



System Assessment and Validation for Emergency Responders (SAVER)

Underwater Cameras Market Survey Report

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System Assessment and Validation for Emergency Responders

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FOREWORD

The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders making procurement decisions. Located within the Science and Technology Directorate (S&T) of DHS, the SAVER Program conducts objective assessments and validations on commercially available equipment and systems and develops knowledge products that provide relevant equipment information to the emergency responder community. The SAVER Program mission includes:

- Conducting impartial, practitioner-relevant, operationally oriented assessments and validations of emergency response equipment
- Providing information, in the form of knowledge products, that enables decision-makers and responders to better select, procure, use, and maintain emergency response equipment.

SAVER Program knowledge products provide information on equipment that falls under the categories listed in the DHS Authorized Equipment List (AEL), focusing primarily on two main questions for the responder community: “What equipment is available?” and “How does it perform?” These knowledge products are shared nationally with the responder community, providing a life- and cost-saving asset to DHS, as well as to Federal, state, and local responders.

The SAVER Program is supported by a network of Technical Agents who perform assessment and validation activities. As a SAVER Program Technical Agent, the Space and Naval Warfare Systems Center (SPAWARSYSCEN) Atlantic has been tasked to provide expertise and analysis on key subject areas, including communications, sensors, security, weapon detection, and surveillance, among others. In support of this tasking, SPAWARSYSCEN Atlantic developed this report to provide emergency responders with information gathered during a market survey of commercially available underwater cameras, which fall under AEL reference number 04MD-01-UCAM titled Camera, Underwater (Still/Video).

For more information on the SAVER Program or to view additional reports on underwater cameras or other technologies, visit www.firstresponder.gov/SAVER.

POINTS OF CONTACT

SAVER Program

U.S. Department of Homeland Security

Science and Technology Directorate

FRG Stop 0203

245 Murray Lane

Washington, DC 20528-0215

E-mail: saver@hq.dhs.gov

Website: www.firstresponder.gov/SAVER

Space and Naval Warfare Systems Center Atlantic

Advanced Technology and Assessments Branch

P.O. Box 190022

North Charleston, SC 29419-9022

E-mail: ssc_lant_saver_program.fcm@navy.mil

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1. INTRODUCTION

Underwater cameras are valuable tools used by public safety divers to document underwater accidents, crime scenes, and security inspections. To provide emergency responders with information on underwater cameras, the System Assessment and Validation for Emergency Responders (SAVER) Program conducted a market survey.

This market survey report is based on information gathered from August 2014 through August 2015 from vendors, Internet research, an emergency responder focus group, and a government issued Request for Information (RFI) that was posted on the Federal Business Opportunities website. For inclusion in this report, the underwater cameras had to meet the following criteria:

- Digital
- Commercially available, removable storage media
- Waterproof to at least 30 feet as a stand-alone camera or using an included housing produced by the same vendor.

Due diligence was performed to develop a report that is representative of products in the marketplace.

2. UNDERWATER CAMERAS OVERVIEW

There are different types of cameras that can be used by public safety divers for underwater photography/videography, but both action cameras and compact digital cameras are capable of capturing and storing video and still images. Some cameras are capable of capturing still images while capturing video. Cameras may be inherently waterproof or placed in underwater housings to protect them. Mounts, interchangeable lenses, filters, and external lighting options are some accessories that may be available for customizing the camera.

2.1 Underwater Camera Types

Action cameras primarily record video of activity in which the user needs hands-free operation. As such, action cameras are usually small and have a variety of mounting options. They are also capable of capturing still images. Many underwater action cameras are ruggedized and include a housing to protect against water and/or shock.

Compact digital cameras primarily capture still images but are also capable of capturing video. They feature modes that optimize the camera settings for various image content. Some also feature a full manual mode to give the photographer full control over all camera settings. Many underwater compact digital cameras are waterproof and/or shock resistant without a housing.

2.2 Housings

A variety of underwater housings are available to fit nearly any camera. Even if a camera is already waterproof, a housing may be desired to increase the depth rating. Although non-waterproof cameras used with underwater housings tend to have a higher resolution than those designed for underwater use, the controls on the housing may be difficult to master. Underwater housings may block a camera's viewfinder entirely; however, when an underwater

camera is equipped with a display screen, the screen is typically visible through an acrylic window in the housing. For a camera that is not waterproof, it is important to review and consider its warranty terms and conditions before deciding to place it in a housing for use in dive operations.

3. PRODUCT INFORMATION

This section provides information on 34 underwater cameras that range in price from \$90 to \$700. They all feature a 1-year warranty, except for Midland[®] Radio Corporation's XTC400VP, which features a 3-year warranty. All cameras include a built-in rechargeable battery or user-replaceable rechargeable battery pack. Replacement battery packs are camera specific and may be available from multiple vendors. All cameras save still images in JPEG file format. Nikon[®] Inc.'s Nikon 1[™] AW1 also saves to Nikon Electronic Format (NEF) RAW and NEF RAW + JPEG. Olympus Corporation of the Americas TG-4 also saves to RAW. All cameras are shock resistant, except for the GoPro[®] Inc. cameras. The SeaLife[®] cameras, UltraMax Enterprises Inc.'s camera, and Monoprice Inc.'s MHD Sport 2.0 Wi-Fi Action Camera and MHD Sport 2.0 Wi-Fi Action Camera + Live View RF Wrist Remote are shock resistant when inside the housing. All cameras also have a standard tripod mount/adaptor, except for the GoPro Inc. cameras, which have a proprietary mount. All action cameras have a fixed-focus lens. Table 3-1 provides general product specifications, broken out separately for action and compact digital cameras. The subsequent sections provide product specific information, accessories included with purchase, and accessories available for an additional cost. Note that some accessories are not intended for underwater use. Product information presented in this section was obtained directly from vendors and their websites. The information has not been independently verified by the SAVER Program.

