

# EF Lenses for EOS Cameras

**Canon**

advanced simplicity™



# Images from your imagination, delivered by Canon EF Lenses

Ever noticed that “imagination” contains the word “image”? That’s because creating an image starts with your imagination. When you have an image in mind, you must choose a lens which can capture that image. And whatever that image may be, you can be sure that Canon has the lens you need. Whether it is a 15mm fisheye or a 1200mm super telephoto, all Canon EF lenses feature the finest materials (especially the L-series lenses) and technologies. They include Fluorite, UD (Ultra-low Dispersion) glass, Aspherical lenses, lens-based Ultrasonic Motors, inner and rear focusing, Image Stabilizer, Diffractive Optics, and a fully electronic interface. Only the variety and versatility of EF lenses can match your wondrous imagination.



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ULTRA-WIDE ZOOM LENSES
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# Getting everything in

If your mind's eye calls for a very wide shot, how about one of the three ultra-wide zoom lenses? The zoom range of these lenses suits the vast majority of wide-angle shots you will ever take. Or, try a standard zoom lens with a focal length from wide to telephoto to get the most out of your camera.



EF 16-35mm f/2.8L USM  
•f/2.8 •2 sec.

## ULTRA-WIDE ZOOM LENSES

# All-round, practical lenses

Very likely, your first EF lens will be (or was) one of these lenses. After all, they feature the most popular focal lengths. From wide-angle to telephoto, you get the best of both worlds. The ten lenses in this category give you a choice of zoom ranges and maximum apertures. The smaller the maximum aperture, the smaller and lighter the lens. Take a look at them all and get the one to suit your needs and budget.



EF 24-70mm f/2.8L USM  
•f/11 •1/60 sec.

## STANDARD ZOOM LENSES

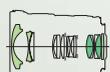


EF 28-90mm f/4-5.6 II USM  
•f/5.0 •1/200 sec.

### EF 16-35mm f/2.8L USM



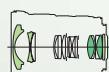
A superb lens that covers nearly every professional wide-angle task. Outstanding optical performance comes from three Aspherical lens elements, and (for the first time ever in an EF wide-angle zoom lens) two Ultra-low Dispersion UD elements. Weather-resistant construction, a rear gel filter holder, close-focusing to 11 inches (0.28m) and a circular diaphragm are among its many highlights.



### EF 17-40mm f/4L USM



About half the price of the 16-35 f/2.8 lens, this L-series lens has an entirely new optical design with three Aspherical elements and a Super UD-glass element. The combination provides superb contrast and sharpness, even at the widest settings. It's ideal for both film and digital SLRs, and features the same weather-resistant design, rear gel filter holder, and high-speed Ultrasonic Motor as the EF 16-35mm lens.



### EF 20-35mm f/3.5-4.5 USM



A superior performance ultra-wide-angle zoom lens, covering the entire range of popular wide-angle focal lengths. A ring-type USM and an inner focus design provide fast and silent AF, along with full-time manual focus override. Priced within the range of serious photo enthusiasts, it's a great all-around choice.



### EF-S 18-55mm f/3.5-5.6

Available only with EOS 300D Kit



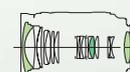
A standard zoom exclusively for the EOS 300D Digital SLR camera with APS-C size image circle equivalent to an approx. 28-90mm focal length. Compact and ultra-lightweight with impressive close-focusing ability of 0.9 feet (0.28m). Features optimised coating for digital imaging sensor to minimise ghost images and flare. **The lens can only be mounted on the EOS 300D with shorter back focus than ordinary EF lenses.**



### EF 24-70mm f/2.8L USM



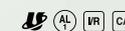
A superb new professional lens that offers an even wider zoom range than its predecessor – ideal for digital cameras. It now features two types of Aspherical elements, and an entirely new UD-glass element for superb optical performance even wide open. It focuses closer than before, and even faster with revised electronics and a new processor. And, it's now sealed against dust and moisture at the lens mount, the zoom and focus rings, and the switch plate. The ultimate professional standard zoom lens just got better.



### EF 24-85mm f/3.5-4.5 USM



An excellent all-round zoom lens that covers the range from ultra-wide-angle to true portrait-length telephoto. Its solid construction, fast USM autofocus and smooth operation are matched by its excellent optical quality. This compact lens is an ideal choice for shooters who want wider coverage than that provided by most standard zooms. The extra-wide coverage also makes it a great standard zoom for digital SLRs.



### EF 28-80mm f/3.5-5.6 II



For many EOS users, this is their first EF lens. Light, compact and affordable, it covers a practical range of focal lengths – ideal for almost everything from family snapshots and travel to event photography. A lightweight DC-focusing motor provides brisk autofocus, as close as 1.3 feet (0.38m), enough to fill the frame with a subject about the size of a postcard.



## STANDARD ZOOM LENSES

### EF 28-90mm f/4-5.6 II USM EF 28-90mm f/4-5.6 II



Super-light and compact like its predecessor, but now with even faster AF due to new internal electronics and a faster lens CPU. It's optically unchanged, which is a good thing – images are sharp and crisp throughout the zoom range, and the Micro USM (USM version only) provides quick and ultra-quiet AF. It's an ideal standard lens, and one of the most popular in the entire EOS system.



### EF 28-105mm f/4-5.6 USM EF 28-105mm f/4-5.6



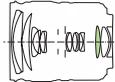
This incredible lens is the smallest and lightest in its class. It's totally new optically, with an Aspherical element to keep the quality up and the size down. Even more noteworthy is an entirely new Micro USM (USM version only), that's about half the length of previous designs – with the same focusing power and performance. Features like circular diaphragm blades (for natural backgrounds) and internal focusing (the front element never rotates) round out this great new lens.



### EF 28-135mm f/3.5-5.6 IS USM



An unbeatable combination of zoom range, silent and fast USM autofocus, excellent optics and Canon's Image Stabilizer technology. IS allows steady hand-held operation at shutter speeds up to two full stops slower than would normally be possible, and makes this a practical lens even in low-light situations. It's one of the most versatile lens choices in the entire EF line-up for the advanced EOS photographer.



### EF 35-80mm f/4-5.6 III



The most affordable zoom lens in the entire EF lens system. Light and ultra-compact, this lens isn't lacking in optical performance – it has an Aspherical lens element for better optical quality, and its close-focusing allows filling the frame with a subject the size of a postcard at its 80mm focal length. It's a great entry into SLR photography and the EOS system.



EF 28-105mm f/3.5-4.5 II USM  
\*f/8 • 1/180 sec.



## Isolate the interesting part

The eye tends to see the whole rather than the individual parts. It also sees what's near and not what's far. By bringing attention to those things missed by the eye, you can create many interesting pictures. It could be the grimace of an athlete, the grill of a classic car, or a girl against a blurred background. Telephoto lenses can also compress images to give dramatic effects. You are limited only by your imagination.



EF 70-200mm f/2.8L USM  
\*f/4 • 1/1500 sec.

## TELEPHOTO ZOOM LENSES

### EF 35-350mm f/3.5-5.6L USM



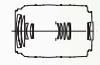
A unique professional L-series lens, covering an amazing 10x zoom range from wide-angle to super-telephoto. It's a magnificent choice for travel photography and other outdoor applications. The zoom control has a separate ring to adjust or lock the zooming action, enhancing its already excellent handling. The 21-element optical formula includes two UD-glass elements, and at its 135mm zoom setting, close focusing to 2 feet (0.6m) is possible.



### EF 55-200mm f/4.5-5.6 II USM



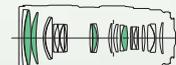
Super-compact and light, this lens is ideal for digital SLRs – used on the EOS 300D, nearly equivalent to a 90-320mm lens. The 13-element design's new optical coatings are optimised for digital cameras. It's a lightweight telephoto that's perfect for any EOS SLR. It focuses down to under 4 feet (1.2m), and its Micro USM-powered AF is faster than ever, due to new electronics within the lens.



### EF 70-200mm f/2.8L IS USM



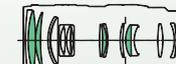
A spectacular professional lens, combining the virtues of the legendary EF 70-200mm f/2.8L USM with the Canon's newest Image Stabilizer technology. The IS system now offers up to a three-stop improvement in hand-held ability, responds faster than ever before, and functions on a solid tripod. Additional improvements include faster AF response and tracking speed, weather-resistant construction, and the entirely new optical system focuses even closer (to 4.6 feet/1.4m) than the non-IS version.



### EF 70-200mm f/2.8L USM



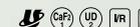
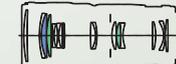
For years, the most popular professional lens in the entire Canon line-up. Superbly sharp and versatile, its constant f/2.8 maximum aperture makes it a favourite of photojournalists and low-light shooters. Four UD-glass elements contribute to its excellent performance. Full compatibility with the EF Extenders 1.4x II and 2x II extends its usefulness, and it's also compatible with the EF Extension Tubes 12 II and 25 II, and the 77mm Close-up Lens 500D.



### EF 70-200mm f/4L USM



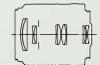
A truly professional L-series telephoto zoom lens, with reduced size and weight for applications where portability is important. Superb optically, it combines a Fluorite element with two UD-glass elements for outstanding contrast and performance. Its ring-type USM is fast, silent, and permits full-time minimum focus, as well as the closest MF of any of the L-series 70-200 designs. It's also compatible with EF Extenders 1.4x II and 2x II, and accepts an optional accessory tripod collar.



### EF 80-200mm f/4.5-5.6 II



The ultimate compact telephoto zoom lens in the EF system, and a great choice for travel and other applications where portability is a priority. It's especially well-suited for compact SLR bodies, and even compact digital EOS SLRs, with a weight of only 8.8 oz. (250g). Its optical quality is assured by a five-group zooming system.



## TELEPHOTO ZOOM LENSES

## Wide and fast

## ULTRA-WIDE & WIDE LENSES

If you need an ultra-wide angle and a large aperture, one of the following lenses will fit the bill. Ultra-wide-angle lenses can capture scenes beyond your natural field of vision. The EF 15mm f/2.8 Fisheye, the widest of them all, has a 180° angle of view. For more normal-looking wide-angle shots, there are longer wide-angle lenses up to 35mm with the maximum aperture you need.



