



APPLETEC Ltd.

Camera Solutions 'Beyond the Catalog'

**Value-Added
Service**

- Company Overview
- About us
- Our Vision
- CCM – Compact Camera Module
- Core Competence

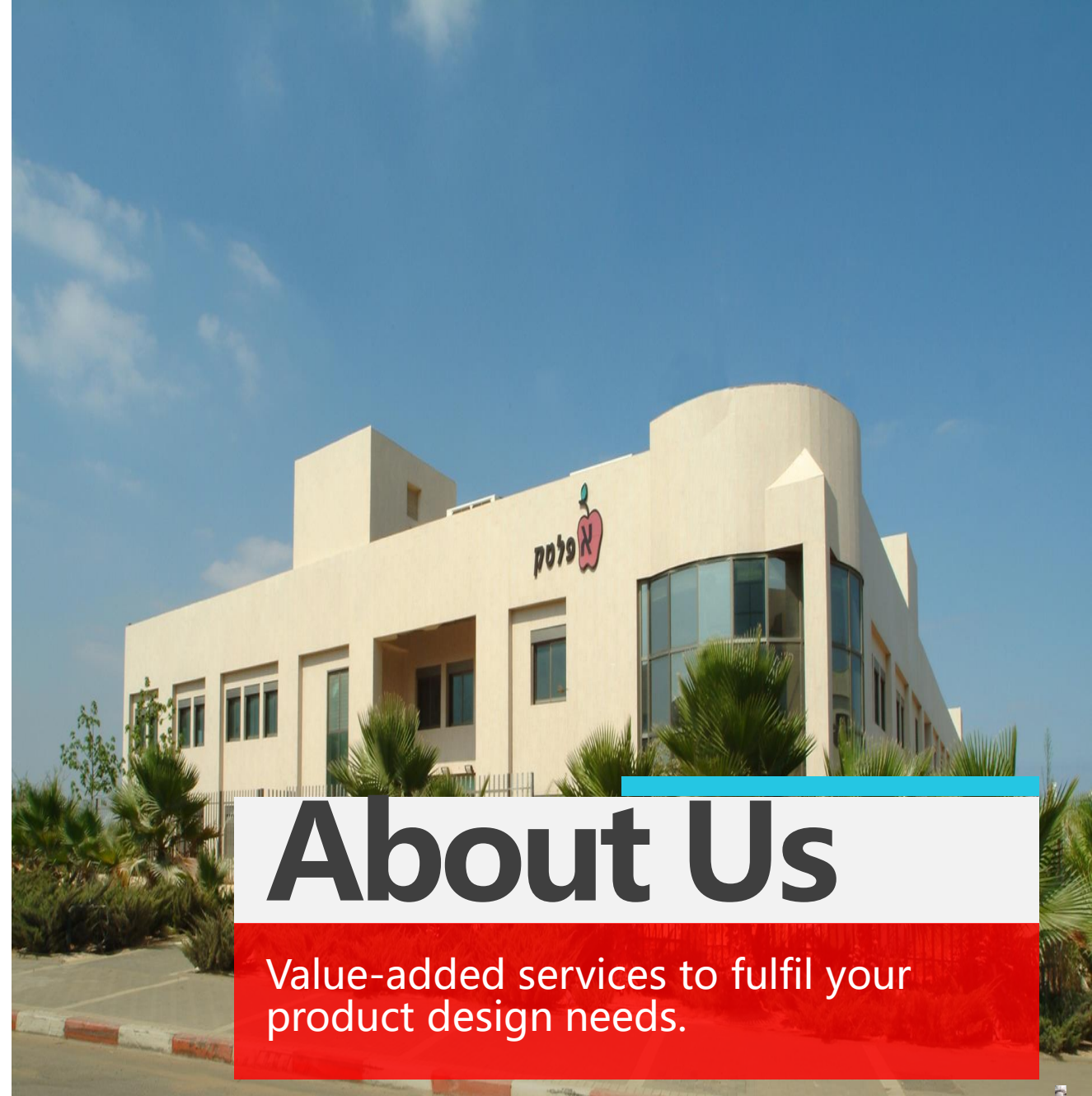
Content

Content

Established 1990, Appletec is a leading Israeli ODM added value company. We offer a full range of cameras for IOT, medical, industrial ,home security, defense and automotive industry.

