

Alexa Fluor™ and Alexa Fluor™ Plus Reactive Esters

(Succinimidyl/NHS, TFP, and SDP esters)

Catalog Numbers A10168, A30000, A30100, A16302, A10169, A20000, A20100, A37570, AF001, AF002, A37563, A30052, A30002, A20001, A20101MP, A20002, A20102, A37571, A20009, A20109, A37564, AF003, AF004, A20003, A20103, A37572, A20004, A20104, A37565, A30050, A20005, A20105, A37573, A20006, A20106, A37566, AF005, AF006, A20007, A37574, A20008, A20108, A37567, A20010, A20110, A37575, A20011, A20111, A37568, AF007, AF008, A30051, A37569

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WARNING! Read the Safety Data Sheets (SDSs) and follow the handling instructions. Wear appropriate protective eyewear, clothing, and gloves. SDSs are available from thermofisher.com/support.

Product description

The Alexa Fluor™ and Alexa Fluor™ Plus Reactive Esters belong to the series of amine-reactive fluorescent dyes used to conjugate proteins, amine-modified oligonucleotides, or other amine-containing compounds. They are superior fluorophores with fluorescence emissions that cover the visible spectrum and extend beyond it.

Features of Alexa Fluor™ and Alexa Fluor™ Plus reactive dyes include:

- **Brighter fluorescence:** Alexa Fluor™ conjugates exhibit brighter fluorescence compared to other spectrally similar fluorophores.
- **Greater photostability:** Alexa Fluor™ conjugates demonstrate greater photostability, allowing for longer imaging sessions.
- **Water solubility:** The dyes in this series are water soluble, making them suitable for biological environments.
- **pH insensitivity:** Alexa Fluor™ dyes are pH-insensitive from pH 4–10, aiding researchers working in various biological conditions.
- **Standalone reagents:** The esters (succinimidyl, commonly known as NHS, as well as TFP and SDP esters) of the Alexa Fluor™ and Alexa Fluor™ Plus reactive dyes are available as standalone reagents (see Table 2), allowing for custom labeling schemes.
- **Selective linking:** These esters provide an efficient and convenient way to selectively link the superior Alexa Fluor™ dyes to primary amines (R-NH₂) located on peptides, proteins, or amine-modified nucleic acids.
- **Low reactivity:** They also exhibit significantly lower reactivity with aromatic amines, alcohols, and phenols, including tyrosine and histidine, compared to other reactive moieties.
- **Preferred reagents:** NHS, TFP, and SDP esters are favored over other amine-reactive reagents, like isothiocyanates, for attaching fluorophores to amine-containing molecules due to the stability of the amide bonds formed, which are as robust as peptide bonds.

Contents and storage

Table 1

Material	Amount	Storage and stability ^[1]
Alexa Fluor™ and Alexa Fluor™ Plus Reactive Esters	3 × 100 µg	• Store at ≤ -20°C • Desiccate
	1 mg	
	5 mg	
	25 mg	

^[1] Protect from light. The stability of these reagents lasts for 6–12 months, when stored properly.

Note: Approximate fluorescence excitation and emission maxima: See Table 4.

Procedural guidelines

- The 5 mg and 25 mg unit sizes are packaged by weighing, resulting in negligible reactivity loss. The post-packaging reactivity is equivalent to the HPLC purity reported on the product's certificate of analysis.
- Certain amount of loss is expected in reactivity during packaging of 100 µg and 1 mg unit sizes.
- For 100 µg and 1 mg unit sizes, Life Technologies™ ensures reactivity is ≥50% after packaging.
- The method used to determine reactivity may not directly reflect the actual reactivity in specific labeling reactions.
- In protein quantitation, some level of protein-to-protein variability is expected due to the unique characteristics of each individual protein.