EF 100-400mm f/4.5-5.6L IS USM  
•1/14 •1/80 sec.



EF 15mm f/2.8 Fisheye  
•1/16 •1/640 sec.

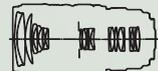


EF 24mm f/1.4L USM  
•1/8 •5 sec.

### EF 75-300mm f/4-5.6 IS USM



A significant lens in the history of Canon optics, this was the first SLR lens in the world to offer Image Stabilizer, providing up to two stops of improvement in hand-held capability at slow shutter speeds. Its 15-element optical formula is unique, but it offers capabilities similar to Canon's 75-300 versions without IS. Image Stabilizer gives this lens amazing real-world sharpness in many situations, and is especially advantageous when combined with lightweight camera bodies.



IS

### EF 90-300mm f/4.5-5.6 USM EF 90-300mm f/4.5-5.6



The most affordable of Canon's long telephoto zooms, this lens is excellent for subjects from portraits to wildlife and nature. With the addition of a Micro USM (USM version only) for faster and even quieter autofocus, the lens is well-suited for many advanced amateurs, as it represents a versatile entry into telephoto photography.

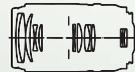


IS

### EF 100-300mm f/4.5-5.6 USM



This affordable and lightweight zoom differs from the 75-300mm models with its higher-performance ring-type Ultrasonic focusing motor and superior AF speed. It also uses rear group focusing, so the front elements never rotate during focusing, and adds full-time manual focusing capability. It's excellent not just for outdoor sports, but any subjects requiring the versatility of a telephoto zoom.



UR FCM

### EF 100-400mm f/4.5-5.6L IS USM



A truly professional L-series telephoto zoom lens with Image Stabilizer, making hand-holding practical even at its 400mm focal length. Both a Fluorite and a Super UD-glass element ensure outstanding contrast and sharpness, and it accepts the EF Extenders 1.4x II and 2x II. A ring-type USM makes AF fast and silent down to 5.9 feet (1.8m), and, of course, it offers full-time manual focus override. This durable L-series lens is regarded by many pros as one of the world's finest telephoto zooms for hand-held outdoor use.



CapS S-UD UR FCM Float IS

### EF 15mm f/2.8 Fisheye



A full-frame fisheye lens that's ideal for special effects with any EOS camera, film or digital. It focuses as close as 8 inches (0.2m), and is tack-sharp throughout its focus range. Up to three gel filters can be inserted into its built-in rear filter holder.



UR

### EF 14mm f/2.8L USM



This is a true rectilinear ultra-wide-angle lens that's absolutely corrected for linear distortion – straight lines remain straight. It's outstanding for shooting in confined areas and interiors, and is often used by professionals because of the unique "look" its extreme wide-angle perspective provides. The optics are superb, highlighted by a ground and polished Aspherical element. It has a gel filter holder in the rear that allows up to three gel filters to be used for colour correction.



AL UR FCM Float

### EF 20mm f/2.8 USM



The optical performance, fast f/2.8 speed and ultra-wide-angle coverage make this a great choice for many applications, like interiors, scenics, travel and photojournalism. It uses a "floating" optical system for excellent sharpness even at its minimum focusing distance of under 10 inches (0.25m), and with a ring-type USM and full-time manual focusing capability, offers the speed and handling pros expect.



UR FCM Float

### EF 24mm f/1.4L USM



That f/1.4 is not a typo; this is the fastest ultra-wide-angle lens in the world. The first EF lens to combine Aspherical and UD Ultra-low Dispersion glass L-series optical technologies, the 24mm f/1.4L provides outstanding sharpness and contrast even wide open. It focuses down to 10 inches (0.25m), and the AF is what you'd expect from a professional Canon lens with USM – fast and silent, with smooth full-time manual focus available at any time.



AL UD UR FCM Float

ULTRA-WIDE ZOOM LENSES

STANDARD ZOOM LENSES

TELEPHOTO ZOOM LENSES

ULTRA-WIDE & WIDE LENSES

MEDIUM & STANDARD TELEPHOTO LENSES

TELEPHOTO LENSES

SUPER TELEPHOTO LENSES

MACRO LENSES

TS-E LENSES

TECHNOLOGY WHERE IT COUNTS

CANON EF LENSES

SPECIFICATIONS



EF 35mm f/1.4 L USM  
•f/1.4 •1/500 sec.

## ULTRA-WIDE & WIDE LENSES

EF 28mm f/1.8 USM



Combine a fast f/1.8 aperture with 28mm wide-angle focal length, and add Canon's Ultrasonic Motor AF. The result is this surprisingly affordable fixed focal length alternative to wide-angle zooms that's ideal for low-light shooting. Internal, rear-group focusing means the front element never moves, so it's easy to use with filters and accessories. The autofocus is virtually silent, and full-time manual focus is always available.



EF 28mm f/2.8



The most affordable fixed focal length wide-angle lens in the Canon EF line-up continues to give benefits difficult or impossible to find with zooms. The fast f/2.8 aperture makes it easy to use in low light, and provides a bright viewfinder image in the camera. It focuses as close as 10 inches (0.25m) without accessories. And optically, it provides excellent edge-to-edge contrast and sharpness along with superior correction of linear distortion, so straight lines in a subject (such as architecture) remain straight.



EF 24mm f/2.8



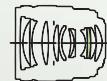
Another superb ultra-wide-angle choice, with floating optics for superior performance throughout its focus range and a fast f/2.8 aperture that makes it a great alternative to a zoom lens for low-light shooting. Its rear-group focusing system reaches down to less than 10 inches (0.25m).



EF 35mm f/1.4L USM



Long requested by professionals, it's the standard lens for many photojournalists and others who value its low-light capability and performance. With the help of an Aspherical lens element, its contrast and sharpness are stunning, even wide open at f/1.4. Solid construction, a powerful ring-type USM for smooth and fast AF, and full-time manual focusing make this a great lens for film or digital shooters.



EF 35mm f/2



An affordable lens that's ideal for tasks like group photos and other applications calling for excellent optical performance and moderately wide focal length. It's compact and lightweight, and with f/2.0 speed, it's a compelling alternative to a wide-angle zoom lens for low-light shooting.



## Medium & standard

A medium telephoto lens with a large aperture brings the subject closer, creates excellent background blur, gives a longer flash range, and affords a faster shutter speed to freeze the action. A standard zoom lens, with its natural angle of view and perspective, captures the subject plainly, with no special effects. However, you can use standard lenses in creative ways by varying the subject distance, aperture and angle. Three medium telephoto lenses and two standard telephoto lenses are available.

EF 50mm f/1.4 USM



The ultimate "normal" lens in the EF system. This superb lens is sharp even wide open, and of course its f/1.4 speed makes it perfect for available-light shooting. For many, it's an ideal lens to accompany a zoom when shooting in low-light conditions. Compact and affordable, it's the only lens in the EF system to combine the extra-small Micro USM and still provide full-time manual focusing when the lens is in the AF mode.



EF 50mm f/1.8 II



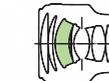
Lightweight and affordable, this sharp lens with a fast f/1.8 aperture is an excellent first lens for those who prefer a fixed focal length, and makes an excellent addition to any photographer's system for available-light shooting. A traditional Gauss-type optical design ensures sharp performance even when wide open, and it focuses as close as 18 inches (0.45m).



EF 85mm f/1.2L USM



The fastest telephoto lens in the entire Canon EF line-up, and the world's fastest 85mm autofocus lens. This exquisite professional lens is obviously popular for its available-light capabilities, but its proven performance makes it ideal for portraits, fashion and even sports. Two Aspherical elements provide thorough correction of spherical aberrations. A ring-type USM means silent AF from 3 feet (0.9m) to infinity, and full-time electronic manual focusing is also available.



EF 85mm f/1.8 USM



Sharp. Lightweight. Responsive. These are just a few adjectives that describe this terrific portrait-length telephoto lens. With a powerful ring-type USM and fast f/1.8 aperture, subjects zip into focus in the viewfinder. It's great for all types of work calling for moderate telephoto power, but comes into its own in low-light situations, and offers a one-third-stop speed advantage over the 100mm f/2 USM lens.



EF 85mm f/1.2L USM  
•f/1.2 •1/750 sec.

EF 100mm f/2 USM



Another option in high-speed moderate telephotos, this compact lens is ideal for portraits and low-light work. Compared with the 85mm f/1.8 USM lens, it provides that little bit extra of telephoto power sometimes necessary outdoors or for candid shooting. Like the 85mm, it's super-sharp (even wide open), and has fast USM autofocus along with full-time manual focusing.



# Long and fast

A telephoto lens is essential to any serious photographer. For sports action, you will need a fast shutter speed and a long focal length. A large maximum aperture allows a faster shutter speed. In this telephoto lens line-up, the focal lengths range from 135mm to 300mm. If you want compactness, choose a lens with a smaller maximum aperture.



EF 135mm f/2L USM  
•f/2 •1/200 sec.



EF 135mm f/2.8 with Softfocus  
•Soft level: 2

EF 135mm f/2.8 with Softfocus  
•Soft level: 0

## EF 135mm f/2L USM



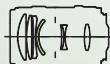
One of the finest lenses of its type in the world today. This magnificent telephoto lens uses two UD-glass elements to provide incredible sharpness and contrast, even wide open. It's perfect for outdoor portraits, but comes into its own in low-light situations. It focuses down to 3 feet (0.9m), and is fully compatible with both the EF 1.4x II and 2x II tele extenders.



