

Mirrorless
Interchangeable Lens Cameras (ILC)

Compact System Camera (CSC)

By

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History OF Digicams

1st Digital Cameras

- Dec. 1975 1st Digital camera by Steve Sasson @ Kodak

<http://petapixel.com/2010/08/05/the-worlds-first-digital-camera-by-kodak-and-steve-sasson/>

- 1989 1st DSLR by Kodak
 - Kodak DCS \$28,000
- Kodak didn't originally sell digicams
 - Made money from patent
- Kodak depended on film cameras & specialty items
- **Bankruptcy**

1st Mirrorless ILC Consumer Camera

- 2004 Epson RD1 – Rangefinder Leica M-mount lenses \$3000
- www.dpreview.com/articles/1924025521/epsonrd1
- www.epson.com/cgi-bin/Store/consumer/consDetail.jsp?oid=49164277

History - Milestones

- 1995 Casio QV-10
 - 2 MB flash memory
 - LCD Panel
 - Pivoting lens (selfies)
 - Internal flash memory
- 1997 Sony Mavica
 - 3.5" floppy disk
 - LCD Panel
- https://en.wikipedia.org/wiki/Sony_Mavica
- www.theverge.com/2012/9/14/3330924/first-lcd-digital-camera-casio-qv-10

History - Milestones

- 2004 Affordable DSLR Body
 - Nikon D70 \$999
 - Canon 20D \$1500
- 2004 1st Mirrorless Rangefinder \$3000
 - Epson R-D1
 - Leica M-mount lense
- 2008 Olympus & Panasonic jointly developed four thirds Mirrorless Camera
 - Lenses interchangeable
 - Brands & camera types
 - Now **MICRO** four thirds
 - Micro 4/3 no mirror box
 - Shorter distance from lens to sensor
- 2009 1st Digital full-frame mirrorless rangefinder
 - Leica M9
- 2013 1st Full frame mirrorless DSLR type,
 - Sony a7 & a7R

History - Milestones

- 2009 1st Digital full-frame mirrorless rangefinder
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- https://en.wikipedia.org/wiki/Leica_M9
- 2013 1st full frame mirrorless DSLR types
 - Sony a7 & a7R
- <http://www.kenrockwell.com/sony/a7.htm>

Types of Mirrorless Cameras

- **DSLR type**
 - Looks like a DSLR
 - Has EVF & LCD panel
 - Can have many controls
 - Buttons
 - Switches
 - Dials
 - Menu – many items
- **Rangefinder type**
 - Compact
 - May not have EVF
must use LCD panel
 - Not pocketable with lens
 - Pancake or body cap type lens **MAY BE AVAILABLE**

Smaller, Lighter, Quieter, Less Expensive

- No mirror box
- No mirror
- No pentaprism
- Shorter distance from lens to sensor

Nikon D750 Mirror Box

Do a search for camera mirror box

Smaller & Lighter

Shorter Distance Between Lens Mount & Sensor

No Mirror or Pentaprism

Quieter

No Mirror to Pop up

Do a search for pictures DDSLR vs Mirrorless for comparison

Sensor Size

APS-C is a Family

<https://photographylife.com/mirrorless-vs-dslr>

<http://newatlas.com/camera-sensor-size-guide/26684/>

Nikon Full frame (FX)	36.0x24.0 mm	X	crop factor 1.0	=	36	x	24
Nikon APS-C (DX)	23.6x15.6 mm	X	crop factor 1.5	=	35.4	x	23.4
Canon APS-C	22.2x14.8mm	X	crop factor 1.6	=	35.5	x	23.7
Micro Four Thirds	17.3x13.0 mm	X	crop factor 2.0	=	34.6	x	26
Nikon 1 sensor (CX)	13.2x 8.8 mm	X	crop factor 2.7	=	35.6	x	23.8

Crop Factor & Lenses

Nikon APS-C camera w/10.5mm DX lens x 1.5 crop = 15.75mm
equivalent to

Nikon Full frame Camera w/16mm FX lens

- Canon APS-C w/75-300mm lens X 1.6 = 120 – 480mm

Advantages & Disadvantages of Full Frame vs Smaller Sensor

Requires Another Tech Talk

Smaller & Lighter

Full Frame DSLR

- Nikon D810 Body Only
 - 5.8"W x 4.9"H x 3.3"D
 - 31.1 oz.

APS-C DSLR

- Canon EOS Rebel T6 Body Only
 - 5.08"W x 3.99"H x 3.06"D
 - 17.11 oz.

Mirrorless DSLR Type

- Olympus OMD-EM1 Body Only
 - 5.1"W x 3.7"H x 2.5"D
 - 15.6

Mirrorless Range Finder Type

- Fujifilm X-E2S Body Only
 - 5.08"W x 2.95"H x 1.47"D
 - 10.6 oz.

Less Expensive

- Smaller
 - Camera body
 - Lens
- No mirror
- No pentaprism
 - Glass or plastic
- May have smaller sensor (next slide)
- Rangefinder type
 - May not have electronic viewfinder
 - May be poss. buy one
 - Cost Up to \$250
 - In hot shoe
 - Must use LCD panel

IS MIRRORLESS
REALLY
LESS EXPENSIVE?