Table 3-1. Underwater Cameras Specifications

Vendor	Product	MSRP	Maximum Angle of View	Optical Zoom	Macro Mode	Depth Rating (feet)	Maximum Image Resolution (megapixels)	Maximum Video Resolution (pixels)	Video File Format	Photo Extraction Software Included	Maximum Removeable Data Storage (GB)	Display	Built-In Battery
Action Cameras													
Contour LLC	Contour+2	\$300	170°	5x		196 ¹	5	1920x1080	MPEG-4	✓	32 (Class 4)	No Display	✓
	ContourROAM3	\$200	170°	5x		30	5	1920x1080	MPEG-4	✓	32 (Class 4)	No Display	✓
GoPro Inc.	HERO	\$130	150°	No		131 ¹	5	1920x1080	MPEG-4	✓	32 (Class 10)	No Display	✓
	HERO+ LCD	\$300	150°	No		131 ¹	8	1920x1080	MPEG-4	✓	64 (Class 10 or UHS-1)	1.5" LCD	✓
	HERO3 White	\$200	170°	5x		131 ¹	5	1920x1080	MPEG-4	✓	64 (Class 4) ²	No Display	✓
	HERO3+ Silver	\$300	170° ³	5x		131 ¹	10	1920x1080	MPEG-4	✓	64 (Class 10)	No Display	✓
	HERO4 Black	\$500	170° ³	5x		131 ¹	12	3840x2160	MPEG-4	✓	64 (Class 10 or UHS-1)	No Display	✓
	HERO4 Session Standard Edition	\$400	150°	No		33 ¹	8	1920x1440	MPEG-4	✓	64 (Class 10 or UHS-1)	No Display	✓
	HERO4 Silver	\$400	170° ³	5x		131 ¹	12	3840x2160	MPEG-4	✓	64 (Class 10 or UHS-1)	1.8" LCD Touch	✓

See page 6 for notes and definitions of the abbreviations used throughout this matrix.

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Vendor	Product	MSRP	Maximum Angle of View	Optical Zoom	Macro Mode	Depth Rating (feet)	Maximum Image Resolution (megapixels)	Maximum Video Resolution (pixels)	Video File Format	Photo Extraction Software Included	Maximum Removeable Data Storage (GB)	Display	Built-In Battery
Action Cameras													
Intova	ConneX	\$285	140°	5x		200	12	1920x1080	MPEG-4		32 (Class 10)	1.5" TFT LCD	✓
	EDGE X	\$315	160°	5x		330	12	1920x1080	MPEG-4		64 (Class 10)	1.5" TFT LCD	
	NOVA HD	\$210	140°	5x		330	12	1920x1080	MPEG-4		32 (Class 6) ⁴	1.5" TFT	✓
Midland Radio Corporation	XTC400VP	\$250	105°	5x		275 ¹	12	1920x1080	MPEG-4		32 (Class 6)	No Display	✓
Monoprice Inc.	MHD 2.0 Action Camera	\$90	170°	No		33	5	1920x1080	MOV, MPEG-4	✓	32 (Class 6)	No Display	✓
	MHD Sport 2.0 Wi-Fi Action Camera	\$160	140°	No		196 ¹	16	1920x1080	MOV, MPEG-4	✓	32 (Class 6)	0.8" OLED	
	MHD Sport 2.0 Wi-Fi Action Camera + Live View RF Wrist Remote	\$200	140°	No		196 ¹	16	1920x1080	MOV, MPEG-4	✓	32 (Class 6)	0.8" OLED (Camera), 1.3" OLED (RF Wrist Remote)	
Oregon Scientific Inc.	ATC9K HD Action Camera	\$250	130°	5x		66	5	1920x1080	MOV	✓	32 (Class 4)	1.5" TFT LCD	
UltraMax Enterprises Inc.	Riff 1080P Full HD Sport/Action Camera	\$230	140°	No		132 ¹	10	1920x1080	MOV		32 (Class 10)	1.8" TFT LCD	✓

See page 6 for notes and definitions of the abbreviations used throughout this matrix.

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Vendor	Product	MSRP	Maximum Angle of View	Optical Zoom	Macro Mode	Depth Rating (feet)	Maximum Image Resolution (megapixels)	Maximum Video Resolution (pixels)	Video File Format	Photo Extraction Software Included	Maximum Removeable Data Storage (GB)	Display	Built-In Battery
Compact Digital Cameras													
Canon USA Inc.	PowerShot D20	\$300	75°	5x	✓	33	12	1920x1080	MOV	✓	No Maximum (Class 4)	3.0" TFT LCD	
	PowerShot D30	\$330	75°	5x	✓	82	12	1920x1080	MOV	✓	No Maximum (Class 6)	3.0" TFT LCD	
Fujifilm Corporation	FinePix XP80	\$230	140°	5x	✓	50	16	1920x1080	MOV	✓	128 (Class 10)	2.7" LCD	✓
Nikon Inc.	COOLPIX AW120	\$250	84°	5x	✓	59	16	1920x1080	MOV, MPEG-4	✓	128 (Class 6)	3.0" OLED	
	Nikon 1 AW1	\$700	72°	2.5x		49	14	1920x1080	MOV	✓	64 (Class 6)	3.0" TFT LCD	
Olympus Corporation of the Americas	TG-3	\$350	Unknown	4x	✓	50	16	1920x1080	AVI, MOV	✓	64 (Class 10)	3.0" LCD	
	TG-4	\$380	83°	4x	✓	50	16	1920x1080	MOV, MPEG-4	✓	128 (Class 10)	3.0" LCD	✓
	TG-850	\$200	Unknown	5x	✓	33	16	1920x1080	MOV	✓	128 (Class 10)	3.0" LCD	
	TG-860	\$250	80°	5x	✓	50	16	1920x1080	MOV	✓	128 (Class 10)	3.0" LCD	✓
Panasonic Corporation of North America	LUMIX Wi-Fi Enabled Tough Adventure Camera DMC-TS6A	\$300	NP	4.6x	✓	43	16	1920x1080	AVCHD, MPEG-4	✓	32 (Class 4)	3.0" TFT LCD	✓

See page 6 for notes and definitions of the abbreviations used throughout this matrix.