Appletec approaches the market with a simple question: Which problem customer is trying to solve, and how to deliver a best solution?

Our People make the difference!



About Us

Value-added services to fulfil your product design needs.



Core Competence

Why choose Appletec?

- Deep involvement from early project stages.
- Finding advanced technical solution to our customers.
- In-depth consideration of the customer's production needs.
- Cooperation with the world's most advanced suppliers.
- Project management and engineering support.
- Cost reduction.

We provide high-level technical solutions, according to your project requirements.

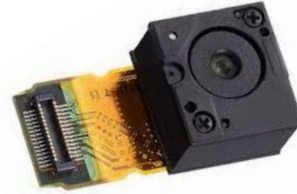
- We accurately define required technical parameters of the products in order to meet your application conditions.
- The design always considers manufacturing capabilities and limitations in order to make a cost-effective and high-quality design simultaneously.
- We think “outside the box” and provide the best solution for your project.

Cameras

CCM – Compact Camera Module

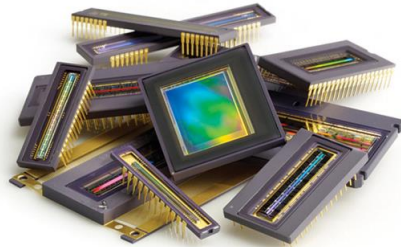


CCM – Compact Camera Module



The CCM is Consist of four main components

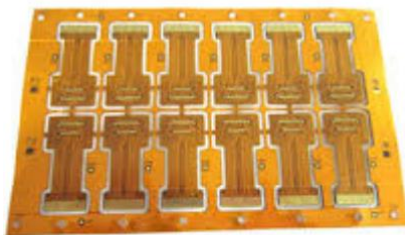
Sensor



Lens



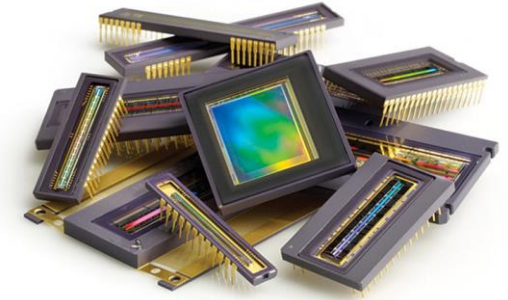
PCB



Connector



CCM – Compact Camera Module

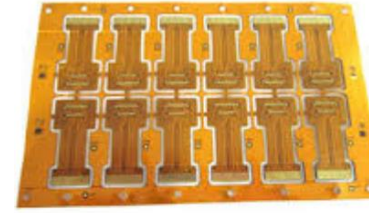


Sensors

We design and provide solutions, based on a wide range of On-Semi sensors:

- Monochrome / Color
- Rolling / Global Shutter
- Variety of Sensor formats
- Pixel Size (resolution/sensitivity)
- Frame Rate
- Dynamic Range
- Low Light Performance
- Environmental conditions (per required grade – outdoor; industrial; automotive)

CCM – Compact Camera Module



PCB + Connector

In most cases solution requires custom Flex PCB design. Such design includes specified pin-assignment for chosen sensor as well as required mechanical properties.

It's a small customization which can be done very quickly - usually within 3- 4 weeks ARO for relatively low amount of NRE .