## EF 135mm f/2.8 with Softfocus



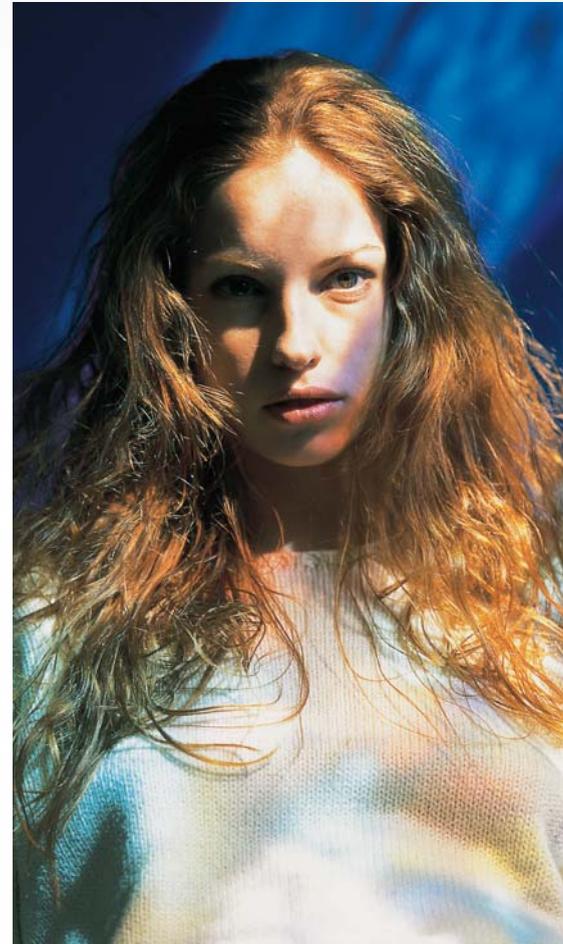
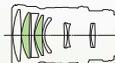
A unique, compact telephoto lens that gives the choice of razor-sharp images, or with the twist of a ring, two degrees of soft focus. It works by applying "softness over sharpness," using deliberate spherical aberration on top of a sharp "core" image at apertures from f/2.8 thru 5.6; images taken at apertures smaller than f/5.6 are always sharp. Autofocus continues to function, with or without the soft focus in use. This lens is an ideal addition to a portrait or scenic photographer's arsenal. A perfect combination with an EOS Digital SLR, with the camera enabling review of soft focus effect on the LCD monitor.



## EF 200mm f/2.8L II USM



Lighter by more than 1.2 pounds (545g) than the 70-200 f/2.8L zoom lens, this fast telephoto lens is a perfect alternative for low-light shooting or just reducing weight in the gadget bag. Two UD-glass elements and internal rear-group focusing are among its optical highlights, and it's fully compatible with Canon's EF 1.4x II and 2x II tele extenders. A detachable hood is included, and Tripod Ring A (B) is available as an accessory.

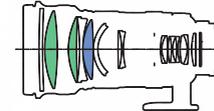


EF 300mm f/2.8L IS USM  
•f/3.5 •1/180 sec.

## EF 300mm f/2.8L IS USM



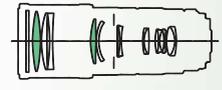
Image Stabilizer adds to what's already a legendary professional lens. The 300mm f/2.8L IS lens focuses closer (down to 8.2 feet/2.5m), offers the world's fastest autofocus when used with EOS bodies having 45-point AF, is gasketed and sealed against dust and moisture, and has a lightweight magnesium alloy barrel and tripod collar. Its image quality, aided by both Fluorite and UD-glass, is stellar, and its advanced IS even works on a rock-steady tripod as well as on a monopod or when hand-held.



## EF 300mm f/4L IS USM



Excellent optics and superb handling in a compact package with Image Stabilizer. The IS allows safe hand-holding at shutter speeds up to two stops slower than otherwise possible, making it even more useful in low light levels. It's less than half the weight of the 300mm f/2.8L IS, and it focuses to an incredibly close 4.9 feet (1.5m), filling the frame with a subject the size of a postcard. Like all of Canon's fixed focal length L-series lenses above 135mm, it's compatible with Canon's EF Extenders 1.4x II and 2x II.



EF 300mm f/4L IS USM  
•f/13 •1/60 sec.

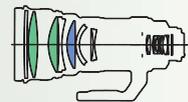
# See a different dimension

A super telephoto lens can make an ordinary scene into an extraordinary one. Its ability to see surpasses that of the human eye. It can compress images and make them look as if they come from another dimension. It opens up new realms of photographic expression. All EF super telephoto lenses are L-series lenses to provide the highest quality. The USM provides quiet and high-speed autofocus. These lenses promise outstanding delineation and put your imagination to the test.

## EF 400mm f/2.8L IS USM



Virtually the standard lens for many professional sports shooters, this optical powerhouse is ideal for any film or digital application where you need telephoto power and low-light capability. With one Fluorite element and two UD-glass elements, it's one lens you won't need to stop down to get a good image. The Image Stabilizer only adds to its all-round abilities. Details include a network of weather-resistant seals and gaskets, and a focus preset that enables instant return to a memorised focusing distance.

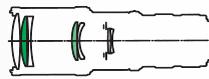


USM, Coated, UD, VR, FT-M, FP, IS, AF-S, DWR

## EF 400mm f/5.6L USM



Light. Portable. Excellent handling. Sharp. And amazingly fast autofocus. The 400mm f/5.6L is all of these things, and a premier choice for wildlife and nature photographers – one of the finest telephoto lenses in the world for fast-moving subjects such as birds in flight or motor sports. It uses UD-glass elements to provide outstanding optical quality, even wide open, and image quality is preserved when used with either the EF 1.4x II or EF 2x II tele extenders. It accepts 77mm filters, and has a built-in removable tripod collar.

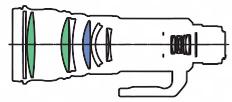


USM, Coated, UD, VR, FT-M

## EF 500mm f/4L IS USM



Always a favourite of motor sports, wildlife and nature shooters, the relatively lightweight 500mm lens now adds Image Stabilizer for an unbeatable package of handling and sharpness. Fluorite and UD-glass – a combination available from no other lens manufacturer – provide great performance, even with the EF 1.4x II or 2x II tele extender attached. It focuses down to under 15 feet (4.5m), and offers the same weather-resistant design and incredible AF speed as its 300mm, 400mm and 600mm siblings.

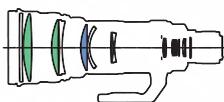


USM, Coated, UD, VR, FT-M, FP, IS, AF-S, DWR

## EF 600mm f/4L IS USM



An outstanding professional lens for bridging distances in sports, wildlife, and many other applications – including commercial and fashion for the distinct “compressed” telephoto character and totally out-of-focus backgrounds its images can possess. Fluorite and UD-glass are combined for incredible image quality, even wide open. An Image Stabilizer adds a new dimension in this long lens's usefulness, even in marginal lighting. It works beautifully with both 1.4x II and 2x II extenders, and now focuses as close as 17.5 feet (5.4m). It has the same weather-resistant gaskets and sealed focusing and focus pre-set rings as Canon's other Image Stabilizer super-telephoto lenses.



USM, Coated, UD, VR, FT-M, FP, IS, AF-S, DWR

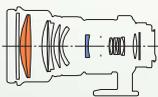
## World's First Diffractive Optics Lens for Photography

### EF 400mm f/4 DO IS USM



An entirely new optical technology for SLR camera lenses, Multi-Layer Diffractive Optics makes possible a 400mm super-telephoto lens that's about one-third shorter and significantly lighter. Diffractive Optics don't end there – combined with a small Fluorite element, they

permit almost total elimination of chromatic aberrations, and at the same time are able to combat spherical aberrations. Combining portability and easy handling, Image Stabilizer weather-resistant construction, superb optics and incredible AF performance, the 400mm DO IS lens is ideal for photographers who want super-telephoto power along with good lens speed in a hand-holdable package.



DO, USM, Coated, VR, FT-M, FP, IS, AF-S, DWR



EF 600mm f/4L IS USM  
\*1/10 - 1/500 sec.

## EF 1200mm f/5.6L USM



This remarkable lens is the longest in the world with full autofocus capability. Two fluorite elements for superb image quality, make it ideal for many professional applications where it's impossible to get close to the subject. Fully compatible with any EOS SLR, including digital bodies, autofocus performance is

silent and instantaneous thanks to the Ultrasonic Motor. It's also compatible with the Canon Extender EF 1.4x II (making it a 1700mm f/8) and EF 2x II (2400mm f/11). Available upon special order.

USM, Coated, VR, FT-M, FP

## Extender EF 1.4x II



A powerful addition to any serious photographer's arsenal, this compact extender is compatible with every fixed focal length L-series lens 135mm and over, as well as the EF 70-200mm f/2.8L, EF 70-200mm f/2.8L IS, EF 70-200mm f/4L, and EF 100-400mm f/4.5-5.6L IS lenses. It multiplies the lens's marked focal length 1.4 times, with a light loss of only one stop. Most impressively, its superior optics preserve the lens's inherent image quality. New with the version II extender are improved internal anti-reflective blackening, and enhanced weather resistance.



DWR

## Extender EF 2x II



A totally new 7-element optical design for this version II extender means superior image quality combined with a doubling of the lens's marked focal length (with a two-stop reduction in effective aperture). Compatible with the same lenses as the 1.4x II extender, the EF 2x II still allows autofocus with any EOS body when used with a lens f/2.8 or faster. It shares the improved anti-reflection internal design and weather-resistant exterior, including seals at its front and rear lens mounts matching those on Canon's newest professional lenses and camera bodies.



DWR

# SUPER TELEPHOTO LENSES

## Focal Length Comparison



15mm Fisheye



14mm



17mm



20mm



24mm



28mm



35mm



50mm



70mm



85mm



100mm



135mm



200mm



300mm



400mm



500mm



600mm



1200mm



EF 400mm f/4 IS DO USM  
\*f/4 - 1/1250 sec.

# Discovering a small world

The small things we see and ignore every day can actually reveal much surprise and fascination up close. A world all their own. Canon offers several ways to discover this world. The four EF macro lenses are the most effective and versatile, while the three screw-on Close-up lenses are the most convenient. Also available are the Life-Size Converter EF and two Extension Tubes.



MP-E 65mm f/2.8 1-5x Macro Photo  
f/11 • 1/125 sec. (3.0x)

## EF 50mm f/2.5 Compact Macro



A versatile macro lens with focusing from infinity down to half life-size (0.5x), and floating optics to insure sharpness and contrast at any focusing distance. With f/2.5 speed, it's actually an ideal general-purpose normal lens that adds true macro capability, and it's great for photographing flat artwork or subjects because of its outstanding centre-to-corner flat field performance. A dedicated optional accessory Life Size Converter, available separately, allows focusing down to full life-size (1x magnification) and its optics actually increase working distance from the front of the lens to the subject.