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Vendor	Product	MSRP	Maximum Angle of View	Optical Zoom	Macro Mode	Depth Rating (feet)	Maximum Image Resolution (megapixels)	Maximum Video Resolution (pixels)	Video File Format	Photo Extraction Software Included	Maximum Removeable Data Storage (GB)	Display	Built-In Battery
Compact Digital Cameras													
Ricoh Imaging Company Ltd.	WG-4 GPS	\$380	NP	4x	✓	45	16	1920x1080	MPEG-4	✓	NP	3.0" TFT LCD	✓
	WG-30W	\$300	NP	5x	✓	39	16	1920x1080	MPEG-4 AVC		NP	2.7" LCD	✓
	WG-M1	\$200	160°	No		33	14	1920x1080	MOV		NP	1.5" LCD	✓
SeaLife	DC1400	\$399	51° ⁵	5x	✓	200 ¹	14	1280x720	AVI		32 (Class 6)	3.0" LTPS TFT LCD	✓
	DC1400 Reef Edition	\$599	111°										
Sony Electronics Inc.	Cyber-Shot Digital Camera TX30	\$228	130°	5x	✓	33	18	1920x1080	AVCHD, MPEG-4		64 (Class 4)	3.3" OLED Touchscreen	✓
<p>Notes:</p> <p>✓—product is equipped with corresponding feature</p> <p>Blank cell—product is not equipped with corresponding feature</p> <p>NP—information not provided</p> <p>Video File Format—Advanced Video Coding (AVC); AVC High Definition (AVCHD); Audio Video Interleave (AVI); Apple Quick Time Movie (MOV); Moving Picture Experts Group (MPEG-4)</p> <p>Maximum Removable Data Storage (GB) —Ultra High Speed (UHS)</p> <p>Display—liquid crystal display (LCD); low temperature polysilicon (LTPS); organic light-emitting diode (OLED); thin-film transistor (TFT)</p>								<p>¹Included underwater housing/waterproof case is required for use.</p> <p>²Class 10 required for 0.5 second Time-Lapse Video mode.</p> <p>³At 1080 pixels, user also has the option to switch to a narrow (90°) or medium (127°) angle of view.</p> <p>⁴Class 10 required for high definition (HD) video recording.</p> <p>⁵Angle of view is 51° underwater and 68° on land.</p>					

Information in the table is based on data gathered from vendors and their websites from August 2014 through August 2015.

3.1 Action Cameras

3.1.1 Contour LLC Contour+2

The Contour+2 is a fixed-focus camera that costs \$300, which includes an underwater housing, a 4GB SD card, a USB cable, a profile mount, a rotating flat surface mount, a lens cap, a protective sleeve, a user manual, software, and a 1-year warranty. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.1.2 Contour LLC ContourROAM3

The ContourROAM3 is a fixed-focus, waterproof camera that costs \$200, which includes an 8GB SD card, a USB cable, a profile mount, a rotating flat surface mount, a lens cap, a protective sleeve, a user manual, software, and a 1-year warranty. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.1.3 GoPro Inc. HERO

The HERO is a fixed-focus camera that costs \$130, which includes a standard underwater housing that is integrated with the camera, a USB cable, a quick-release buckle, a curved adhesive mount, a flat adhesive mount, a user manual, a quick-start guide, software, and a 1-year warranty. This product also includes an interchangeable backdoor for the housing; however, it is not waterproof. The skeleton backdoor is used for access to camera ports, cooling, and optimal audio capture. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.1.4 GoPro Inc. HERO+ LCD

The HERO+ LCD is a fixed-focus camera that costs \$300, which includes a standard underwater housing that is integrated with the camera, a skeleton backdoor, a micro USB cable, a mounting buckle, a curved adhesive mount, a flat adhesive mount, a user manual, a quick-start guide, software, and a 1-year warranty. This product also includes an additional interchangeable backdoor for the housing; however, it is not waterproof. The touch backdoor has a thin plastic layer across the back that allows use of the touch screen while in the housing. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.1.5 GoPro Inc. HERO3 White

The HERO3 White is a fixed-focus camera that costs \$200, which includes a standard underwater housing, a micro USB to USB cable, a quick-release buckle, a curved adhesive mount, a flat adhesive mount, a quick-start guide, software, and a 1-year warranty. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.1.6 GoPro Inc. HERO3+ Silver

The HERO3+ Silver is a fixed-focus camera that costs \$300, which includes a standard underwater housing, a micro USB to USB cable, a quick-release buckle, a vertical quick-release buckle, a curved adhesive mount, a flat adhesive mount, a 3-way pivot arm, a quick-start guide, software, and a 1-year warranty. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.1.7 GoPro Inc. HERO4 Black

The HERO4 Black is a fixed-focus camera that costs \$500, which includes a standard underwater housing, a skeleton backdoor, a USB cable, a quick-release buckle, a curved adhesive mount, a flat adhesive mount, a 3-way pivot arm, a quick-start guide, software, and a 1-year warranty. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.1.8 GoPro Inc. HERO4 Session Standard Edition

The HERO4 Session Standard Edition is a fixed-focus camera that costs \$400, which includes a standard frame, a low-profile frame, a micro USB cable, a curved adhesive mount, a flat adhesive mount, a ball-joint mounting buckle, a mounting buckle with hardware, a quick-start guide, software, and a 1-year warranty. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.1.9 GoPro Inc. HERO4 Silver

The HERO4 Silver is a fixed-focus camera that costs \$400, which includes a standard underwater housing, a skeleton backdoor, a touch backdoor, a USB cable, a quick-release buckle, a curved adhesive mount, a flat adhesive mount, a 3-way pivot arm, a quick-start guide, software, and a 1-year warranty. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.1.10 Intova® ConneX™

The ConneX is a fixed-focus, waterproof camera that costs \$285, which includes a USB cable, a radio frequency (RF) remote controller, a lens cap, and a 1-year warranty. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.1.11 Intova EDGE X

The EDGE X is a fixed-focus, waterproof camera that costs \$315, which includes a USB cable, a float strap, an anti-glare hood, silicone grease, and a 1-year warranty. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.1.12 Intova NOVA HD

The NOVA HD is a fixed-focus, waterproof camera that costs \$210, which includes a USB cable, an RF remote controller, a lens cap, and a 1-year warranty. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.1.13 Midland Radio Corporation XTC400VP

