



LDC Debugging Guide

Version: 1.0.1

Release date: 2021-07-20

Copyright © 2020 CVITEK Co., Ltd. All rights reserved.

No part of this document may be reproduced or transmitted in any form or by any means without prior written consent of CVITEK Co., Ltd.

CONTENTS

1	Disclaimer	2
2	LDC Function and Specification Description	3
2.1	Algorithm Specification for Each Chip	3
3	LDC Debugging Guide	4
3.1	Basic Concept	4
3.1.1	Field of View	4
3.2	Debugging Guide for Each Application Scenario Parameter	5
3.2.1	LDC	5
3.2.2	LDC Correction Model	5
3.2.2.1	Example of Correction of Barrel Distortion	7
3.2.2.2	Example of Correction of Pincushion Distortion	8
3.2.3	Free Angle Rotation	8
3.2.4	Data Flow Chart	8
4	Calibration Tool	9
4.1	Instruction	9

Revision History

Revision	Date	Description
0.1	2021/07/14	Initial
0.1	2021/07/18	Chapter determination, adding table content
0.1	2021/07/20	Completion of the experimental diagram and content

DISCLAIMER



Terms and Conditions

The document and all information contained herein remain the CVITEK Co., Ltd' s ("CVITEK") confidential information, and should not disclose to any third party or use it in any way without CVITEK' s prior written consent.

User shall be liable for any damage and loss caused by unauthority use and disclosure.

CVITEK reserves the right to make changes to information contained in this document at any time and without notice.

All information contained herein is provided in "AS IS" basis, without warranties of any kind, expressed or implied, including without limitation mercantability, non-infringement and fitness for a particular purpose.

In no event shall CVITEK be liable for any third party' s software provided herein, User shall only seek remedy against such third party.

CVITEK especially claims that CVITEK shall have no liable for CVITEK' s work result based on Customer' s specification or published shandard.

Contact Us

Address Building 1, Yard 9, FengHao East Road, Haidian District, Beijing, 100094, China

Building T10, UpperCoast Park, Huizhanwan, Zhancheng Community, Fuhai Street,
Baoan District, Shenzhen, 518100, China

Phone +86-10-57590723 +86-10-57590724

Website <https://www.sophgo.com/>

Forum <https://developer.sophgo.com/forum/index.html>

LDC FUNCTION AND SPECIFICATION DESCRIPTION

The Lens Distortion Correction (LDC) system corrects and expands a frame for Barrel Distortion and Pincushion Distortion, correcting the distorted images in both categories.

2.1 Algorithm Specification for Each Chip

If necessary, the reference data should be presented in a table when available.

LDC DEBUGGING GUIDE

3.1 Basic Concept

3.1.1 Field of View

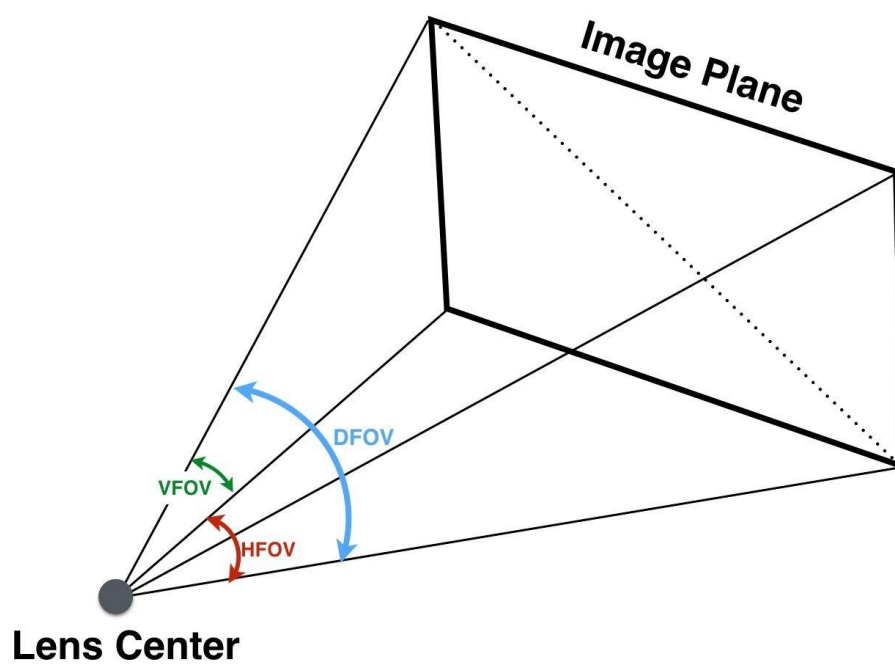


Fig. 3.1: horizontal field of view, horizontal field of view, diagonal field of view

3.2 Debugging Guide for Each Application Scenario Parameter

3.2.1 LDC

Table 3.1: LDC Parameter Configuration Table

Configuration Parameter	Configuration Range	Parameter Meaning
CenterXOffset	-511~+511	Horizontal offset of the image center point from the physical center point
CenterYOffset	-511~+511	Vertical offset of the image center point from the physical center point
DistortionRatio	[-300,500]	Correction strength, negative numbers for pincushion type, positive numbers for barrel type
bAspect	bool	Whether the aspect ratio is maintained during the field of view adjustment
XYRatio	0~100	Parameter for field of view size, valid when bAspect=1
XRatio	0~100	X-directional field of view size parameter, valid when bAspect=0
YRatio	0~100	Y-directional field of view size parameter, valid when bAspect=0

3.2.2 LDC Correction Model

LDC supports two correction modes, barrel distortion and pincushion distortion, as shown in Figure 3-2 and Figure 3-4.