Float

## Life-Size Converter EF



A unique accessory, dedicated exclusively to the EF 50mm f/2.5 Compact Macro lens. Unlike a conventional extension tube, the Life Size Converter EF has a four-element optical design that acts like a tele extender, allowing magnifications from 0.26x to 1x (full life-size) while increasing the working distance from the front of the lens to the subject. Optical quality is outstanding with the Life Size Converter EF in place.



## MP-E 65mm f/2.8 1-5x Macro Photo



This special-purpose lens is strictly for high-magnification shooting between 1x (life size) and 5x – at its closest focus distance, you can fill the frame with a grain of rice. Its optics, dedicated to macro work, are superb. Focus is manual only, and there's a detailed magnification scale engraved on the barrel. It includes a tripod collar, and is fully compatible with Macro Ring Lite MR-14EX and Macro Twin Lite MT-24EX.

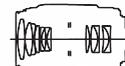


Float UD

## EF 100mm f/2.8 Macro USM



Many EOS shooters consider this two professional lenses in one: a superior-performance portrait-length tele with a fast f/2.8 aperture and lightning-quick USM AF; and a superb macro lens that focuses to life size (1x) without accessories. It has a unique internal focusing design and floating optics for sharpness throughout its vast focus range, and allows a working distance of 5.9 inches (149mm) at life size. Full-time manual focusing and an available Tripod Mount B with adapter round out this terrific macro lens.



UD IR FCM Float

## Extension Tube EF 12 II Extension Tube EF 25 II

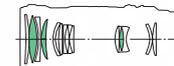


Extension tubes are one method of getting closer with EF lenses. A powerful tool when attached to standard and wide-angle lenses, they're also used with telephotos to get just a bit closer. With any lens, the longer the extension tube, the greater the close-up effect. The 12mm EF 12 II is often used with wide-angle lenses, while the longer EF 25 II is a better choice for normal or telephoto lenses. Auto exposure continues to work reliably, but manual focus is recommended in most instances. The version II extension tubes are also compatible with EF-S 18-55mm f/3.5-5.6.

## EF 180mm f/3.5L Macro USM



One of the sharpest lenses in the entire EOS system, and a brilliant all-round telephoto lens that can focus to true life size (1x) – with a working distance of almost 10 inches (0.25m) from the subject! Three UD-glass elements, a floating optical system, and internal focusing assure superb performance at any distance. It's even compatible with the EF 1.4x II and 2x II tele extenders. A powerful ring-type USM means fast and silent AF, along with full-time manual focus. It includes a tripod collar and detachable lens hood.



UD UD IR FCM Float

## Close-up Lens 250D Close-up Lens 500D Close-up Lens 500



An effective close-up method with telephoto lenses, and the only close-up accessory that doesn't lose light. The 250D is optimised for lenses between 50 and 135mm, while the 500D works best with lenses from 75mm through 300mm. Both have a double-element design, so their optical quality is excellent. The Close-up Lens 500, a single-element design, offers an even more affordable alternative.

## About Macro Magnification

A life-size macro lens; that is, a 1x magnification records an image on film at its actual size. If you're photographing a flower, for example, and it has a diameter of 1 cm., it will occupy 1 cm. on your film. Other macro lenses have lower or higher magnifications. A lens with 0.5x magnification would produce an image on film that is half the size of the actual subject. Your 1 cm. flower, then, would only occupy 0.5 cm. on film. In the other direction, a 5x magnification lens would convert the 1 cm. flower to a 5 cm. diameter image. Since the entire image wouldn't fit in the frame of your film, you would have an enlarged image of a detail of the flower. Magnification is not the same thing as focal length. A 50mm lens and a 135mm might both be macro lenses with, for example, 1.0x magnification. The advantage of the longer lens is that it allows greater distance from a subject. You would choose the 135mm macro lens to photograph a butterfly or a bird. The 50mm lens would be more suitable for a subject that won't move away when you approach it.



0.25x



0.5x



1.0x



3.0x



5.0x



EF 100mm f/2.8 Macro USM  
f/5.6 • 1/6 sec.

ULTRA-WIDE ZOOM LENSES  
STANDARD ZOOM LENSES  
TELEPHOTO ZOOM LENSES  
ULTRA-WIDE & WIDE LENSES  
MEDIUM & STANDARD TELEPHOTO LENSES  
TELEPHOTO LENSES  
SUPER TELEPHOTO LENSES  
MACRO LENSES  
TS-E LENSES  
TECHNOLOGY WHERE IT COUNTS  
CANON EF LENSES  
SPECIFICATIONS

# For advanced photo work

With a Canon TS-E lens, you can control the angle of the plane of focus and the picture's perspective. The effects of large-format camera movements can be obtained with TS-E lenses for EOS cameras. Although manual focusing is required, automatic aperture control enables autoexposure and autoexposure bracketing. The tilt and shift axes intersect at a 90° angle. They can be made parallel at an authorised Canon Service Facility (modified at owner's expense).



## TS-E 24mm f/3.5L



The widest tilt-shift lens in the Canon system, and a marvellous problem-solver for architecture, scenics and many other applications calling for a wide-angle perspective. With floating optics, it's sharp from infinity down to 1 foot (0.3m), and it uses a ground and polished Aspherical front element to assure excellent quality. Like all the TS-E lenses, it has a fully automatic diaphragm, so there's never a risk of forgetting to stop the lens down.



AL Float

## TS-E 45mm f/2.8



The normal lens in the TS-E system, and an excellent choice for product shooting and other applications calling for a natural perspective. It allows up to 11mm of shift off centre, and even more impressive, tilting of the front standard up to 8° to modify the plane of focus. Among the TS-E 45mm f/2.8's optical highlights are a floating optical system (focusing down to 1.3 feet (0.4m), and a precise rear-group focusing system.



Float

## TS-E 90mm f/2.8



Telephoto perspective, f/2.8 speed, and full tilt and shift movements in a compact, professional package. Impressively sharp, its ability to alter the plane of focus can provide a "look" that previously required a view camera to achieve. Pros have found it a great option for portraits, products and even fashion work. At its closest focus distance 1.6 feet (0.5m), it gives magnifications of about one-third life-size.



TS-E 45mm f/2.8  
•f/4 •1/30 sec.

# TS-E Lens movements

# TS-E LENSES

TS-E lenses are capable of tilt and shift movements which greatly expand picture-taking possibilities. Tilt movements alter the angle of the plane of focus between the lens and film plane, and shift movements move the lens's optical axis in parallel.

## Tilt Movements

If you want to bring the entire length of the hedge into focus, you could use a wide-angle lens and a small aperture to obtain a wide depth of field (Photo 1-a). With tilt movements, you can achieve this wide depth of field even at the maximum aperture. By tilting the centre of the TS-E lens barrel, you can tilt the lens so that the plane of focus is uniform on the film plane (Photo 1-b).

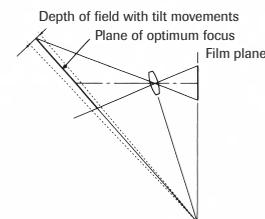


Photo 1-a  
Uncorrected



Photo 1-b  
Corrected with tilt

## Using Tilt Movement to Focus an Oblique Subject Plane



## Shift Movements

Normally, when you point your camera up at a tall building, the building will look slimmer toward the top. It becomes trapezoidal (Photo 2-a). This perspective effect is more pronounced with shorter lens focal lengths, distorting the building even more. By altering the parallel position between the lens and the film plane with the TS-E lens, this perspective effect can be corrected. With the camera's film plane set parallel to the building, shifting the lens upward will obtain a more rectangular-looking building (Photo 2-b).

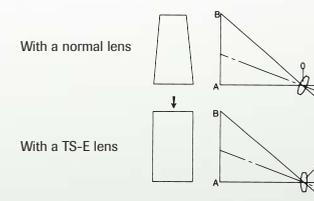


Photo 2-a  
Uncorrected



Photo 2-b  
Corrected with shift

## Using Shift Movements to Focus Tall Building



# Technology where it counts

Canon's innovations put your images on film quickly, quietly, and easily with outstanding results.



## Ultrasonic Motors (USM)

The Ultrasonic Motor (USM) in Canon EF lenses is the world's first lens-based motor. Based on a totally new technology, the motor spins by ultrasonic oscillation energy. The USM is quiet and quick. It has made EF lenses almost noiseless and autofocus fast, precise, and practical. The direct-drive construction is very simple, with no gear train. This makes it durable and efficient. It also consumes little power. Two types of USM are used: Ring-type USM and Micro USM. The former type is found in large-aperture and super telephoto lenses, while the latter is used in more compact lenses. Using the optimum type of USM in the lens results in maximum efficiency and effectiveness.



MRing-type USM



Micro USM

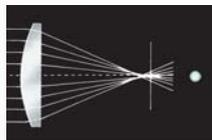


## Aspherical Lenses

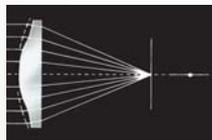
Ordinary spherical elements have an inherent flaw in that the point of focus for the lens centre does not match that of the lens periphery. Spherical aberrations of large-aperture lenses and distortion by ultra-wide-angle lenses cannot be resolved with spherical elements alone. The Aspherical lens element was therefore developed. The curvature of the lens element is calculated and shaped to achieve the ideal single point of focus. The result is high contrast with minimal flare even with a large-aperture lens. Distortion can also be effectively corrected in ultra-wide-angle lenses.

Canon started to develop manufacturing technology for Aspherical elements early on. We eventually succeeded in establishing a mass-production grinding and polishing process with a polishing precision of 5/10,000 mm. In 1971, Canon marketed the FD 55mm f/1.2AL lens, the world's first large-aperture Aspherical lens for SLRs. This was followed by many other Canon lenses incorporating Aspherical elements and they were well-received.

Also, Canon developed mass-production technology for glass-moulded aspherical elements and replicated Aspherical lenses. The former was produced by an ultra-high-precision aspherical lens-moulding machine which shaped the glass directly. For the latter, the Aspherical surface was formed by ultraviolet-hardened resin film applied on a spherical element. Canon has developed numerous compact-size lenses, taking full advantage of Aspherical elements to attain high image quality.