The XTC400VP is a fixed-focus camera that costs \$250, which includes an underwater housing, a micro USB cable, a basic adhesive mount, a mini spider mount, a user manual, and a 3-year warranty. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.1.14 Monoprice Inc. MHD 2.0 Action Camera

The MHD 2.0 Action Camera is a fixed-focus, waterproof camera that costs \$90, which includes a mini USB cable, a neoprene carry bag, a handlebar mount, a mounting clip, a mounting clip ball joint, a mounting clip screw key, a security tether, a carabiner, a user manual, software, and a 1-year warranty. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.1.15 Monoprice Inc. MHD Sport 2.0 Wi-Fi® Action Camera

The MHD Sport 2.0 Wi-Fi Action Camera is a fixed-focus camera that costs \$160, which includes a waterproof case, a micro USB charging cable, a USB wall charger, a vented rear door, a waterproof case rear door, a flat adhesive mounting socket, a curved adhesive mounting socket, a swivel T Tip, a T Tip adapter, an adhesive anchor, six anti-fog inserts, a hook and loop strap, a security tether, a safety lock, a user manual, software, and a 1-year warranty. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.1.16 Monoprice Inc. MHD Sport 2.0 Wi-Fi Action Camera + Live View RF Wrist Remote

The MHD Sport 2.0 Wi-Fi Action Camera + Live View RF Wrist Remote is a fixed-focus camera that costs \$200, which includes an RF wrist remote and an RF wrist remote charging cable in addition to what is included with the MHD Sport 2.0 Wi-Fi Action Camera. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.1.17 Oregon Scientific® Inc. ATC9K HD Action Camera

The ATC9K HD Action Camera is a fixed-focus, waterproof camera that costs \$250, which includes a USB cable, an HDMI cable, a long silicone strap, a long Velcro strap, a helmet grip (to attach silicone and Velcro straps), a handlebar mount, a tripod mount, a rubberized patch, a Velcro patch, a lens cap, a remote control, a carrying bag, a user manual, a quick-start guide, software, and a 1-year warranty. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.1.18 UltraMax Enterprises Inc. Riff 1080P Full HD Sport/Action Camera

The Riff 1080P Full HD Sport/Action Camera is a fixed-focus camera that costs \$230, which includes an underwater housing, a USB charging cable, a curved adhesive mount, a flat adhesive mount, a helmet strap mount, a bike-rack/roll bar mount, a horizontal connector, a vertical connector, three thumb screws, and a 1-year warranty. No accessories for an additional cost were provided.



3.2 Compact Digital Cameras

3.2.1 Canon® USA Inc. PowerShot D20

The PowerShot D20 is a waterproof camera that costs \$300, which includes a USB cable, a wrist strap, a strap mount, an AC battery charger, a user manual, software, and a 1-year warranty. The camera has manual, automatic, and macro focus modes. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.2.2 Canon USA Inc. PowerShot D30

The PowerShot D30 is a waterproof camera that costs \$330, which includes a wrist strap, an AC battery charger, a basic user manual, software, and a 1-year warranty. The camera has manual, automatic, and macro focus modes. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.2.3 Fujifilm Corporation FinePix XP80

The FinePix XP80 is a waterproof camera that costs \$230, which includes a USB cable, a hand strap, an AC power adapter with plug adapter, an owner's manual, software, and a 1-year warranty. The camera has automatic and macro focus modes. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.2.4 Nikon Inc. COOLPIX® AW120

The COOLPIX AW120 is a waterproof camera that costs \$250, which includes a USB cable, a neck strap, an AC battery charger, a cleaning brush, a user manual, software, and a 1-year warranty. The camera has automatic and macro focus modes. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.2.5 Nikon Inc. Nikon 1 AW1

The Nikon 1 AW1 is a waterproof camera that costs \$700, which includes a USB cable, a camera strap, an AC battery charger, a 1 NIKKOR® AW 11-27.5mm f/3.5-5.6 removable lens with lens cap, a body cap to prevent dust from entering the camera when a lens is not attached, an O-ring, an O-ring protector, a user manual, software, and a 1-year warranty. The camera has manual and automatic focus modes. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.2.6 Olympus Corporation of the Americas TG-3

The TG-3 is a waterproof camera that costs \$350, which includes a USB cable, a wrist strap, an AC battery charger, a user manual on CD, a quick-start guide, waterproof instructions, software, and a 1-year warranty. The camera has automatic and macro focus modes. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.2.7 Olympus Corporation of the Americas TG-4

The TG-4 is a waterproof camera that costs \$380, which includes a USB cable, a wrist strap, an AC adapter, a user manual on CD, a quick-start guide, software, and a 1-year warranty. The camera has automatic and macro focus modes. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.2.8 Olympus Corporation of the Americas TG-850

The TG-850 is a waterproof camera that costs \$200, which includes a USB cable, a wrist strap, an AC battery charger, a user manual on CD, a quick-start guide, waterproof instructions, software, and a 1-year warranty. The camera has automatic and macro focus modes. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.2.9 Olympus Corporation of the Americas TG-860

The TG-860 is a waterproof camera that costs \$250, which includes a USB cable, a premium wrist strap, an AC adapter, a user manual on CD, a quick-start guide, waterproof instructions, software, and a 1-year warranty. The camera has manual, automatic, and macro focus modes. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.2.10 Panasonic Corporation of North America LUMIX Wi-Fi Enabled Tough Adventure Camera DMC-TS6A

The LUMIX Wi-Fi Enabled Tough Adventure Camera DMC-TS6A is a waterproof camera that costs \$300, which includes a USB cable, a hand strap, a battery charger, an AC cable, software, and a 1-year warranty. The camera has automatic and macro focus modes. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.2.11 Ricoh Imaging Company Ltd. WG-4 GPS

The WG-4 GPS is a waterproof camera that costs \$380, which includes a USB cable, a carabiner strap, a power adapter, a CD-ROM with software, and a 1-year warranty. The camera has manual, automatic, and macro focus modes. No accessories for an additional cost were provided.