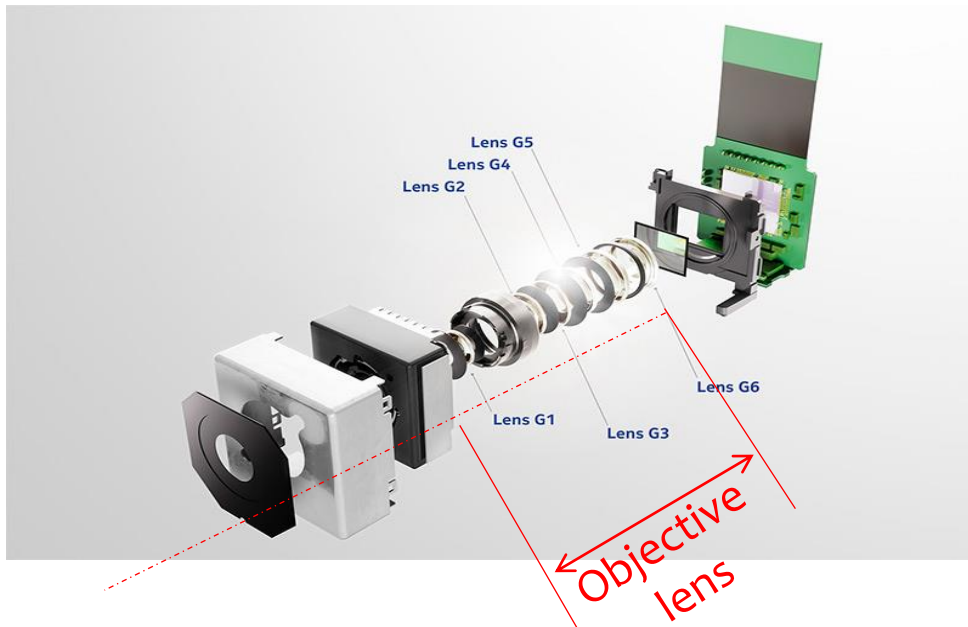
Variety of connectors are available according to customer's requirement or our suggestion according to customer's application.

CCM – Compact Camera Module



Objective lens

Function – transfer object image to sensor



Production technology of lens elements

1. Polish – Glass; usually spherical, small project quantity 100 to 1000pcs
2. Molding – Glass/Plastic, Spherical/Aspheric. large quantity ~ for 1k to 1M
3. CNC - Glass/Plastic - very small quantity



Lenses

In most cases solution can be done, using off-the-shelf components, which available in the open market. Our knowledge and experience of product's integration is one of Appletec's main added values. For specialty projects, when off-the-shelf solutions are not providing suitable results - customized lens design is always can be done using our in-house optical design capabilities .

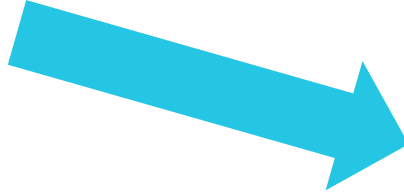
Following lens properties should be considered in any kind of solution:

- Fixed Focus/ Auto Focus
- Focal length (required FOV)
- Lens Resolution (MTF)
- F#
- Spectral range requirements (IR correction/ band pass filters for IR illumination)
- Distortion
- Relative Illumination
- Depth of Field

How To Define CCM optical properties?

4WD Mnemonic rule

What need to be **D**etected
When need to be **D**etected
Where need to be **D**etected
Why it need to be **D**etected