New Mirrorless Cameras - Photokina Medium Format

**Hasselblad X1D w/45mm lens
\$12,995**

**Fujifilm GFX 50S vs. Nikon D810
< \$10,000?**

<http://www.hasselblad.com/>

<http://fujiaddict.com/2016/09/21/fujifilm-gfx-50s-vs-nikon-d810/>

Hasselblad Medium Format 43.8x32.9mm sensor 67% larger than full frame
Fujifilm GFZ 50S 44x33mm

Is Mirrorless Really Less Expensive?

DSLR Type

- Olympus OM-D E-M1 Mark II
 - \$2000
- Sony α 7RII (body only)
 - \$1698 (\$1498 sale)
- Canon EOS M5 EF-M w/15-45mm f/3.5-6.3 IS STM Lens
 - \$1099
- Panasonic LUMIX G7 4K w/14-42 mm Lens
 - \$800 (\$700sale)
- Olympus OM-D E-M10 w/14-42mm F3.5-5.6 Lens
 - \$595 Amazon
 - Mark II \$800

Rangefinder Type

- Leica M Type 262 (body only)
 - \$5,069
- Sony α 6500 (body only)
 - \$1400
- Fujifilm X-E2S w/18-55mm lens
 - \$699 @ Amazon & Service Photo
- Nikon 1 J5 w/ 10-30mm lens
 - \$497 Amazon & Service Photo
- Canon EOS M10 w/15-45mm lens
 - \$480 Amazon
- Olympus Pen E-PL6 w/14-40mm lens
 - \$287 Amazon

Lenses May be Similar Look at Specifications

Olympus 14-42mm f3.5-5.6 II R
2.76x3.31 0.84 pounds \$300
(sale\$99)

- <http://www.getolympus.com/us/en/lenses/m-zuiko-digital-ed-12-40mm-f2-8-pro.html>

Olympus 14-42mm f3.5-5.6 II R
\$300

- <http://www.getolympus.com/us/en/lenses/m-zuiko-14-42mm-f3-5-5-6-ii.html>

Legend:  EDA lens  Aspherical lens  DSA lens  ED lens  HR lens  HD lens

Camera & Lens

Smaller, Lighter, Less Expensive?

- **Weight**
 - Camera 1 lb. do you want Lens 2+ lbs.?
- **Cost**
 - Camera \$1000, do you want Lens \$1800 - \$2500?

**Olympus 300mm f/4.0 IS Pro ED
M.Zuiko Digital PRIME Lens \$2500
2.8 lbs. no collar 3.3 lbs. w/collar
9.4 x 3.7 inches w/collar**

- <http://www.getolympus.com/us/en/lenses/m-zuiko-ed-300mm-f4-0-is-pro.html>

**Olympus MSC ED-M 75 to 300mm II
f4.8-6.7 ZOOM Lens \$450/\$549**

- 1 lb .
- 4.6 x 2.7 inches

- <http://www.getolympus.com/us/en/lenses/m-zuiko-digital-ed-75-300mm-f4-8-6-7-ii.html>

Crop Factor X2

**Panasonic LUMIX G LEICA DG
VARIO-ELMAR Lens, 100-400mm,
f4.0-6.3 ASPH \$1800
2.2 lbs. 6.8 x 3.3 closed**

- <http://shop.panasonic.com/cameras-and-camcorders/lumix-camera-lenses/H-RS100400.html#start=1&cgiid=lumix-camera-lenses>

**Panasonic 100-300mm
f/4-5.6 ASPH. \$548
1.75 lbs. 5 X 3 inches**

- <http://shop.panasonic.com/cameras-and-camcorders/lumix-camera-lenses/H-FS100300.html#start=1&cgiid=lumix-camera-lenses>

Crop Factor X2

Less Expensive Lenses

Third Party Lens

- Cost is less
- Quality of glass?
- Lens mount
 - Mechanical
 - Electronics?

Old Lens

- Lens free or low cost
 - Lens adapter
 - Depends on camera
 - Most under \$25 up to \$\$\$
 - Electronics Contacts?
- Good quality

No electronic contacts =
manual shooting

Adapter W/Electronic Contacts

- https://www.amazon.com/Metabones-Canon-Micro-Thirds-adapter/dp/B014C1BF70/ref=pd_sbs_421_14?encoding=UTF8&pd_rd_i=B014C1BF70&pd_rd_r=0Z326DMRJ5S3RMCHG14N&pd_rd_w=EoJhH&pd_rd_wg=AXQdx&psc=1&refRID=0Z326DMRJ5S3RMCHG14N

Adapter No Electronic Contacts

- https://www.amazon.com/Fotodiox-Mount-Adapter-Mirrorless-Camera/dp/B003G49V70/ref=sr_1_10?s=electronics&ie=UTF8&qid=1480096021&sr=1-10&keywords=lens+converter+nikon+to+M4%2F3