3.2.12 Ricoh Imaging Company Ltd. WG-30W

The WG-30W is a waterproof camera that costs \$300, which includes a USB cable, a strap, a macro stand, a power adapter, and a 1-year warranty. The camera has manual, automatic, and macro focus modes. No accessories for an additional cost were provided.



3.2.13 Ricoh Imaging Company Ltd. WG-M1

The WG-M1 is a fixed-focus, waterproof camera that costs \$200, which includes a USB cable, a carabiner strap, a WG flat adhesive mount, a lens protector, an underwater lens protector, a power adapter, an operating manual on CD, a quick-start guide, and a 1-year warranty. No accessories for an additional cost were provided.



3.2.14 SeaLife DC1400

The DC1400 costs \$399, which includes an underwater housing with a wrist strap and lens cap, a USB cable, a wrist strap for the camera, an audio/video (AV) cable, an AC battery charger, international plug adapters, a flash link optical cable adapter, a flash diffuser with strap, a camera pouch, a two-pack of moisture removal/drying agents, a cleaning brush, a lens cloth, a user manual, a quick-start guide, and a 1-year warranty. The camera has automatic and macro focus modes. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.2.15 SeaLife DC1400 Reef Edition

The DC1400 Reef Edition costs \$599, which includes an accessory fisheye wide angle lens and a travel case in addition to what is included with the DC1400. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



3.2.16 Sony Electronics Inc. Cyber-Shot Digital Camera TX30

The Cyber-Shot Digital Camera TX30 is a waterproof camera that costs \$228, which includes a micro USB cable, a wrist strap, an AC adapter, a user manual, and a 1-year warranty. The camera has automatic and macro focus modes. Accessories available for an additional cost are listed in the accessory table in [Appendix A](#).



4. VENDOR CONTACT INFORMATION

Additional information on the underwater cameras included in this market survey report can be obtained from the vendors listed in Table 4-1.

Table 4-1. Vendor Contact Information

Vendor	Phone Number	Website
Canon USA Inc.	(800) 652-2666	www.usa.canon.com
Contour LLC	(888) 250-8768	http://contour.com
Fujifilm Corporation	(800) 800-3854	www.fujifilmusa.com
GoPro Inc.	(888) 600-4659	www.gopro.com
Intova	(877) 837-0074	www.intova.net
Midland Radio Corporation	(816) 241-8500	https://midlandusa.com
Monoprice Inc.	(877) 271-2592	www.monoprice.com
Nikon Inc.	(800) 645-6687	www.nikonusa.com
Olympus Corporation of the Americas	(888) 553-4448	www.olympusamerica.com
Oregon Scientific Inc.	(800) 853-8883	www.oregonscientific.com
Panasonic Corporation of North America	(800) 211-7262	http://shop.panasonic.com
Ricoh Imaging Company Ltd.	(800) 877-0155	www.ricoh-imaging.co.jp/english/index.html
SeaLife	(800) 257-7742	www.sealife-cameras.com
Sony Electronics Inc.	(877) 865-7669	http://store.sony.com
UltraMax Enterprises Inc.	(877) 228-5872	www.ultramaxdive.com

5. SUMMARY

This market survey report provides information on 34 underwater cameras, which are classified as either an action camera or a compact digital camera. In selecting a camera type, it is important to consider available camera settings and modes as well as if the camera is capable of capturing still images while capturing video. The cameras also vary greatly on cost, depth rating, and maximum image resolution. Underwater housings can be used to increase the depth rating. Underwater housings are often available from the vendor or can be purchased from third-party vendors. When purchasing an underwater housing, it is important to review the warranty terms and conditions for both the housing and camera. Many cameras can also be customized by purchasing accessories, such as a variety of mounting options, external flash options, and interchangeable lenses.

Emergency responder agencies that consider purchasing underwater cameras should carefully research each product's overall capabilities and limitations in relation to their agency's operational needs.

APPENDIX A. ACCESSORIES

ACTION CAMERAS

Contour LLC Contour+2, Contour LLC ContourROAM3

Accessory	MSRP
360 Degree Helmet Mount	\$20
Bar Mount	\$20
Bowl Mount	\$20
Camera Charging Kit	\$30
Camouflaged Camera Case	\$30
Contour+2 Battery (Contour+2 only)	\$20
Flex Strap Mount	\$30
Goggle Strap Mount	\$15
Hat Mount	\$15
Headband Mount	\$15
Outdoor Bundle Mount	\$40
Picatinny Rail Mount	\$30
Pole Mount	\$20
Profile Mount	\$10
Roll Bar Mount	\$30
Rotating Flat Mount Adhesive	\$5
Rotating Flat Surface Mount	\$15
Suction Cup Mount	\$30
Surfboard Mount	\$20
Surfboard Mount Base	\$10
Vented Helmet Mount	\$15

GoPro Inc. HERO, GoPro Inc. HERO+ LCD

Accessory	MSRP
3-Way Mount	\$70
Adjustable Music Mount	\$70
Auto Charger	\$30
Bag Pack (5 Pack)	\$20
Bodyboard Mount	\$20
Camera Tethers	\$20
Casey (Camera, Mounts, and Accessories Case)	\$50
Chesty (Chest Harness)	\$40
Curved and Flat Adhesive Mounts (3 of Each)	\$20
Fetch (Dog Harness)	\$60

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Floaty Backdoor	\$20
Gooseneck (Used with a Variety of Mounts to Allow Adjustment of Camera Angle)	\$20
Hand, Wrist, Arm, and Leg Mount	\$60
Handlebar/Seatpost/Pole Mount	\$20
Head Strap and Quick Clip	\$20
Helmet Front Mount	\$15
Jaws Flex Clamp	\$50
Junior Chesty (Chest Harness)	\$30
Magenta Dive Filter	\$70
Microphone Stand Mount	\$15
Night Vision Goggle (NVG) Mount	\$30
Red Dive Filter	\$70
Removable Instrument Mounts (3 Pack)	\$20
Replacement Parts (Includes Curved Adhesive Mount, Flat Adhesive Mount, Quick-Release Buckle, Vertical Quick-Release Buckle, Thumb Screw, 3-Way Pivot Arm, Locking Plug, and Camera Tether)	\$20
Roll Bar Mount	\$30
Side Mount	\$15
Smart Remote (HERO+ LCD only)	\$80
Smart Remote Accessory Kit (HERO+ LCD only)	\$20
Smart Remote Attachment Keys and Rings (5 of Each) (HERO+ LCD only)	\$10
Smart Remote Charging Cable (HERO+ LCD only)	\$20
Sportsman Mount	\$70
Suction Cup	\$40
Surfboard Mounts (2 Pack)	\$20
The Handler (Floating Hand Grip)	\$30
The Tool (Thumb Screw Wrench and Bottle Opener)	\$5
Tripod Mounts (Includes Tripod Mount and Quick-Release Tripod Mount)	\$10
Vented Helmet Strap Mount	\$15
Wall Charger	\$40