Object properties
Day/night/light source
Indoor/outdoor/car/ etc.
Function

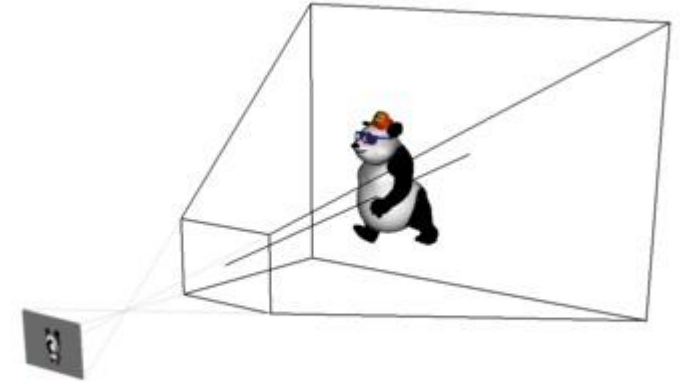
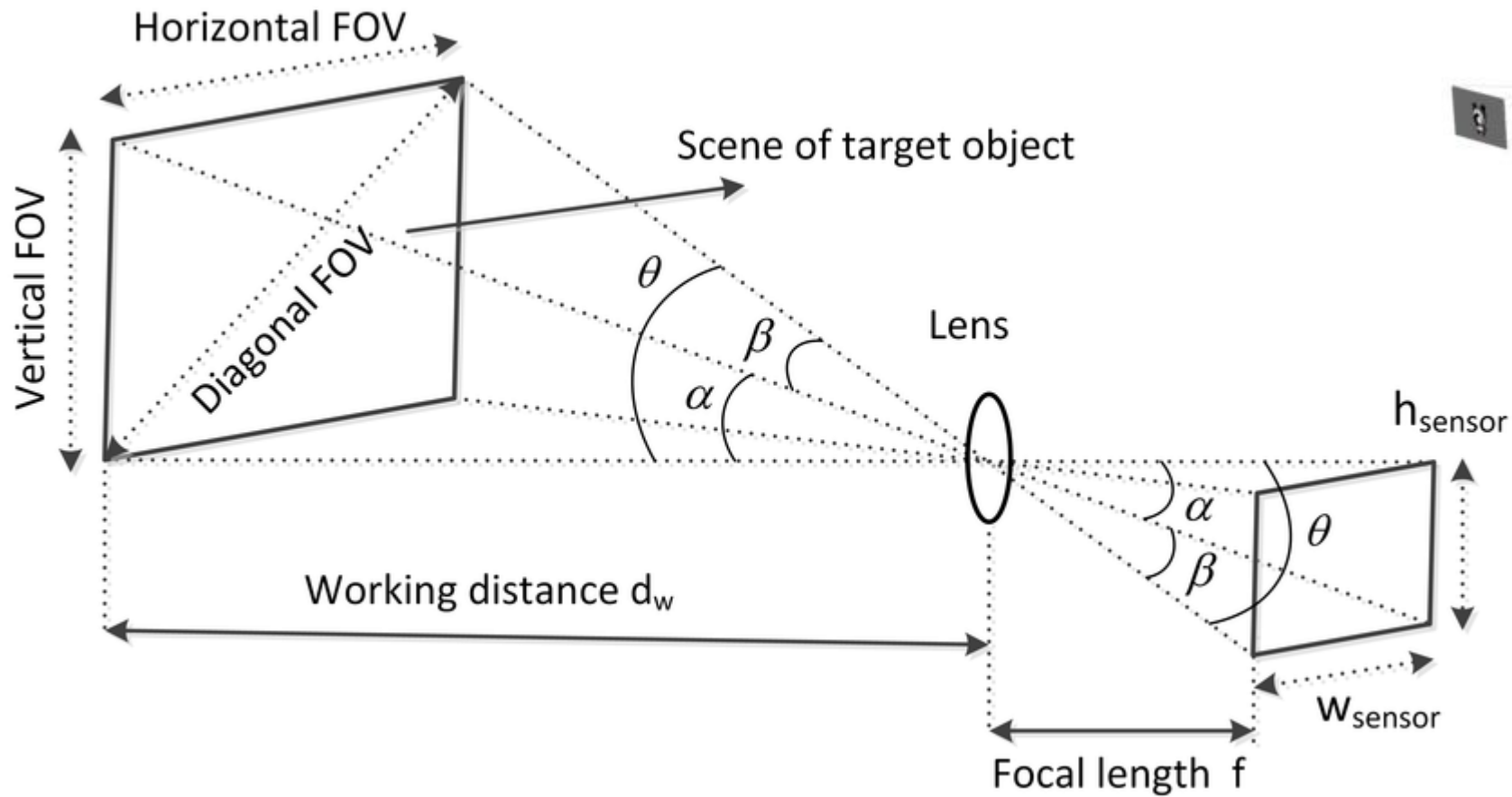