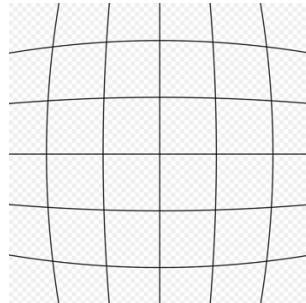


Fig. 3.2: Barrel Distortion

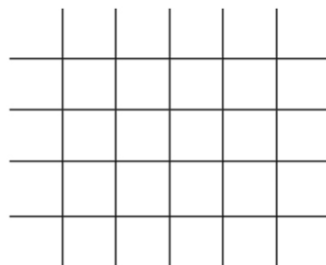


Fig. 3.3: Without Distortion

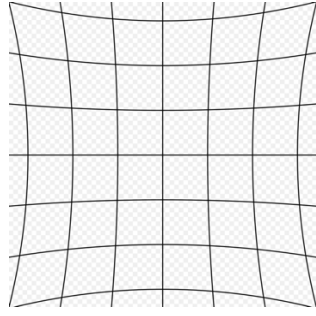
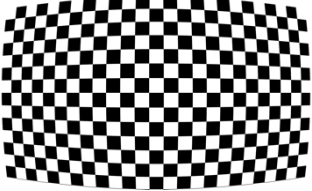
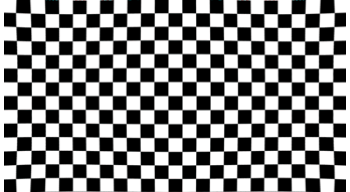
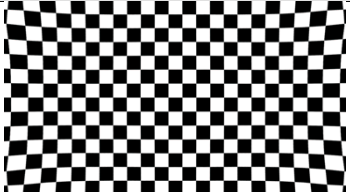
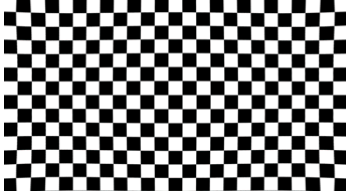
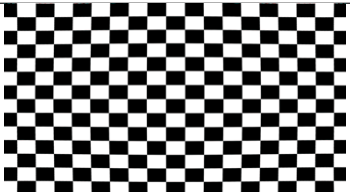
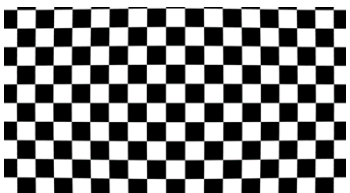


Fig. 3.4: Pincushion Distortion

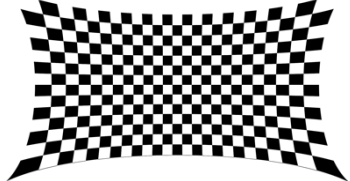
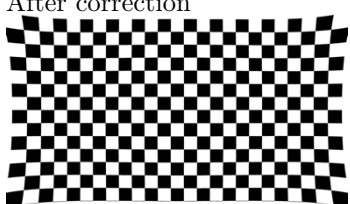
3.2.2.1 Example of Correction of Barrel Distortion

Table 3.2: Instructions for correction of barrel distortion

Parameter Description	Parameter Configuration	Image Examples
Typical Configuration Distortion center overlaps with image center Maintain the aspect ratio Maintain the maximum field of view	Width=1920 Height=1080 OutWidth=1920 OutHeight=1080 CenterXOffset/CenterYOffset=0 DistortionRatio=-165 bAspect=1 XYRatio=100 XRatio=100 YRatio=100	Before correction  After correction 
Ratio: Correction strength A higher value indicates a lower correction strength	DistortionRatio=-205	
bAspect: Whether to maintain the aspect ratio 1: Maintain the aspect ratio 0: Do not maintain the aspect ratio and retain the maximum field of view	bAspect=0 DistortionRatio=-165	
bAspect=0, XRatio, YRatio XRatio: Horizontal field of view reservation magnitude YRatio: Vertical field of view reservation magnitude bAspect=1: Enable XYRatio XYRatio: The field of view reservation magnitude in scene where the aspect ratio is maintained Note: 100 is the maximum field of view retained, 0 is 2/3 of the maximum field of view retained	bAspect=0, XRatio=20 bAspect=1, XRatio=20	 

3.2.2.2 Example of Correction of Pincushion Distortion

Table 3.3: Instructions for correction of pincushion distortion

Parameter Description	Parameter Configuration	Image Examples
Typical Configuration Distortion center overlaps with image center Maintain the aspect ratio Maintain the maximum field of view	Width=1920 Height=1080 OutWidth=1920 OutHeight=1080 CenterXOffset/CenterYOffset=0 DistortionRatio=500 bAspect=1 XYRatio=100 XRatio=100 YRatio=100	Before correction  After correction 

3.2.3 Free Angle Rotation

Table 3.4: Configuration of Free Angle Rotation

Configuration Parameter	Configuration Range	Parameter Meaning
CenterXOffset	-511~+511	Horizontal offset of the center of rotation from the center of the image
CenterYOffset	-511~+511	Vertical offset of the center of rotation from the center of the image
OutWidth	480~8192	Width of the output image
OutHeight	360~8192	Height of the output image

3.2.4 Data Flow Chart

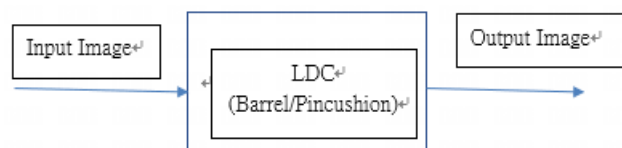


Fig. 3.5: LDC (Lens Distortion Correction flowchart)

CALIBRATION TOOL

4.1 Instruction

Please refer to the PQ tool to make online adjustments to obtain the best model parameters.