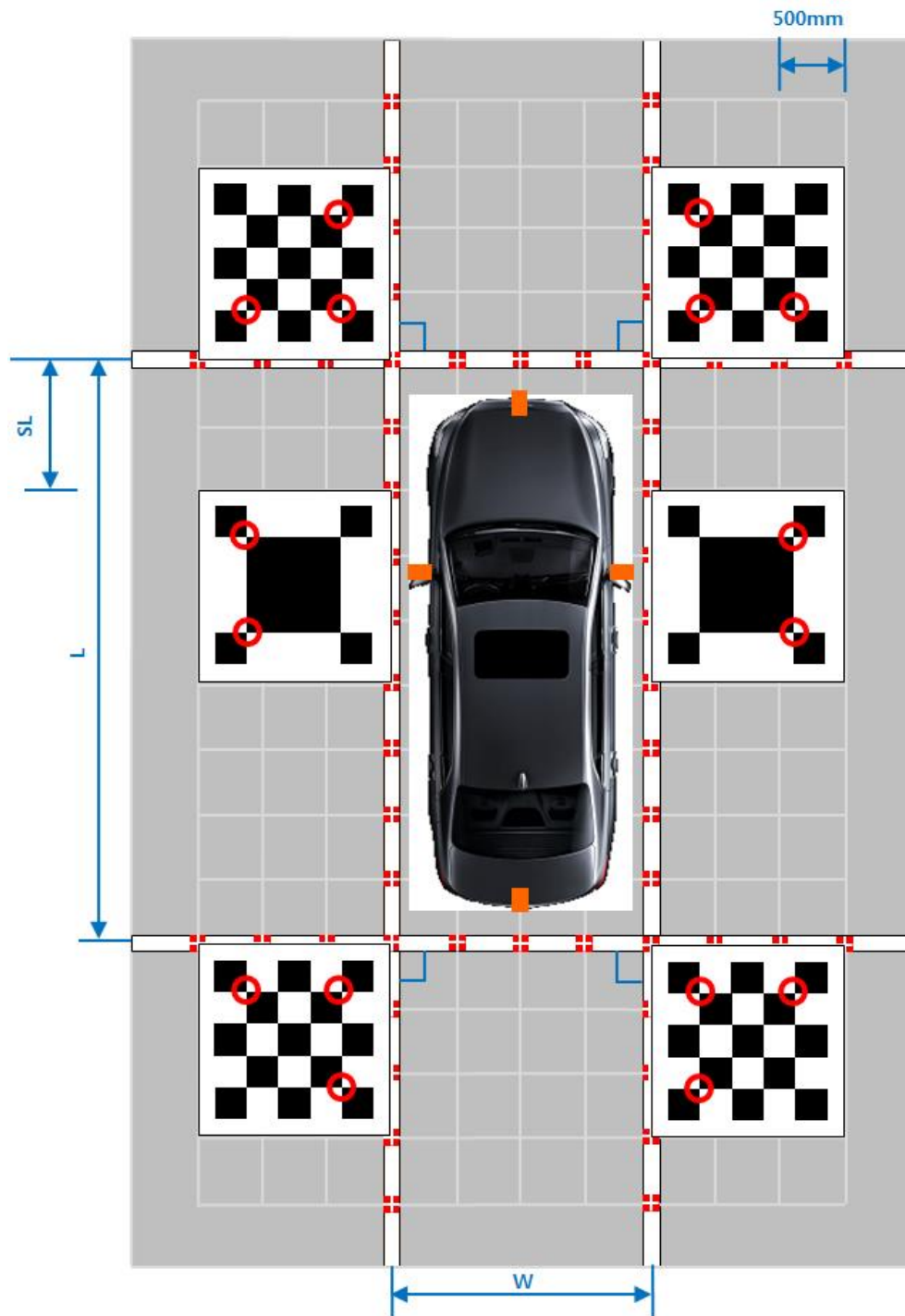
Figure 8 Pattern Type 3 Installation Guide

1.3.3. On Board Offline Calibration Mode

There are two kinds of calibration.

1) manual offline calibration

    A. Extracts camera angle and position for a specific camera

    B. If you want to adjust the feature point manually, control the cross point.

2) auto calibration

    A. Offline calibration will be done for all camera in order of front->left->right->rear camera

    B. View generation will be done after extracting position information for all camera.

C. If it is failed to extract camera position information for a camera, popup menu to ask to retry will be displayed.

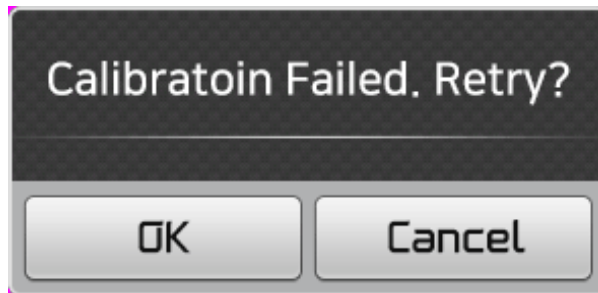When Offline calibration is started, the input image of the selected camera will be captured. Feature point will be searched and camera position and angle information will be extracted base on feature point. The camera position and angle information will be used to generate various section view modes.