Range, size, ratio
Illumination condition
Environmental conditions
Application

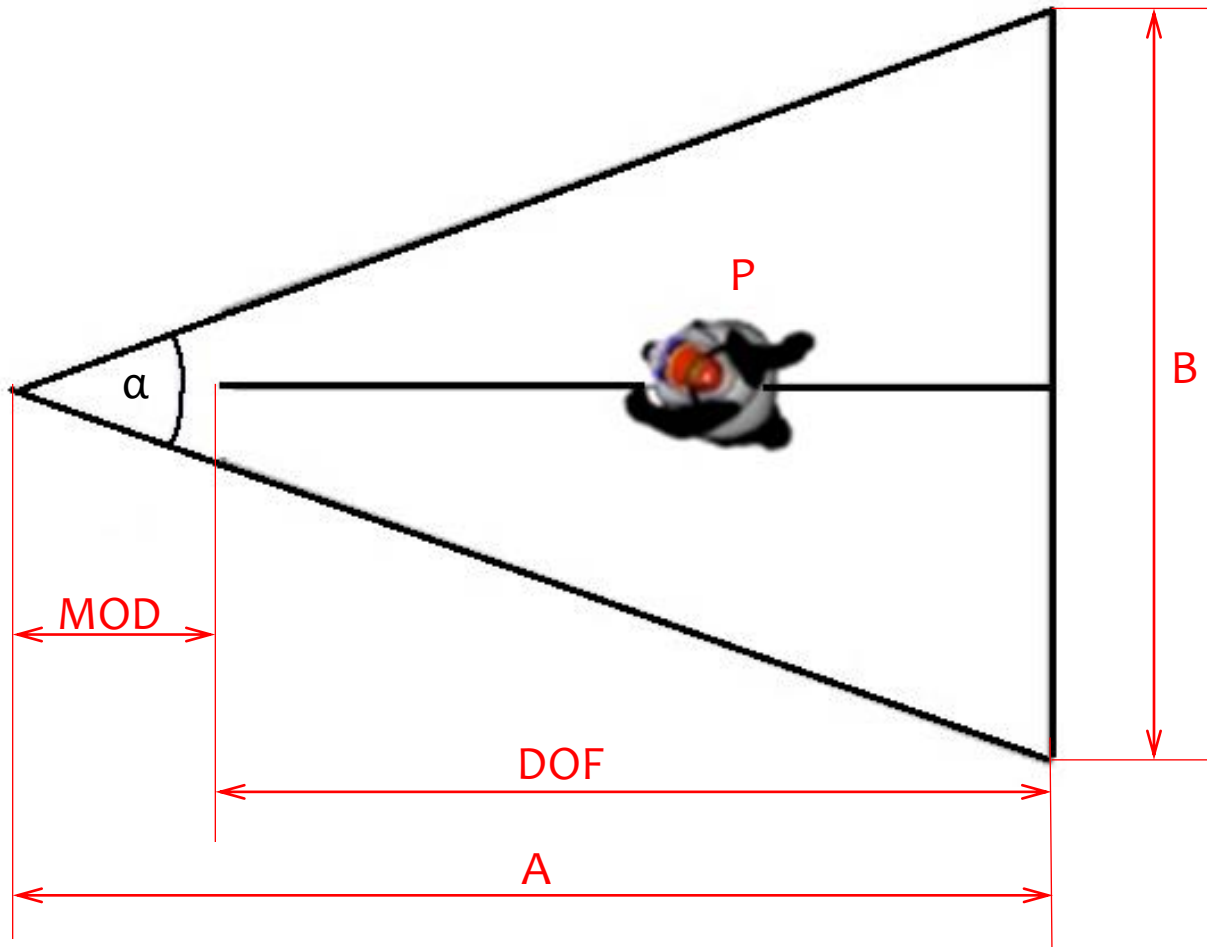


Lens resolution, FOV, MTF, distortion
F#; Operation wavelength - VIS/IR
Lens components materials, and coating
Which parameters most critical and which
can be compromised

Optical Properties. Some definitions.



Optical Properties. Some definitions.