Spherical aberration of spherical lens.



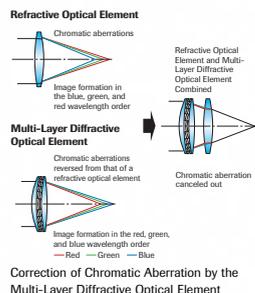
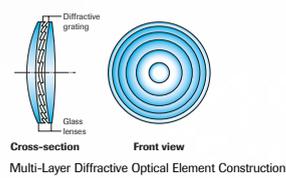
Convergence of parallel light rays by an Aspherical lens.



## Diffraction Optics

In another world's first in camera lens optical design, Canon introduced new technology in order to build a super telephoto that complements its latest compact film and digital SLR cameras. This cutting-edge technology employs diffractive optical elements that use the principle of diffraction to change the direction of the lightwave's path. This revolutionary element has Aspherical characteristics, which help define superior maximum aperture image quality, as well as optical qualities superior to UD-glass to totally correct colour fringing. The Multi-Layer Diffractive Optical

Elements exhibit outstanding ability to correct chromatic aberrations (colour defects), and are especially effective in super telephoto lens design where these specific types of optical defects are most likely to happen. You can see how well the technology works in your own pictures by examining the straight edges of a subject in your picture. You will see a crisp, clear edge without the telltale, prismatic colour fringing that is visible with images shot using inferior optics.

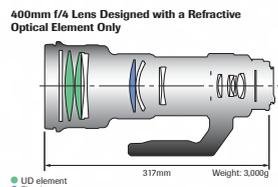


Correction of Chromatic Aberration by the Multi-Layer Diffractive Optical Element

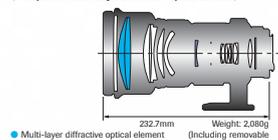
Glass lens elements refract, or bend, lightwaves as they pass through to form an image. That's simply the naturally occurring physics of light. We use multiple elements and special glass to help keep the waves focused like a pinpoint instead of spreading them into the rainbow of colour seen when light passes through a glass prism. To diffract a lightwave means that the ray goes through a change in direction before passing through the lens. The change in direction is caused by a diffraction grating - very fine parallel grooves or slits on the surface. Canon found that using a concentric diffraction grating that gets smaller toward the edges - some as fine as tenths of a micrometre - solved of one many inherent physical limitations of camera optics. The design also makes it possible to obtain the same effect as an Aspherical lens. And taking the technology a step beyond, we actually use two single-layer diffractive optical elements whose diffraction gratings are bonded together face-to-face.

Since longer wavelengths form an image closer to the lens due to the large diffractive angle, and shorter wavelengths form an image farther from the lens due to the smaller diffractive angle, putting the DO elements with conventional glass optics actually cancels out each other's chromatic aberrations and is exceptionally effective in correcting this optical defect. The diffraction that occurs with Canon's Multi-Layer Diffractive optical elements actually corrects the optical system's chromatic aberrations and improves the image formation performance.

The net result of Canon's DO technology is a lens design with reduced size and weight while offering higher image quality than a comparable focal length lens that incorporates conventional glass optical elements. It means a new generation of high-performance lenses that complement the more compact designs of our latest SLR film and digital cameras.



400mm f/4 Lens Designed with a Refractive Optical Element Only



400mm f/4 DO IS USM (Incorporates Multi-Layer Diffractive Optical Element)

Lens Downsizing with the Multi-Layer Diffractive Optical Element

Note: If a very bright spotlight like a mercury lamp is photographed with a DO lens, a ring of light may occasionally appear around the light source, due to the imaging characteristics of the Multi-Layer Diffractive Optical Element.

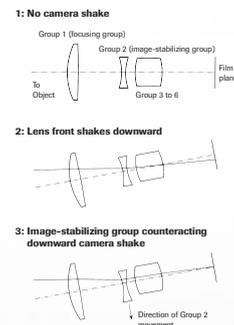


## Image Stabilizer

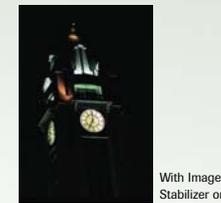
No matter how great the lens is, camera shake can spoil the shot. Blurred photos due to camera shake usually occur when the shutter speed is slower than the reciprocal of the lens focal length.

For example, a shutter speed slower than 1/200 sec. at the 200mm focal length can invite a blurred photo caused by camera shake. In such cases, a tripod is necessary. However, a tripod can be a heavy and troublesome burden when you go hiking or travelling. There are even places where using tripods is prohibited. Using a slow shutter speed then becomes difficult. To resolve this problem, Canon became the first manufacturer to incorporate an Image Stabilizer in an SLR camera lens. Optical shake is detected by gyro sensors which provide the data necessary to shift the image-stabilizing lens group in parallel to neutralise the shake.

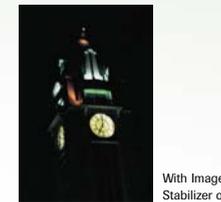
This increases the usable shutter speed range by up to two full steps for hand-held shooting. Except for the EF 28-135mm f/3.5-5.6 IS USM and EF 75-300mm f/4-5.6 IS USM lenses, IS lenses have two IS modes. One is for normal image stabilisation and the other is for panned shots. With a monopod, the Image Stabilizer on all IS lenses operates normally as during hand-held shooting. Also, the EF 300mm f/2.8L IS USM, EF 400mm f/2.8L IS USM, EF 500mm f/4L IS USM, and EF 600mm f/4L IS USM lenses have a mechanism that prevents having the Image Stabilizer turned on while the lens is mounted on a tripod.



How the Image Stabilizer Works in the EF 75-300mm f/4-5.6 IS USM



With Image Stabilizer on

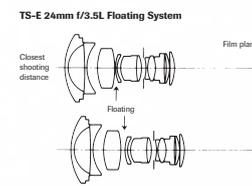


With Image Stabilizer off

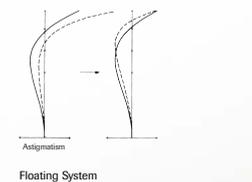


## Floating System

Ordinary lenses are designed to give the best results when the correction of aberrations is most effective. This is usually at the most commonly used focusing distances. At other focusing distances, especially at the closest focusing distance, aberrations tend to appear. Canon's floating system suppresses aberrations at close focusing distances. This system adjusts the gap between certain lens elements in correspondence to the focusing distance. The aberration is effectively corrected. The result is high image quality with aberrations suppressed at all focusing distances.



TS-E 24mm f/3.5L Floating System



Floating Effect (TS-E 24mm f/3.5L)

Floating System



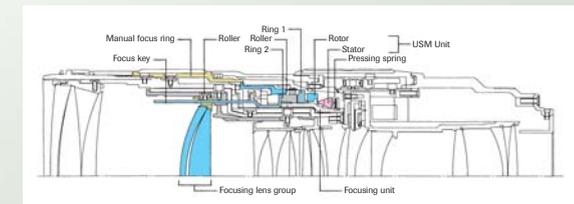
## Circular Aperture

Certain Canon lenses feature a new Circular Aperture diaphragm unit, which uses curved aperture blades to provide for a more rounded opening as the lens is stopped down. It's especially effective at rendering out-of-focus background highlights as natural rounded shapes. In lenses such as the EF 70-200mm f/2.8L IS lens, the lens opening is virtually circular from f/2.8 to f/5.6. These lenses retain all the benefits previously available with Canon's Electromagnetic Diaphragm - smooth and consistent stop-down operation (even at up to 10 fps with the EOS-1V), near-silent aperture control, and total absence of mechanical levers or switches in the lens mount.



## Full-Time Manual Focusing

Canon EF lenses and EOS cameras have very high AF precision. Optimum focus can be achieved quickly for almost any shooting situation. Recent EOS cameras have been equipped with multiple focusing points for higher flexibility in composing a photo while using AF. Picture-taking is even more flexible with Canon's full-time manual focusing which overrides the autofocus mode. Lenses with this feature allow you to switch to manual focusing even in the AF mode. You can keep looking through the viewfinder and touch up the focus manually without switching the focus mode switch. Since the focusing ring does not rotate during autofocus, we could make it wider for better holding comfort and easier manual focusing. Another ergonomic design which lets you convey your intentions quickly. Full-time manual focusing comes in two types. One is electronic manual focusing where the rotation amount of the focusing ring is detected and the focusing motor is driven electronically. The other type is mechanical manual focusing where the rotation of the focusing ring adjusts the focus mechanically.



## AF Stop Feature

AF stop is featured on the EF 300mm f/2.8L IS USM, EF 400mm f/2.8L IS USM, EF 500mm f/4L IS USM, and EF 600mm f/4L IS USM lenses. If something passes between the camera and subject during autofocus, pressing the AF stop buttons momentarily locks the AF to prevent the focus from shifting to the obstruction passing by. After the obstruction is gone, the focus is still maintained on the subject and you can quickly resume shooting. The AF stop buttons are positioned at four locations around the lens grip at the front of the lens for easy access during both horizontal and vertical shooting.



## Dust- and Water-Resistant Construction

The new EF 300mm f/2.8L IS USM, EF 400mm f/2.8L IS USM, EF 500mm f/4L IS USM, and EF 600mm f/4L IS USM lenses are highly dust- and water-resistant. The switch panel, exterior seams, and drop-in filter compartment have rubber linings. Moving parts such as the focusing ring and switches are also designed to prevent water and dust from entering. These lenses can therefore be used in harsh conditions without dust and water getting inside.

The lens is equipped with a rubber ring on the mount to improve its dustproofing and waterproofing characteristics. As the lens is repeatedly mounted and detached, the rubber ring will leave fine abrasion marks on the outside of the camera mount. This will not affect operation.