Alexa Fluor™ and Alexa Fluor™ Plus Reactive Esters

Table 2

Alexa Fluor™ dye	Ester type	Unit size			
		3 × 100 µg	1 mg	5 mg	25 mg
Alexa Fluor™ 350	NHS	NA	NA	A10168	NA
Alexa Fluor™ 405	NHS	NA	A30000	A30100	NA
Alexa Fluor™ 420	NHS	A16302 ***	NA	NA	NA
Alexa Fluor™ 430	NHS	NA	NA	A10169	NA
Alexa Fluor™ 488	NHS	NA	A37570	A20100	NA
Alexa Fluor™ Plus 488	TFP	A37570 *	AF001 *	AF002 *	A37563 *
Alexa Fluor™ Plus 488	SDP	NA	A30052 *	NA	NA
Alexa Fluor™ 514	NHS	NA	A30002	NA	NA
Alexa Fluor™ 532	NHS	NA	A20001	A20101MP	NA
Alexa Fluor™ 546	NHS	NA	A20002	A20102	NA
Alexa Fluor™ 555	NHS	A37571	A20009	A20109	A37564
Alexa Fluor™ Plus 555	NHS	—	AF003	AF004	—
Alexa Fluor™ 568	NHS	NA	A20003	A20103	NA
Alexa Fluor™ 594	NHS	A37572	A20004	A20104	A37565
Alexa Fluor™ Plus 594	SDP	*	*	*	*
Alexa Fluor™ 610–X	NHS	NA	A30050	NA	NA
Alexa Fluor™ 633	NHS	NA	A20005	A20105	NA
Alexa Fluor™ 647	NHS	A37573	A20006	A20106	A37566
Alexa Fluor™ Plus 647	NHS	—	AF005	AF006	—
Alexa Fluor™ 660	NHS	NA	A20007	NA	NA
Alexa Fluor™ 680	NHS	A37574	A20008	A20108	A37567
Alexa Fluor™ Plus 680	NHS	—	—	—	—
Alexa Fluor™ 700	NHS	NA	A20010	A20110	NA
Alexa Fluor™ 750	NHS	A37575	A20011	A20111	A37568
Alexa Fluor™ Plus 750	NHS	—	AF007	AF008	—
Alexa Fluor™ 790	NHS	A30051 **	NA	A37569 ***	NA
Alexa Fluor™ Plus 800	NHS	—	—	—	—

Note: NA = Not available. *See “Technical Tip: Greater Control and More Reaction Time with SDP Ester” ([X30052](#)) on the product pages.

Available as a single vial of 100 µg. *Available as a 10 mg unit size.

Prepare reactive dye solution

- Immediately before use, dissolve the ester in high-quality, anhydrous dimethylsulfoxide (DMSO) such as [D12345](#) or dimethylformamide (DMF).
- The reconstituted reactive dye solution is relatively unstable, particularly when exposed to moisture.
- Use molecular sieves to eliminate water contamination in these solvents before mixing with the reactive dye.

Note: Although Alexa Fluor™ and Alexa Fluor™ Plus Reactive Esters are water soluble, they hydrolyze into the non-reactive free acid in aqueous solutions.

Alexa Fluor™ and Alexa Fluor™ Plus Reactive Esters protocol

- Refer to the generic protocol for conjugating proteins and amine-modified nucleic acids with reactive dyes in the user guide, Amine-Reactive Probes ([MAN0001774](#)). Additional labeling protocol details are available at <http://thermofisher.com>.
- Alexa Fluor™ 633 succinimidyl ester is unsuitable for labeling nucleic acids.
- For DNA labeling, refer to the protocol using aminoallyl dUTP and Alexa Fluor™ succinimidyl esters in the user guide, Aminoallyl dUTP ([MAN0012968](#)).
- For researchers who prefer the convenience of optimized conjugation protocols, Table 3—provides the Alexa Fluor™ succinimidyl esters as components of several protein and nucleic labeling kits.

Store the reactive dye solution

- The dye can hydrolyze quickly when exposed to moisture or air.
- Use the dye immediately after preparation to maintain reactivity.
- If storage is necessary, dissolve the lyophilized dye under anhydrous conditions, aliquot it, and store it at –80°C with a desiccant.
- Avoid freeze/thaw cycles.