- α – Field of View
- A – Working distance
- B – Scene range
- MOD – Minimum object distance
- DOF – Depth of field
- P – Object size

$$\alpha = 2 \cdot \tan^{-1} \left(\frac{B/2}{A} \right)$$

CCM – Compact Camera Module

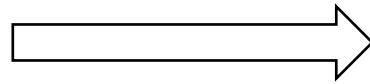


Several consideration for design solutions and objective lens construction

Application Requirements:

Security (indoor)

1. Day/night operations
2. Low light conditions
3. Low power consumption

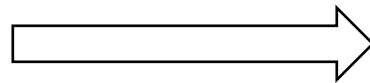


Typical Solution

1. Big pixel sensor ($>4.0\mu\text{m}$)
2. Low resolution lens (MTF \sim 60lp/mm)
3. Low F# \sim 1.5
4. All plastic or hybrid lens

Consumer Medical

1. Good illumination conditions
2. Close object distance
3. Compact size
4. High image quality



1. Small pixels (\sim 1.4 μm)
2. High resolution lens (MTF \sim 120lp/mm)
3. High F# \sim 8-10
4. All plastic

CCM – Compact Camera Module

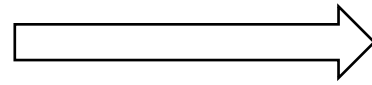


Several consideration for design solutions and objective lens construction

Application Requirements:

Automotive

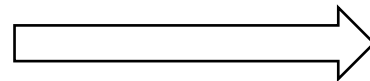
1. Extreme light conditions
2. High image quality
3. Wide temperature range



Typical Solution

1. High dynamic range sensor (>120db)
2. High resolution lens (MTF>120lp/mm)
3. Low distortion (<1-4%)
4. All glass lens

Consumer



High variety of optical parameters



Way to integrate precise CCM solution High lights

- Relevance to application
- Design to cost
- Avoid overkilling

CCM Project Scenario

Application – Smart Glasses



Application Challenges

- Compact physical dimensions
- High Resolution
- Low light sensitivity
- Strict optical performance requirements
- Low distortion - critical for image processing
- Autofocus Lens - critical for precise details detection of moving object
- Mass production price – consumer market applications requires very competitive pricing in mass production

CCM Project Scenario

Application - Smart Glasses



Solution Example

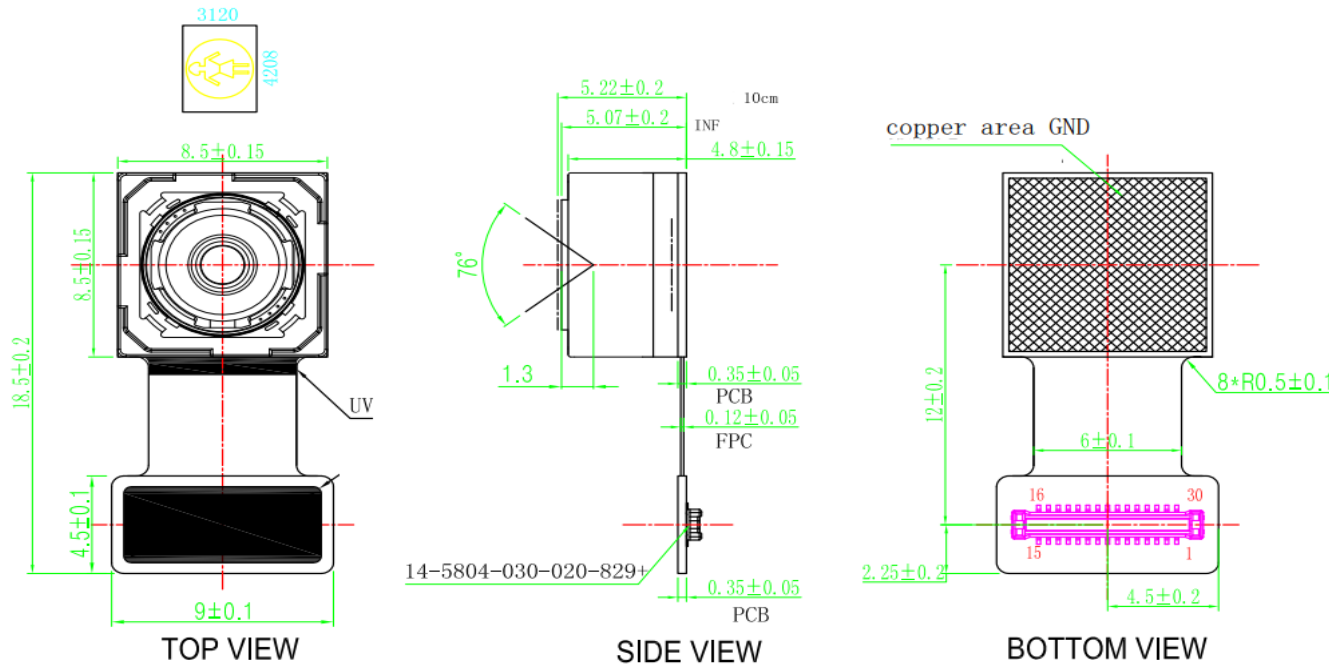
- Application required high resolution sensor with good sensitivity at low light conditions.
- On-Semi AR1337 13Mega Pixel sensor was chosen.
- In order to meet strict optical requirements, an AF high resolution off-the-shelf lens with good F# and low distortion was chosen.
- The lens options reviewed considering strict mechanical limitation and optical requirements .
- Design Review of module configuration and test conditions was done with customer
- Module final specification provided to customer for review and confirmation.
- Samples production.