Full-time mechanical manual focus mechanism

ULTRA-WIDE ZOOM LENSES  
 STANDARD ZOOM LENSES  
 TELEPHOTO ZOOM LENSES  
 ULTRA-WIDE & WIDE LENSES  
 MEDIUM & STANDARD TELEPHOTO LENSES  
 TELEPHOTO LENSES  
 SUPER TELEPHOTO LENSES  
 MACRO LENSES  
 TS-E LENSES  
 TECHNOLOGY WHERE IT COUNTS  
 CANON EF LENSES  
 SPECIFICATIONS

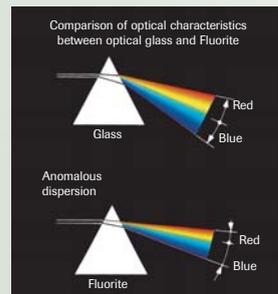
## Focus Preset

With the focus preset feature, you can set the desired focusing distance in memory and later instantly focus the lens at that distance. Normal picture-taking and focusing are possible even while focus preset has been set. At a soccer game, for example, you can preset the focus for the goal. You can focus normally while the player approaches the goal, then when the ball is shot into the goal, you can obtain instant focus.

(CaF<sub>2</sub>) (UD) (S-UD)

## Fluorite (CaF<sub>2</sub>) and UD-Glass

The refraction of light differs depending on the wavelength. The point of focus, therefore, differs depending on the different wavelengths or colours. When the different wavelengths are focused at different points, the colours look smeared. This is called chromatic aberration. The longer the focal length, the more pronounced chromatic aberration becomes. Usually, an achromatic element is used in a lens to correct chromatic aberration. However, normal optical glass can only be corrected for two primary spectral colours. An exception to this limitation is Fluorite, an ideal material. Fluorite, which is crystalline, has abnormally low refraction and low dispersion characteristics, which optical glass cannot achieve. It also has anomalous dispersion from the green to blue wavelengths. Canon developed production technologies to manufacture Fluorite. By incorporating Fluorite in lenses, the points of focus of the three primary spectral colours of red, green, and blue all meet at one point for ideal correction of chromatic aberration. There is also UD-glass, which is a special type of optical glass whose properties nearly match those of Fluorite. The effect of two UD-glass elements is equivalent to having one Fluorite element. And one super UD-glass element gives almost the same effect as one Fluorite element.



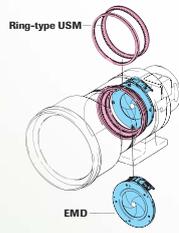
Fluorite and UD glass

## Large, Fully Electronic Mount System

The conventional interface between the lens and camera body was mechanical, with the use of engaging levers and gears. This method caused physical problems such as wear and rattle. It was limited and more diverse information could not be exchanged. Canon EF lenses do not use such mechanical links at all. About 50 items of information are exchanged as digital signals between the lens and camera in real time. This enables high-speed and high-precision control. And since the lens mount diameter is an ample 54mm, special lenses such as large-aperture lenses and TS-E lenses can be used. The EF mount is an advanced interfacing system with infinite possibilities.

## Built-In Motor and EMD

Canon EF lenses (except TS-E and MP-E lenses) have a built-in AF motor. Compared with camera body-based AF motors, lens-based motors have driving energy with lower transmission loss. The optimum AF motor for the particular lens can also be selected and installed. The AF operation is therefore quick, quiet, and highly precise. The lenses also have an EMD (Electromagnetic Diaphragm) to control the aperture electronically. The aperture can be set either with an electronic dial or with the electronic pulse signal sent according to the exposure reading. Aperture control precision is therefore unmatched.



Built-in motor and EMD

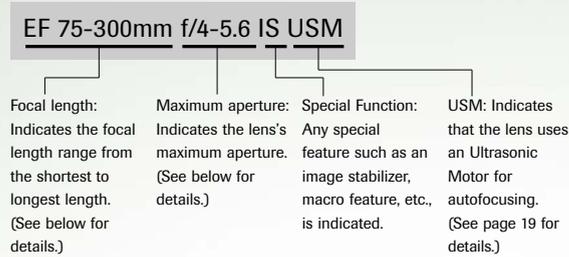
(IR)

## Inner Focusing and Rear Focusing

An inner focusing lens has the focusing lens group(s) in front of the diaphragm, while a rear focusing lens has the focusing lens group(s) behind the diaphragm. Both focusing systems allow the focusing lens group to be small. This minimises the load on the actuator which drives the autofocus. In turn, the AF speed is faster. The whole optical system can also be made more compact. Also, since the lens does not rotate during focusing, the effects of a circular polarising filter or gelatin filter remain intact.

## Description of Lens Designation

The lens designations follow a standard format to identify the lens.



## Focal Length

A focal length of 50mm is closest to what the eye sees. This focal length is used as a reference point for lens categories. For example, lenses with a shorter focal length are called wide-angle lenses, while those with a longer focal length are called telephoto lenses. Single focal length lenses have only one focal length, while zoom lenses have a range of focal lengths. (When EF lenses are used with the EOS IX, the focal length corresponds to 1.25 times that indicated for 35mm cameras.)

## Angle of View

This indicates how much coverage of the scene you can see through the lens. Telephoto lenses have a narrower angle of view than wide-angle lenses.

## Angle of View and Perspective

Perspective refers to the distance between the near and far objects that you can see at the same time. When the angle of view is wide (with a shorter focal length), the perspective becomes more apparent. And with a narrow angle of view (with a longer focal length), the perspective becomes less apparent. The image also becomes more compressed, with the far objects looking like they are right behind the nearer objects.

## Maximum Aperture

This indicates the speed of the lens. A fast lens has a large maximum aperture allowing more light to enter. The smaller the maximum aperture's f-number, the larger the aperture opening is. A larger maximum aperture makes the image look brighter and easier to see through the viewfinder. You can also use a faster shutter speed or obtain better background blur. On the other hand, a smaller

maximum aperture (the f-number is larger) allows the lens to be more compact and light. Single focal length lenses have only one maximum aperture while zoom lenses may have two, one for each end of the focal length range. For example, a EF 28-80mm f/3.5-5.6 lens has a maximum aperture of f/3.5 at 28mm and f/5.6 at 80mm.

## Aperture and Shutter Speed

Under the same light level, if the aperture opening is made larger by one step, the shutter speed can be increased by one step. For example, if an aperture of f/5.6 and shutter speed of 1/60 sec. are set, adjusting the aperture to f/4 will enable a shutter speed of 1/125 sec. to be used. An aperture of f/2.8 will allow a faster shutter speed of 1/250 sec. while the same exposure level is maintained.

## Depth of Field

Normally, there is only one point of optimum focus. However, we often see objects in front of or behind this point also in focus. This is made possible by a wide depth of field.

## Depth of Field with the Aperture and Focal Length

The depth of field is mainly determined by the lens focal length, aperture and subject distance. For example, if a wide-angle lens is used at the minimum aperture, almost everything in the picture will be in focus. However, if a telephoto lens is used at maximum aperture, the background will be really blurred, making the subject in focus stand out.

# Canon EF Lens accessories

## General Purpose Filters for Black-and-White or Colour Film

Sky (1A), Haze (UV-1), ND (03 • 0.6)  
• 52mm • 58mm • 72mm

## Conversion Filters for Colour Film

80A, 80B, 85, 85B, FCB, FCD  
• 52mm • 58mm • 72mm

## General Purpose Filters for Black-and-White Film

Yellow 2, Green 11, Orange 15, Red 25A  
• 52mm • 58mm • 72mm

## Softmat Filters

Softmat filters mildly soften the focus for flattering portraits and dreamy landscapes. These filters utilise the effect of diffraction which occurs between light passing through the transparent part and light passing through the coated part. Use Softmat No. 1 filter for a gentle soft-focus effect, and Softmat No. 2 for a stronger effect.

No.1, No.2  
• 52mm • 58mm

## Warming Filters for Colour Film

81A, 81B  
• 52mm • 58mm • 72mm

## Circular Polarising Filters PL-C

Polarising filter enhances picture quality by blocking harmful reflected light. Use it to reduce polarised light reflections from glass and water surfaces or to improve colour saturation. Simple to use, circular polarising filters (such as Canon's PL-C) polarise light circularly, rather than linearly, so it does not interfere with autofocus or TTL light metering.

• 52mm • 58mm • 67mm • 72mm  
• 77mm (Type II)

## Loupe 8x & 4x



The Canon Loupe 4x is a high-performance magnifier for viewing the entire picture area (24 x 36mm) of a 35mm-format slide or negative. With three lens elements in three groups, chromatic aberration and distortion are effectively corrected to give crystal-clear images. Eye fatigue is not a problem even after prolonged use. Loupe 8x is another magnifier for viewing the entire picture area, but with special emphasis on a 24mm-diameter area at the centre. The four lens elements in four groups attain high performance and a high magnification. All elements have Super Spectra Coating to make image viewing clear enough for you to effectively check the quality of photos taken with EF lenses. These two loupes can make your evaluation of photos more accurate.

## Drop-in Filters



Drop-in Filters PL-C

Drop-in Filters PL-C can be rotated from the outside without

removing them from the lens for precise control. The 48mm PL-C filter can be used with the following lenses – EF 200mm f/1.8L USM and EF 1200mm f/5.6L USM; the 52mm PL-C filter is designed for use with the EF 300mm f/2.8L IS USM, EF 400mm f/2.8L IS USM, EF 500mm f/4L IS USM and EF 600mm f/4L IS USM.



Drop-in Gelatin Filter Holders

These glass-backed holders accept up to three commercially available cut-to-size gelatin filters for rear-insertion lenses. A 48mm holder is provided standard with EF 200mm f/1.8L USM and EF 1200mm f/5.6L USM; and a 52mm holder, with EF 300mm f/2.8L IS USM, EF 400mm f/2.8L IS USM, EF 500mm f/4L IS USM and EF 600mm f/4L IS USM.



Drop-in Screw Filter Holders With Protect Filters

The enclosed regular filter can be exchanged with other commercially available screw-type filters. Note that only filters with correct filter frame thickness can be mounted on the lens.  
• 48mm • 52mm

Only Canon Filters are guaranteed for use with EF lenses.

## Gelatin filter Holders III & IV



Gelatin Filter Holder III

Gelatin Filter Holder IV

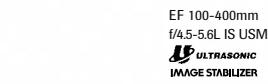
Gelatin Filter Holder III uses 3 x 3 inch gelatin filters and Gelatin Filter Holder IV uses 4 x 4 inch gelatin filters. Holders III and IV both provide extension hoods and 52mm, 58mm, 67mm, 72mm and 77mm adapters. Refer to the EF Lens Accessory Table for information on lens combinations.