GoPro Inc. HERO3 White, GoPro Inc. HERO3+ Silver, GoPro Inc. HERO4 Black, GoPro Inc. HERO4 Silver

Accessory	MSRP
3.5mm Microphone Adapter	\$20
3-Way Mount	\$70
AC Battery Charger	\$40
Anti-Fog Inserts (12 Pack)	\$15
BacPac Backdoor Kit	\$10
Bag Pack (5 Pack)	\$20
Battery BacPac	\$50
Blackout Housing	\$50
Bodyboard Mount	\$20
Camera Tethers	\$20
Chesty (Chest Harness)	\$40
Combo Cable (Composite Video Output, 3.5mm Microphone Input, and USB Connectivity)	\$40
Curved and Flat Adhesive Mounts (3 of Each)	\$20
DC Battery Charger	\$30
Dive Housing (Waterproof to 197 Feet)	\$60
Dual AC Battery Charger	\$30
Fetch (Dog Harness)	\$60
Filter (Various Colors Available)	\$70
Floaty Backdoor	\$20
Gooseneck (Used with a Variety of Mounts to Allow Adjustment of Camera Angle)	\$20
Handlebar/Seatpost/Pole Mount	\$20
Head Strap and Quick Clip	\$20
Helmet Front Mount	\$15
Jaws: Flex Clamp	\$50
Junior Chesty (Chest Harness)	\$30
LCD Touch BacPac	\$80
Lens Replacement Kit	\$20
Microphone Stand Mount	\$15
Micro HDMI Cable	\$20
Mini USB Composite Cable	\$20
Night Vision Goggle (NVG) Mount	\$30
Protective Lens	\$20
Protective Lens and Covers (HERO3+ Silver, HERO4 Black, HERO4 Silver)	\$20
Rechargeable Battery	\$20
Removable Instrument Mounts (3 Pack)	\$20

Replacement Parts (Includes Curved Adhesive Mount, Flat Adhesive Mount, Quick-Release Buckle, Vertical Quick-Release Buckle, Thumb Screw, 3-Way Pivot Arm, Locking Plug, and Camera Tether)	\$20
Roll Bar Mount	\$30
Side Mount	\$15
Skeleton Housing	\$50
Smart Remote	\$80
Smart Remote Accessory Kit	\$20
Smart Remote Attachment Keys and Rings (5 of Each)	\$10
Smart Remote Charging Cable	\$20
Sportsman Mount	\$70
Standard Housing (Waterproof to 131 Feet)	\$50
Suction Cup	\$40
Surfboard Mounts (2 Pack)	\$20
The Frame Mount	\$40
The Handler (Floating Hand Grip)	\$30
The Tool (Thumb Screw Wrench and Bottle Opener)	\$5
Tripod Mounts (Includes Tripod Mount and Quick-Release Tripod Mount)	\$10
Vented Helmet Strap Mount	\$15
Wrist Housing	\$50

GoPro Inc. HERO4 Session Standard Edition

Accessory	MSRP
Auto Charger	\$30
Bag Pack (5 Pack)	\$20
Camera Tethers	\$20
Casey (Camera, Mounts, and Accessories Case)	\$50
Floaty	\$20
Lens Replacement Kit	\$40
Smart Remote	\$80
The Tool (Thumb Screw Wrench and Bottle Opener)	\$5
Wall Charger	\$40

Intova® ConneX™, Intova EDGE X, Intova NOVA HD

Accessory	MSRP
Adhesive Helmet Mount	\$18
Adhesive Mount	\$19
Bar-Pole Mount	\$27
Base Tray Double (Light Mounting System)	\$79

Accessory	MSRP
Body Board Mount	\$24
Camera Bag	Contact Vendor
Camera Care Kit	\$15
Camera Float Strap	Contact Vendor
Camera Hand Strap	\$16
Camera U Connector (Attaches Camera to Flex Arm)	\$13
Chest Strap	\$31
Colored Lens Port Rings (4 Pack) (NOVA HD only)	\$10
Compact Extension Pole	\$30
Extension Pole	\$32
Face Mask Mount	\$20
Fiber Optic Cable (EDGE X only)	\$31
Flex Arm (Base Tray Attachment)	Contact Vendor
Floating Multi Grip	\$18
Helmet Mount 2	\$27
Helmet Mount 2N	\$25
Helmet Mount 3	\$18
Intova Pod (Flexible Mount)	\$20
Macro/Close Up Lens	\$48
Mini Flex Arm (Base Tray Attachment)	\$29
Mount Adapter	\$11
O-Ring Remover	\$3
Red Filter	\$57
Silica Sticker	\$11
Silicone Grease	\$5
Spear Gun Mount	\$45
Stay Slim Extra Arm (For Stay Slim With Flex Arm)	Contact Vendor
Stay Slim with Flex Arm (To Mount Strobes or Video Lights to an Underwater Camera Housing)	\$8
Suction Cup Mount	\$14
Surf Board Mount	\$23
Tripod Mount Adapter	\$10
Tripod to Tripod Mount (Standard Tripod Thread on Each Side to Mix and Match Mounting Accessories)	\$13
Universal Adapter (U.S., U.K., EU, and AU AC Adapters and Two USB Charging Ports)	\$24
White Balance Wrist Band	\$17