CCM Project Scenario

Application - Smart Glasses

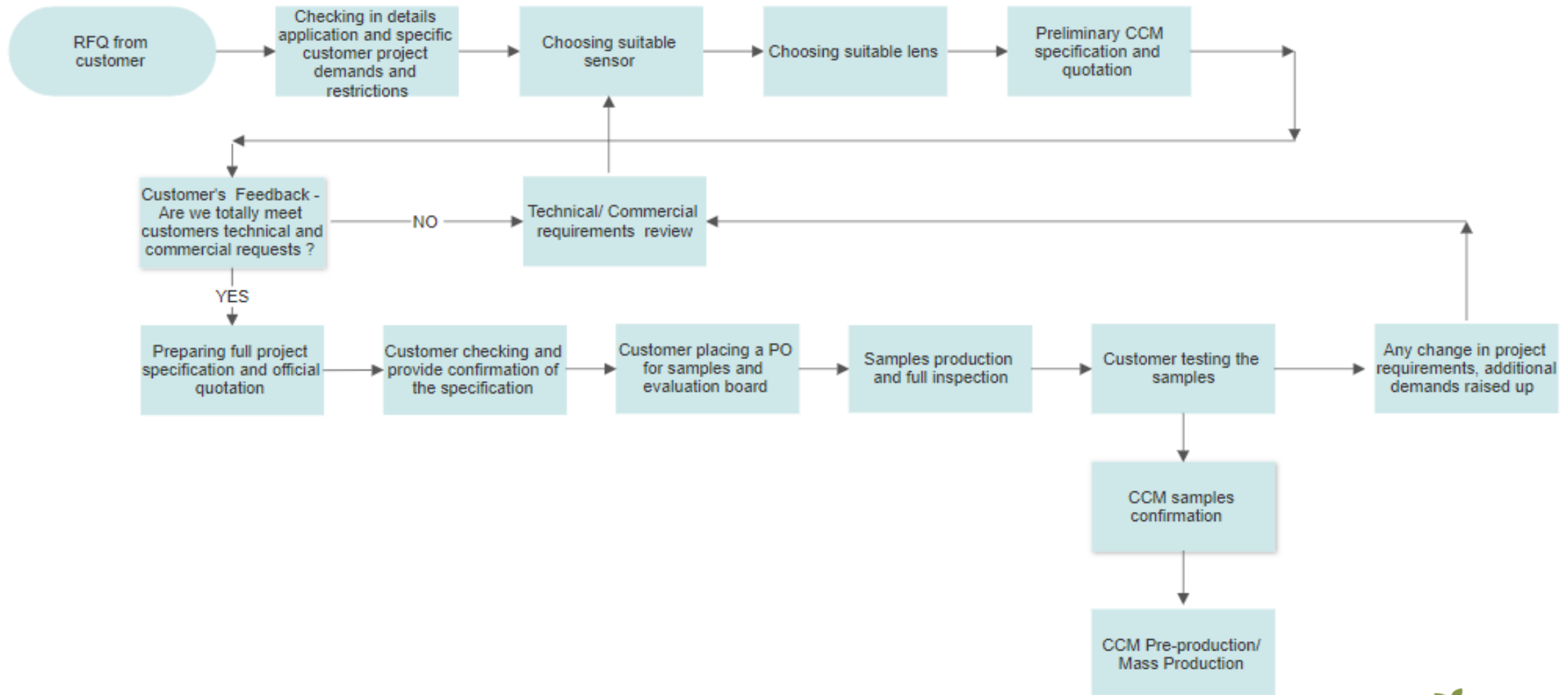


Solution Example



Spec			
EFL	3.69mm	Distortion	<1.5%
Effective Pixel Number	4208*3120	Relative Illumination	31%
Image Sensor Size	1/3.2 inch	sensor type	AR1337
Max Image Circle(D)	6.3mm	Drive IC type	DW9718S
F/ND	2.0+/-5%	EEPROM type	CN24C64AH
FOV	76°	SENSOR I2C :	0X6C/6D
Constructure	5P	Drive IC I2C :	0X18

CCM Production Flow Chart



CCM Project Scenario

Suggested CCM Specification

P/N: AP-CM-55-0.3-50-XX

0.3MP Camera module
with ARX3A0 image sensor



APPLETEC Ltd.

Camera Module Technical Data Sheet
Appletec Part No.
AP-CM-55-0.3-50-XX

Revision 1.0
2020/09/18


Prepared By: Paula T Date: 2020/09/18
Checked By: Mark V Date: 2020/09/18
Approved By: Mark V Date: 2020/09/18

Customer: _____

Customer Signature and Seal	Date

P/N: AP-CM-54-4.0-70-XX

4MP Camera module
with AR0430 image sensor



APPLETEC Ltd.

Camera Module Technical Data Sheet
Appletec Part No.
AP-CM-54-4.0-70-XX

Revision 1.0
2020/09/08


Prepared By: Paula T Date: 2020/09/08
Checked By: Mark V Date: 2020/09/08
Approved By: Mark V Date: 2020/09/08