1.4. Section View Generation Process

A section view is made based on Sub View configuration data. This data will be generated by the PC Tool and should be saved at flash memory in advance.

SVMconfig.bin file has some contents related with Sub View Configuration info.

for more information, please refer to "PI5008K_ViewGenerationTool_v1.20.00".

Section views are created in the order of section number.

Section view generation perform half on core 0 and the rest on core1.

core1 created a section view lut and passing lut data to core0. core0

during the generation and update of section view, the quad split scree is displayed and you can check the progress of the process(0~100%, 11steps)
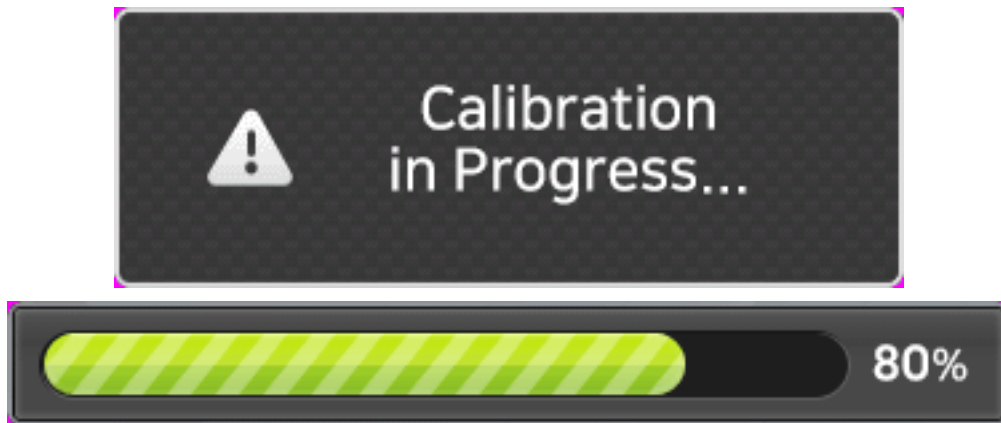

Figure 9 progress bar

1.5. LUT Sampling And Upgrade

PI5008K can display up to four sections. the default mode   is "top 2d" display in left side, and "3d/2d(rear)front)" display in right side.

 make non-sampling "lut" about each section, and then it has to be sampled to sampling lut.
 then update sampled lut to flash memory.

 In the previous introduction said core0 generate from section 1 to 27, and core 1 generate from section 28 to 52.
every time that core1 creates each section lut, core1 requests update to core0 (using mail box)
That is flash update and lut sampling are only executed by core0.

The following functions are lists of functions for sampling lut, see the "PI5008K_API_Reference_Calibration.doc"document for details.

STATIC PP_BOOL PPAPI_Viewgen_LUT_GetSamplingData(PP_BOOL bSection, PP_U16 IN u16Width, PP_U16 IN u16Height, PP_U32* IN pu32NonSamplingLutBuf, PP_U32* OUT pu32SamplingLutBuf)

STATIC PP_BOOL PPAPI_Viewgen_SectionLUT_Sampling(PP_U16 IN u16SectionWidth, PP_U16 IN u16SectionHeight, PP_U32* IN pu32NonSamplingLutBuf, PP_U32* OUT pu32SamplingLutBuf)

STATIC PP_BOOL PPAPI_Viewgen_SectionLUT_Update(PP_U32 IN u32SectionIndex, PP_SVMMEM_SECTION_DATA_E IN enSectionType, PP_U32* IN pu32SectionData, PP_U32 u32SectionDataSize)

STATIC PP_U32 PPAPI_Viewgen_SectionLUT_GetSamplingDataSize(PP_U16 IN u16SectionWidth, PP_U16 IN u16SectionHeight)

PP_VOID PPAPI_Section_Viewgen_Update(PP_U32 IN u32Section_num, PP_U32   IN FB_ADDR,PP_U32   IN LR_ADDR)

1.6. APIs

Please refer to PI5008K_API_Reference_Calibration.doc

2. Revision History

Version	Date	Description
v0.1	20180608	
v0.2	20180726	
v0.3	20181107	
v0.4	20181204	