Midland Radio Corporation XTC400VP

Accessory	MSRP
31.5" Monopod Mount	\$60
44" Monopod Mount	\$100
AC Battery Charger	\$20
Basic Adhesive Mount	\$30
Belt Mount	\$20
Bow Mount	\$20
DC Battery Charger	\$20
Goggle Mount	\$20
Handlebar Mount	\$35
Head Strap Mount	\$30
Micro USB Cable	\$20
Mini Spider Mount	\$30
Minipod Mount	\$40
Picatinny Rail Mount	\$20
RAM Magnetic Mount	\$50
RAM Motorcycle/All-Terrain Vehicle (ATV) Mount	\$40
RAM Roll Bar Mount	\$50
Rechargeable Battery	\$40
Replacement Lens Kit	\$30
Rifle Mount	\$70
Shotgun Mount	\$70
Spider Mount	\$30
Suction Cup Mount	\$30
Surf Mount	\$30
Tree Mount	\$20
Tripod Mount	\$20
Underwater Housing	\$40
USB Mini Cable	\$10
Vented Helmet Strap Mount	\$20
Visor Mount	\$20

Monoprice Inc. MHD 2.0 Action Camera

Accessory	MSRP
Board Mount	\$15
Camera Helmet Mount	\$14
Suction Cup Mount	\$19
Universal Helmet/Rollbar/Vehicle Mount	\$20

Monoprice Inc. MHD Sport 2.0 Wi-Fi® Action Camera, Monoprice Inc. MHD Sport 2.0 Wi-Fi Action Camera + Live View RF Wrist Remote

Accessory	MSRP
Adhesive Flat Surface Mount	\$8
Bike Mount	\$10
Board Mount	\$15
Camera Floaty	\$4
Camera Helmet Mount	\$14
Camera Holder	\$9
Chest Mount	\$10
Dash Camera Suction Mount	\$9
Dive Case	\$20
Lithium-Ion Rechargeable Battery	\$8
Lithium-Ion Rechargeable Battery with Housing	\$21
Rail Mount	\$11
Suction Cup Mount	\$19
Telescope Mount	\$8
Universal Helmet/Rollbar/Vehicle Mount	\$20
Vented Head Mount	\$9
Wi-Fi AA Battery Pack	\$16

Oregon Scientific® Inc. ATC9K HD Action Camera

Accessory	MSRP
ATC Camera Mount Conversion Kit	\$15
ATC9K Cold Weather Pouch	\$25
ATC9K GPS Module	\$30
Delkin Fat Gecko Mini Action Camera Mount	\$30
Delkin Fat Gecko Suction Action Camera Mount	\$56

COMPACT DIGITAL CAMERAS**Canon® USA Inc. PowerShot D20, Canon USA Inc. PowerShot D30**

Accessory	MSRP
AC Adapter Kit	\$70
AC Battery Charger	\$50
Accessory Kit (Carrying Case, Silicone Jacket, Float, Shoulder Strap, and Carabiner Strap) (PowerShot D20 only)	\$130
Audio/Video (AV) Cable	\$16
Battery Pack	\$60
Deluxe Leather Case (PowerShot D20 only)	\$20
High-Power Flash	\$130 to \$150
Interface Cable	\$16
Mini-HDMI Cable	\$80
Underwater Case (For Deeper Diving – 130 Feet) (PowerShot D20 only)	\$330

Fujifilm Corporation FinePix XP80

Accessory	MSRP
Action Camera Lens	\$120
Lithium-Ion Rechargeable Battery	\$50

Nikon Inc. COOLPIX® AW120

Accessory	MSRP
AC Battery Charger	\$38 to \$42
Chest Strap	\$45
Cleaning Brush	\$8
Floating Strap	\$10
Nikon COOLPIX Case	\$30
Rechargeable Battery	\$38
Silicone Case	\$19
Silicone Jacket	\$28
Sport Case	\$35
Strap	\$12
USB Cable	\$12

Nikon Inc. Nikon 1 AW1

Accessory	MSRP
1 NIKKOR 6.7-13mm f/3.5-5.6 VR Lens	\$500
1 NIKKOR 10-100mm f/4.0-5.6 VR Lens	\$550
1 NIKKOR 11-27.5mm f/3.5-5.6 Lens	\$190
1 NIKKOR 10mm f/2.8 Lens	\$250
1 NIKKOR 18.5mm f/1.8 Lens	\$190
1 NIKKOR AW 11-27.5mm f/3.5-5.6 Lens (Underwater)	\$150
1 NIKKOR AW 10mm f/2.8 Lens (Underwater)	\$200
1 NIKKOR VR 10-100mm f/4.5-5.6 PD-ZOOM Lens	\$750
1 NIKKOR VR 10-30mm f/3.5-5.6 Lens	\$190
1 NIKKOR VR 10-33mm f/3.5-5.6 PD-ZOOM Lens	\$300
1 NIKKOR VR 30-110mm f/3.8-5.6 Lens	\$250
1 NIKKOR VR 70-300 f/4.5-5.6 Lens	\$1,000
1 NIKKOR 32mm f/1.2 Lens	\$900
52mm Screw-On Neutral Color (NC) Filter	\$50
55mm Screw-On NC Filter	\$40
62mm Circular Polarizer II	\$152
62mm Filter NC	\$70
62mm Soft Focus Filter	\$105
AC Battery Charger	\$54 to \$118
AW 40.5 NC Screw-On Filter	Contact Vendor
Bayonet Hood	\$27
Bayonet Lens Hood	\$25
Body Cap	\$7
D-SLR Close Up Lens (52mm)	\$50
Front Lens Cap (LC-N40.5)	\$8
Front Lens Cap (LC-N52)	\$10
Front Lens Cap (LC-N55)	\$10
Front Lens Cap (LC-N62)	\$10
Leather Hand Strap	\$20
Leather Neck Strap	\$30
Lens Hood (HB-N101)	\$18
Lens Hood (HB-N102)	\$33
Lens Hood (HB-N103)	\$21
Lens Hood (HB-N104)	\$28
Lens Hood (HB-N105)	\$25
Lens Hood (HB-N110)	\$22
Lens Hood (HN-N102)	\$30
NC 40.5 Neutral Color 40.5mm Filter	\$41