Customer: _____

Customer Signature and Seal	Date

P/N: AP-CM-50-13-76-XX

13MP Camera module
with AR1337 image sensor



APPLETEC Ltd.

Camera Module Technical Data Sheet
Appletec Part No.
AP-CM-50-13-76-XX

Revision 1.0
2020/11/02

Prepared By: Paula T Date: 2020/11/02
Checked By: Mark V Date: 2020/11/02
Approved By: Mark V Date: 2020/11/02

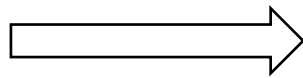
Customer: _____

Customer Signature and Seal	Date

CCM Project Scenario

CCM Request for Customization

CCM Request for Customization



Parameter	Required
Sensor Parameters	
Sensor format	
Sensor Resolution	
Shutter type - Rolling/Global	
Lens Parameters	
Focal length (mm)	
Object size/type	
F#	
FOV D/H/V(deg)	
MTF	
DOF (mm)	
TV distortion	
Relative illumination	
Spectral range (nm)	
Lens mount	
Mechanical Dimensions (mm)	
Filter	
CCM Parameters	
Connector	
Data Interface	
FPC Length/ Shape drawing for special requirement (mm)	
Pin-Out	

Major Customers

Major customers in Israel



Quality Assurance

Quality Assurance

SAP Business One

SAP Business One

שם חברה: APPLETEC Ltd.

קוד משתמש: *

סיסמה: *****

בחירת חברה | יציאה | אשר