• 52mm • 58mm • 67mm  
• 72mm • 77mm

• Adapter III for EF 50mm 1: 1.4

# Canon EF Lenses

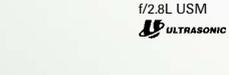
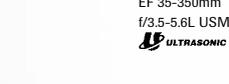
## Ultra-Wide Zoom



## Wide Angle



## Telephoto Zoom



## Standard Zoom



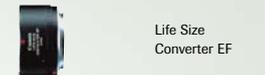
## Standard & Medium Telephoto



## Telephoto



## Macro Lenses



## TS-E Lenses



## Extension Tubes



## Tele-Extenders



# Canon EF Lens Specifications & Accessories Table

Lens	Angle of View (horizontal • vertical • diagonal)	Lens Construction (Elements/Groups)	No. of Diaphragm Blades	Minimum Aperture	Closest Focusing Distance (m/ft)	Maximum Magnification (x)	AF Actuator	Filter Diameter (mm)	Max. Diameter x Length (mm/in)	Weight (g/oz)	Magnification with Extension Tube EF 12 II	Magnification with Extension Tube EF 25 II	Lens Hood	Hard Case	Soft Case
<b>EF 16-35mm f/2.8L USM</b>	98° - 54° - 74°10' - 38° - 108°10' - 63°	14 / 10	7	22	0.28 / 0.9	0.22	USM	77	83.5 / 3.3 x 103 / 4.1	600 / 1.3 lb.	0.87 - 0.36	1.09 - 0.80	EW-83E	-	LP1319
<b>EF 17-40mm f/4L USM</b>	84° - 34° - 53° - 19°30' - 74° - 29°	12 / 9	7	22	0.28 / 0.92	0.24 (at 40mm)	Ring USM <sup>1</sup>	77	83.5 / 3.3 x 96.8 / 3.8	500 / 1.1 lb.	0.83 - 0.32	1.02 - 0.40	EW-83E	-	LP1319
<b>EF 20-35mm f/3.5-4.5 USM</b>	84° - 54° - 62° - 38° - 94° - 63°	12 / 11	5	22 - 27	0.34 / 1.1	0.13 (at 35mm)	USM <sup>1</sup>	77	83.5 / 3.3 x 68.9 / 2.7	340 / 12.0	0.70 - 0.36	1.00 - 0.80	EW-83H	LH-D11	LP1214
<b>EF-S 18-55mm f/3.5-5.6*</b>	65°30' - 23°20' - 45°30' - 15°40' - 75°20' - 75°50'	11 / 9	6	22 - 38	0.28 / 0.92	0.28 (at 55mm)	MM	58	69 / 2.7 x 66.2 / 2.6	190 / 6.7	0.81 - 0.23	0.92 - 0.51	EW-60C	-	LP814
<b>EF 24-70mm f/2.8L USM</b>	84° - 34° - 53° - 19°30' - 74° - 29°	16 / 13	8	22	0.38 / 1.25	0.29 (at 70mm)	USM <sup>1</sup>	77	83.2 / 3.3 x 123.5 / 4.9	950 / 2.1	0.63 - 0.18	1.25 - 0.40	EW-83F	-	LP1219
<b>EF 24-85mm f/3.5-4.5 USM</b>	74° - 24° - 53° - 16° - 84° - 28°30'	15 / 12	6	22 - 32	0.5 / 1.6	0.16 (at 85mm)	USM <sup>1</sup>	67	73.0 / 2.9 x 69.5 / 2.7	380 / 13.4	0.59 - 0.15	1.23 - 0.33	EW-79H	LH-C13	ES-C9 / LP1014
<b>EF 28-80mm f/3.5-5.6 II</b>	75° - 30° - 46° - 17° - 65° - 25°	10 / 10	5	22 - 38	0.38 / 1.25	0.26 (at 80mm)	MM <sup>2</sup>	58	67 / 2.6 x 71 / 2.8	200 / 7.8	0.57 - 0.16	1.14 - 0.35	EW-60C	-	LP814
<b>EF 28-90mm f/4-5.6 II USM</b>	65° - 22°40' - 46° - 15°10' - 75° - 27°	10 / 8	5	22 - 32	0.38 / 1.3	0.30 (at 90mm)	Micro USM	58	67 / 2.6 x 71 / 2.8	190 / 6.7	0.56 - 0.14	1.13 - 0.31	EW-60C	-	LP814
<b>EF 28-90mm f/4-5.6 II</b>	65° - 22°40' - 46° - 15°10' - 75° - 27°	10 / 8	5	22 - 32	0.38 / 1.3	0.30 (at 90mm)	MM	58	67 / 2.6 x 71 / 2.8	190 / 6.7	0.56 - 0.14	1.13 - 0.31	EW-60C	-	LP814
<b>EF 28-105mm f/4-5.6 II USM</b>	65° - 22°40' - 46° - 15°10' - 75° - 27°	10 / 8	5	22 - 32	0.48 / 1.57	0.30 (at 105mm)	Micro USM	58	67 / 2.6 x 68 / 2.7	180 / 6.3	0.56 - 0.14	1.13 - 0.31	EW-60C	-	LP814
<b>EF 28-105mm f/4-5.6 II</b>	65° - 22°40' - 46° - 15°10' - 75° - 27°	10 / 8	5	22 - 32	0.38 / 1.3	0.30 (at 105mm)	MM	58	67 / 2.6 x 71 / 2.8	180 / 6.3	0.56 - 0.14	1.13 - 0.31	EW-60C	-	LP814
<b>EF 28-135mm f/3.5-5.6 IS USM</b>	65° - 15° - 46° - 10° - 75° - 18°	16 / 12	6	22 - 36	0.5 / 1.64	0.19 (at 135mm)	USM <sup>1</sup>	72	78.4 / 3.1 x 96.8 / 3.8	540 / 18.9	0.53 - 0.09	1.09 - 0.21	EW-78BII	-	LP1116
<b>EF 35-80mm f/4-5.6 III</b>	54° - 25° - 38° - 17° - 63° - 30°	8 / 8	5	22 - 32	0.4 / 1.3	0.23 (at 80mm)	MM <sup>2</sup>	52	65.0 / 2.6 x 63.5 / 2.5	175 / 6.2	0.50 - 0.16	0.97 - 0.35	EW-54II	LH-C13	ES-C9 / LP814
<b>EF 35-350mm f/3.5-5.6L USM</b>	54° - 6° - 38° - 4° - 63° - 7°	21 / 15	8	22 - 32 <sup>3</sup>	0.6 / 2 (at 135mm)	0.25 (at 135mm)	USM <sup>1</sup>	72	85.0 / 3.3 x 167.4 / 6.7	1,385 / 3.1 lb.	0.43 - 0.04	0.82 - 0.08	EW-78H	LH-D22	LZ1324
<b>EF 55-200mm f/4.5-5.6 II USM</b>	36° - 10° - 25° - 7° - 43° - 12°	13 / 13	6	22 - 27	1.2 / 3.9	0.21 (at 200mm)	Micro USM	52	70.4 / 2.8 x 92.3 / 3.8	310 / 10.9	0.26 - 0.06	0.50 - 0.14	ET-54	-	LP1016
<b>EF 70-200mm f/2.8L IS USM</b>	29° - 10° - 19°30' - 7° - 34° - 12°	23 / 18	8	32	1.4 / 4.6	0.17	USM	77	86.2 / 3.4 x 197 / 7.8	1,470 / 3.24 lb.	0.22 - 0.06	0.41 - 0.14	ET-86	-	LZ1324
<b>EF 70-200mm f/2.8L USM</b>	29° - 10° - 19°30' - 7° - 34° - 12°	18 / 15	8	32	1.5 / 4.9	0.16 (at 200mm)	USM <sup>1</sup>	77	84.6 / 3.3 x 193.6 / 7.6	1,310 / 2.9 lb.	0.22 - 0.06	0.41 - 0.14	ET-83II	LH-D24B	LZ1324
<b>EF 70-200mm f/4L USM</b>	29° - 10° - 19°30' - 7° - 34° - 12°	16 / 13	8	32	1.2 / 3.9	0.21 (at 200mm)	USM <sup>1</sup>	67	76 / 3.0 x 172 / 6.8	705 / 25	0.23 - 0.06	0.39 - 0.13	ET-74	-	LP1224
<b>EF 75-300mm f/4.5-5.6 IS USM</b>	27° - 6°50' - 18°11' - 4°35' - 32°11' - 8°15'	15 / 10	8	32 - 45	1.5 / 4.9	0.26 (at 300mm)	Micro USM	58	78.5 / 3.1 x 137.2 / 5.4	650 / 1.4 lb.	0.21 - 0.04	0.39 - 0.09	ET-64II	LH-D18B	LP1022
<b>EF 90-300mm f/4.5-5.6 USM</b>	22°40' - 6°50' - 15°10' - 4°35' - 27° - 8°15'	13 / 9	7	38 - 45	1.5 / 4.9	0.25 (at 300mm)	Micro USM	58	71 / 2.8 x 114.7 / 4.5	190 / 14.8	0.20 - 0.13	0.36 - 0.09	ET-60	-	LP1019
<b>EF 90-300mm f/4.5-5.6 II</b>	22°40' - 6°50' - 15°10' - 4°35' - 27° - 8°15'	13 / 9	7	38 - 45	1.5 / 4.9	0.25 (at 300mm)	MM	58	71 / 2.8 x 114.7 / 4.5	190 / 14.8	0.20 - 0.13	0.36 - 0.09	ET-60	-	LP1019
<b>EF 80-200mm f/4.5-5.6 II</b>	25° - 10° - 17° - 7° - 30° - 12°	10 / 7	5	22 - 27 <sup>3</sup>	1.5 / 4.9	0.16 (at 200mm)	MM <sup>2</sup>	52	69.0 / 2.7 x 78.5 / 3.1	250 / 8.8	0.21 - 0.06	0.39 - 0.14	ET-54	LH-B12	ES-C13 / LP1014