Accessory	MSRP
Neck Strap	\$14
O-Ring	\$15
O-Ring Protector	\$5
O-Ring Remover	\$9
Power Connector	\$48
Rear Lens Cap (LF-N1000)	\$6
Rear Lens Cap (LF-N2000)	\$7
Rechargeable Battery	\$63
Rubber Cap	\$5
Screw-On Lens Hood (HN-N103)	\$38
Silicone Grease	\$10
Silicone Jacket	\$37
Snap-On Front Lens Cap 72mm	\$21
Soft Lens Case	\$23
Tripod Mount	\$60
Underwater Speedlight (SB-N10)	\$750
USB Cable	\$8
Water-Resistant Body Case	\$42
Water-Resistant Hand Strap	\$23
Water-Resistant Neck Strap	\$28
Wireless Mobile Adapter	\$60

Olympus Corporation of the Americas TG-3, Olympus Corporation of the Americas TG-4

Accessory	MSRP
40.5mm Protective Lens Filter (For Use with the Telephoto Tough Lens Pack and Adapter)	\$40
Adapter (For Attaching Waterproof Converters and 40.5mm Filters)	\$20
Adjustable Wrist Strap Water Ready	\$5
Carabiner Camera Strap	\$10
Clamshell Case for Tough Cameras	\$30
Fashion Floating Strap	\$20
Fisheye Tough Lens Pack and Adapter	\$140
Floating Foam Strap	\$20
Leather Body Jacket	\$50
LED Light Guide	\$41
Lithium-Ion Battery Charger	\$60
Lithium-Ion Rechargeable Battery	\$40
Mini Tripod	\$10
Neoprene Tough Case	\$13

Accessory	MSRP
Premium Tough Accessory Pack (Water-Resistant Semi-Hard Camera Case with Carabiner, Belt Loop, and Red Float Strap)	\$40
Silicone Jacket	\$21
Small Tough Beach Bag	\$10
Telephoto Tough Lens Pack and Adapter	\$130
Tough Mini Backpack	\$25
Tough Sport Holder	\$35
Underwater Housing (For Deeper Diving – 150 Feet)	\$300
Underwater Strobe/Replacement Accessories	\$500
Universal Tough Case	\$35
USB Download Cable	\$13

Olympus Corporation of the Americas TG-850, Olympus Corporation of the Americas TG-860

Accessory	MSRP
Adjustable Wrist Strap Water Ready	\$5
Carabiner Camera Strap	\$10
Clamshell Case for Tough Cameras	\$30
Fashion Floating Strap	\$20
Floating Foam Strap	\$20
LCD Hood for Underwater Housing	\$30
Lithium-Ion Battery Charger	\$80
Lithium-Ion Rechargeable Battery	\$45
Mini Tripod	\$10
Neoprene Case with Rubber Grip	\$13
Neoprene Tough Case	\$13
Premium Tough Accessory Pack (Water-Resistant Semi-Hard Camera Case with Carabiner, Belt Loop, and Red Float Strap)	\$40
Silicone Jacket (TG-860 only)	\$20
Small Tough Beach Bag	\$10
Tough Accessory Pack (Float Strap and Case)	\$25
Tough Mini Backpack	\$25
Tough Sport Holder	\$35
Underwater Housing (For Deeper Diving – 150 Feet)	\$250
Universal Tough Case	\$35
USB Download Cable	\$13

Panasonic Corporation of North America LUMIX Wi-Fi Enabled Tough Adventure Camera DMC-TS6A

Accessory	MSRP
AC Adapter	\$80
AC Cable	\$7
Audio/Video (AV) Cable	\$10
Battery Charger	\$36
Battery Pack	\$40
Hand Strap	\$3
USB Cable	\$6

SeaLife DC1400, SeaLife DC1400 Reef Edition

Accessory	MSRP
AquaPod (Monopod)	\$70
AquaPod Mini	\$50
Buoyancy Control Weight	\$40
Charger Kit (Spare Battery, Charging Tray, and AC Cable)	\$50
Fisheye Wide Angle Lens	\$279
Flex-Connect Adapter for Digital Pro Flash	\$40
Flex-Connect Adapter for GoPro Cameras	\$30
Flex-Connect Arm	\$50
Flex-Connect Arm Conversion Kit	\$20
Flex-Connect Ball Joint Adapter	\$50
Flex-Connect Cold Shoe Mount	\$50
Flex-Connect Dual Tray	\$50
Flex-Connect Dual Tray Kit	\$270
Flex-Connect Grip	\$40
Flex-Connect Handle	\$30
Flex-Connect Single Tray	\$40
Flex-Connect Single Tray Kit	\$150
Flex-Connect Y-S Adapter	\$30
Float Strap	\$20
Pro Case	\$40
Rechargeable Battery	\$30
Sea Dragon 1200 Photo/Video/Dive Light	\$300
Sea Dragon 2000 Photo/Video/Dive Light	\$500
Sea Dragon Flash	\$400
Wrist Strap	\$15

Sony Electronics Inc. Cyber-Shot Digital Camera TX30

Accessory	MSRP
Attachment Grip	\$15
Battery Charger	\$50
Battery Charger and Battery	\$60
Battery Charger, Battery, and USB Cable	\$70
Carrying Case	\$25
Circular Polarizing Filter	\$90
Compact Battery Charger	\$60
Compact Remote Control Tripod	\$130
Digital Photo Printer Media	\$55
Filter Adapter	\$30
Floating Strap	\$30
LCD Protective Cover	\$15
Lithium-Ion Battery	\$40
Micro to HDMI Cable – 4'7"	\$30
Micro to HDMI Cable – 9'6"	\$45
Mini-High Speed HDMI Cables	\$30 to \$45
Premium Jacket Cases	\$85 to \$100
Rechargeable Battery Pack	\$50
Soft Carrying Cases	\$12 to \$40
Travel DC Charger Kit	\$60
Tripods	\$35 to \$60
USB Charger	\$20
Vertical Type Soft Carrying Case	\$120
XLR Microphone Adapter Kit	\$600