Mirrorless Lens vs Old 35mm Film Camera Lens on Mirrorless Camera

Olympus 12-40 mm

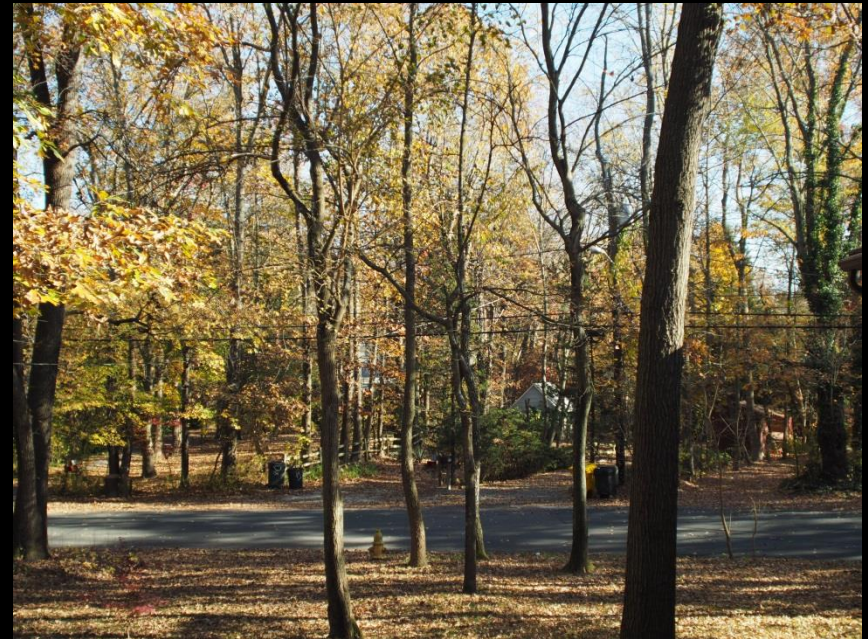
25 mm @f2.8 ISO 200 5300 K

Focus Assist Used

Nikkor-N Auto 1:2.8 24 mm

24 mm @f2.8 ISO 200 5300K

1963 Design Lens (Focus w/old eyes)



No Crop Factor or No Photo Editing

How Many & What Kind of Lenses Are Available for Mirrorless

- 81 Micro Four Thirds Lenses
 - 42 Olympus lenses (+ converters/adapters)
 - 25 Panasonic lenses (+4 require an adapter)
 - 14 lenses from other Four Thirds Consortium members (some are manual)
- 34 Sony Lenses (more with converter)
- 23 Fujifilm Lenses
- 9 Canon EF-M (more with adapter)
- 13 Nikon 1 Lenses

Who Makes Mirrorless Interchangeable Lens Cameras (ILC)

- Fujifilm (Rangefinder, SLR, & Med. Format types)
- Olympus (Rangefinder, SLR, Smart Phone types)
- Panasonic (Rangefinder & SLR types)
- Sony (Rangefinder, SLR, Smart Phone types)
- Canon (Rangefinder & SLR types)
- Nikon (Rangefinder type)
- Hasselblad (Medium Format)
- Leica (Rangefinder)
- Kodak (SLR & Smart Phone types)
- Pentax (Ricoh) (SLR type)
- Samsung **Rumor** (Rangefinder & SLR types)

FYI - Camera Body Using Smart Phone as LCD Panel

**Olympus Air A01 Body Only
\$299**

**Sony ILCE-QX1 Lens-Style
Camera Body Only \$499.99**

<http://www.getolympus.com/us/en/digitalcameras/air-a01.html>

<http://www.getolympus.com/us/en/digitalcameras/air-a01.html>

Who Sells Mirrorless Interchangeable Lens Cameras (ILC)

Service Photo Sells 5/11

Fujifilm Sony

Canon Nikon

Leica

Best Buy Sells 6/11

Fujifilm Sony

Olympus Panasonic

Canon Nikon

Ritz? Olympus Panasonic

Other

- Manufactgurer
- Amazon
- New York
- DC ?
- Virginia ?
- Rent
- Buy & return

See Spec Sheets for Features

Camera

- Sensor size
- Resolution
- Auto focusing
- GPS
- WiFi
- Touch Screen
- Movies (some 4K)
- Programable Buttons
- Dials
- Weather resistant

Lens

- Manufacturer
 - Same as camera
 - Third party
 - Electronic Contacts?
- Image Stabilization (IS) or Vibration Reduction (VR)
 - In Lens (Pana) or camera body (Oly)
- Weather resistant
- UV filter?
 - in lens (Oly) or body (Pana)
- Ability to use old lenses
 - Adapter available?
 - No electronics

Is Mirrorless Right for You?

- What do you want to spend?
- What do you want to do with the camera?
 - Travel
 - Is weight important?
 - Is space important?
 - What kind of lenses do you need?
 - Birding
 - Bad weather
- Read reviews
- Look at sample pictures
 - Magnify if you can
 - Load into photo editing program
- Look at camera manual if available on line
- Is raw file conversion available
 - e.g. Olympus = ORF

Raw Files

- <https://helpx.adobe.com/camera-raw/using/supported-cameras.html>

That's all Folks
Questions?