<b>EF 100-300mm f/4.5-5.6 USM</b>	20° - 6°50' - 14° - 4°35' - 24° - 8°15'	13 / 10	8	32 - 38 <sup>3</sup>	1.5 / 4.9	0.20 (at 300mm)	USM <sup>1</sup>	58	73.0 / 2.9 x 121.5 / 4.8	540 / 1.2 lb.	0.26 - 0.04	0.37 - 0.09	ET-65III	-	ES-C17 / LP1019
<b>EF 100-400mm f/4.5-5.6L IS USM</b>	20° - 5°10' - 14° - 3°30' - 24° - 6°10'	17 / 14	8	32 - 38 <sup>3</sup>	1.8 / 5.9	0.20 (at 400mm)	USM <sup>1</sup>	77	92.0 / 3.6 x 189.0 / 7.4	1,380 / 3.0 lb.	0.19 - 0.03	0.35 - 0.07	ET-83C	-	LZ1324
<b>EF 14mm f/2.8L USM</b>	104° - 81° - 114°	14 / 10	5	22	0.25 / 0.8	0.10	USM <sup>1</sup>	Rear Gel Holder	77.0 / 3.0 x 89.0 / 3.5	560 / 1.2 lb.	-	-	Built-In	LH-C13	ES-C13 / LP1016
<b>EF 15mm f/2.8 Fisheye</b>	141°54' - 91°44' - 180°	8 / 7	5	22	0.27 / 0.7	0.14	AFD	Rear Gel Holder	73.0 / 2.9 x 62.2 / 2.4	330 / 11.6	0.94 - 0.80	-	Built-In	LHP-C10	ES-C9 / LP814
<b>EF 20mm f/2.8 USM</b>	84° - 62° - 94°	11 / 9	5	22	0.25 / 0.8	0.14	USM <sup>1</sup>	72	77.5 / 3.1 x 70.6 / 2.8	405 / 14.3	0.72 - 0.60	-	EW-75H	LH-D13	LP1214
<b>EF 24mm f/1.4L USM</b>	74° - 53° - 84°	11 / 9	7	22	0.25 / 0.82	0.16	USM <sup>1</sup>	77	83.5 / 3.3 x 77.4 / 3.0	550 / 19.4	0.66 - 0.50	-	EW-83DII	-	LP1214
<b>EF 24mm f/2.8</b>	74° - 53° - 84°	10 / 10	6	22	0.25 / 0.8	0.16	AFD	58	67.5 / 2.7 x 48.5 / 1.9	270 / 9.5	0.64 - 0.50	1.22 - 1.11	EW-60H	LH-B9	ES-C9 / LP811
<b>EF 28mm f/1.8 USM</b>	65° - 46° - 75°	10 / 9	7	22	0.25 / 0.8	0.18	USM <sup>1</sup>	58	73.6 / 2.9 x 56.6 / 2.2	310 / 10.9	0.61 - 0.43	1.13 - 0.96	EW-63H	LHP-C10	ES-C9 / LP814
<b>EF 28mm f/2.8</b>	65° - 46° - 75°	5 / 5	5	22	0.3 / 1	0.13	AFD	52	67.4 / 2.7 x 42.5 / 1.7	185 / 6.5	0.56 - 0.43	1.09 - 0.95	EW-65H	LHP-B9	ES-C9 / LP1011
<b>EF 35mm f/1.4L USM</b>	54° - 38° - 63°	11 / 9	8	22	0.3 / 0.98	0.18	USM <sup>1</sup>	72	79.0 / 3.1 x 86.0 / 3.4	580 / 20.5	0.54 - 0.36	0.97 - 0.79	EW-78C	-	LP1214
<b>EF 35mm f/2</b>	54° - 38° - 63°	7 / 5	5	22	0.25 / 0.8	0.23	AFD	52	67.4 / 2.7 x 42.5 / 1.7	210 / 7.4	0.58 - 0.35	1.00 - 0.77	EW-65H	LH-B9	ES-C9 / LP1011
<b>EF 50mm f/1.4 USM</b>	40° - 27° - 46°	7 / 6	8	22	0.45 / 1.5	0.15	Micro USM <sup>1</sup>	58	73.8 / 2.9 x 50.5 / 2.0	290 / 10.2	0.39 - 0.24	0.68 - 0.53	ES-71II	LHP-C10	ES-C9 / LP1014
<b>EF 50mm f/1.8 II</b>	40° - 27° - 46°	6 / 5	5	22	0.45 / 1.5	0.15	MM <sup>2</sup>	52	68.2 / 2.7 x 41.0 / 1.6	130 / 4.6	0.39 - 0.24	0.68 - 0.53	ES-62 <sup>200mm-90mm</sup>	LH-B9	ES-C9 / LP1014
<b>EF 85mm f/1.2L USM</b>	24° - 16° - 28°30'	8 / 7	8	16	0.95 / 3.1	0.11	USM	72	91.5 / 3.6 x 84.0 / 3.3	1,025 / 2.3 lb.	0.25 - 0.15	0.42 - 0.33	ES-79H	LH-D12	LP1219
<b>EF 85mm f/1.8 USM</b>	24° - 16° - 28°30'	9 / 7	8	22	0.85 / 2.8	0.13	USM <sup>1</sup>	58	75.0 / 3.0 x 71.5 / 2.8	425 / 15.0	0.27 - 0.15	0.44 - 0.32	ET-65III	LH-B12	ES-C13 / LP1014
<b>EF 100mm f/2 USM</b>	20° - 14° - 24°	8 / 6	8	22	0.9 / 3	0.14	USM <sup>1</sup>	58	75.0 / 3.0 x 73.5 / 2.9	460 / 1.0 lb.	0.27 - 0.13	0.42 - 0.28	ET-65III	LH-B12	ES-C13 / LP1014
<b>EF 135mm f/2L USM</b>	15° - 10° - 18°	10 / 8	8	32	0.9 / 3	0.19	USM <sup>1</sup>	72	82.5 / 3.2 x 112.0 / 4.4	750 / 1.7 lb.	0.29 - 0.09	0.41 - 0.20	ET-78H	LH-D18H	LP1219
<b>EF 135mm f/2.8 with Softfocus</b>	15° - 10° - 18°	7 / 6	6	32	1.3 / 4.3	0.12	AFD	52	69.2 / 2.7 x 98.4 / 3.9	390 / 13.8	0.22 - 0.09	0.33 - 0.20	ET-65III	LH-C13	ES-C13 / LP1016
<b>EF 200mm f/2.8L II USM</b>	10° - 7° - 12°	9 / 7	8	32	1.5 / 4.9	0.16	USM <sup>1</sup>	72	83.2 / 3.3 x 136.2 / 5.4	765 / 1.7 lb.	0.23 - 0.06	0.32 - 0.14	ET-83BII	LH-D18H	LP1222
<b>EF 300mm f/2.8L IS USM</b>	6°50' - 4°35' - 8°15'	17 / 13	8	32	2.5 / 8.2	0.13	USM <sup>1</sup>	52 Drop-in	128.0 / 5.0 x 252.0 / 9.9	2,550 / 5.6 lb. (lens only)	0.18 - 0.04	0.24 - 0.09	ET-120	Lens Case 300	-
<b>EF 300mm f/4L IS USM</b>	6°50' - 4°35' - 8°15'	15 / 11	8	32	1.5 / 4.9	0.24	USM <sup>1</sup>	77	90.0 / 3.5 x 221.0 / 8.7	1,190 / 2.6 lb.	0.30 - 0.04	0.37 - 0.09	Built-In	LH-D27	LZ1128
<b>EF 400mm f/2.8L IS USM</b>	5°10' - 3°30' - 6°10'	17 / 13	8	32	3 / 9.8	0.15	USM <sup>1</sup>	52 Drop-in	163.0 / 6.4 x 349.0 / 13.7	5,370 / 11.8 lb.	0.19 - 0.03	0.23 - 0.06	ET-155	Lens Case 400	-
<b>EF 400mm f/4.0L DO IS USM</b>	5°10' - 3°30' - 6°10'	17 / 13	8	32	3.5 / 11.48	0.12	USM	52 Drop-in	128.0 / 5.0 x 232.7 / 9.4	1,940 / 4.3 lb.	0.16 - 0.03	0.20 - 0.07	ET-120	Lens Trunk	-
<b>EF 400mm f/5.6L USM</b>	5°10' - 3°30' - 6°10'	7 / 6	8	32	3.5 / 11.5	0.12	USM <sup>1</sup>	77	90.0 / 3.5 x 256.5 / 10.1	1,250 / 2.8 lb.	0.16 - 0.03	0.21 - 0.07	Built-In	LH-D29	LZ1132
<b>EF 500mm f/4L IS USM</b>	4° - 2°45' - 5°	17 / 13	8	32	4.5 / 14.8	0.12	USM <sup>1</sup>	52 Drop-in	146.0 / 5.8 x 387.0 / 15.2	3,870 / 8.5 lb.	0.15 - 0.03	0.18 - 0.05	ET-138	Lens Case 500	-
<b>EF 600mm f/4L IS USM</b>	3°30' - 2°20' - 4°10'	17 / 13	8	32	5.5 / 18	0.12	USM <sup>1</sup>	52 Drop-in	168.0 / 6.6 x 456.0 / 18.0	5,360 / 11.8 lb.	0.14 - 0.02	0.17 - 0.05	ET-160	Lens Case 600	-
<b>EF 1200mm f/5.6L USM</b>	1°45' - 1°10' - 2°05'	13 / 10	8	32	14 / 45.9	0.09	USM	48 Drop-in	228.0 / 9.0 x 836.0 / 32.9	16,500 / 36.4 lb.	0.12 - 0.01	0.13 - 0.02	Built-in	Exclusive	-
<b>EF 50mm f/2.5 Compact Macro</b>	40° - 27° - 46°	9 / 8	6	32	0.23 / 0.8	0.50	AFD	52	67.8 / 2.7 x 63.0 / 2.5	280 / 9.9	0.74 - 0.24	1.04 - 0.54	-	LHP-C10	ES-C9 / LP814
<b>Life-Size Converter EF</b>	- - - - -	4 / 3	-	-	0.24 / 0.8	1.00	-	-							



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