Table 3 Alexa Fluor™ and Alexa Fluor™ Plus protein and nucleic acid labeling kits

Alexa Fluor™ dye	Microscale protein labeling kit	Antibody labeling kit for 1 mg	Antibody labeling kit for 100 µg	ReadyLabel™ antibody labeling kit	Zip rapid antibody labeling kit	ARES™ DNA labeling kit
Alexa Fluor™ 350	—	A10170	A88061	—	—	—
Alexa Fluor™ 420	—	—	—	R10725	—	—
Alexa Fluor™ 488	A30006	A10235	A88062	R10709	Z11233	A21665
Alexa Fluor™ 514	—	—	—	R10720	—	—
Alexa Fluor™ 532	—	A10236	A88063	—	—	—
Alexa Fluor™ 546	—	A10237	A88064	—	—	—
Alexa Fluor™ 555	A30007	A20174	A88065	—	Z11234	A21677
Alexa Fluor™ Plus 555	—	—	—	R10721	—	—
Alexa Fluor™ 568	—	A10238	A88066	—	—	—
Alexa Fluor™ 594	A30008	A10239	A88067	R10722	—	A21669
Alexa Fluor™ 633	—	A20170	—	—	—	—
Alexa Fluor™ 647	A30009	A20173	A88068	R10710	Z11234	A21676
Alexa Fluor™ 660	—	A20171	—	—	—	—
Alexa Fluor™ 680	—	A20172	A88069	—	—	—
Alexa Fluor™ 700	—	—	—	R10723	—	—
Alexa Fluor™ 750	—	—	—	—	—	—
Alexa Fluor™ Plus 750	—	—	—	R10724	—	—
Alexa Fluor™ 790	—	—	A88070	—	—	—

Optical properties of Alexa Fluor™ dyes

Table 4 Physical characteristics of the Alexa Fluor™ dyes

Dye	Molecular weight	λ_{max}^*	Em*	$\epsilon^\dagger$	CF ₂₈₀ ‡	CF ₂₆₀ §
Alexa Fluor™ 350	410	346 nm	445 nm	19000	0.19	0.25
Alexa Fluor™ 405	1028	400 nm	424 nm	34000	0.70	0.23
Alexa Fluor™ 420	687	420 nm	500 nm	26000	0.17	0.37
Alexa Fluor™ 430	702	434 nm	541 nm	16000	0.28	ND
Alexa Fluor™ 488	643	494 nm	517 nm	73000	0.11	0.30
Alexa Fluor™ Plus 488	885	495 nm	519 nm	71000	0.11	0.30
Alexa Fluor™ 514	714	517 nm	542 nm	80000	0.18	0.31
Alexa Fluor™ 532	721	532 nm	554 nm	81000	0.09	0.24
Alexa Fluor™ 546	1260	554 nm	570 nm	112000	0.12	0.21
Alexa Fluor™ 555	1250	555 nm	565 nm	150000	0.08	0.08
Alexa Fluor™ Plus 555	1102	557 nm	571 nm	150000	0.08	0.05
Alexa Fluor™ Plus 568	792	578 nm	603 nm	913000	0.46	0.45
Alexa Fluor™ 594	820	590 nm	617 nm	90000	0.56	0.43
Alexa Fluor™ Plus 594	1910	590 nm	616 nm	97000	0.57	0.30
Alexa Fluor™ 610-X	1285	603 nm	323 nm	132000	0.44	0.43
Alexa Fluor™ 633	1200	632 nm	647 nm	100000	0.55	ND
Alexa Fluor™ 647	1260	650 nm	665 nm	239000	0.03	0.00
Alexa Fluor™ Plus 647	1425	658 nm	681 nm	250000	0.04	0.00
Alexa Fluor™ 660	1100	663 nm	690 nm	132000	0.10	0.00
Alexa Fluor™ 680	1150	679 nm	702 nm	184000	0.05	0.00
Alexa Fluor™ Plus 680	1730	684 nm	703 nm	200000	0.11	0.10
Alexa Fluor™ 700	1400	699 nm	723 nm	192000	0.07	0.00
Alexa Fluor™ 750	1300	749 nm	775 nm	240000	0.04	0.00
Alexa Fluor™ Plus 750	1450	754 nm	777 nm	220000	0.03	0.02
Alexa Fluor™ 790	1750	785 nm	810 nm	260000	0.08	0.00
Alexa Fluor™ Plus 800	1685	783 nm	795 nm	250000	0.04	0.04

Note: Refer to [Fluorescence SpectraViewer](#) for additional information.

- *Fluorescence absorbance and emission maxima, in nm, conjugated to an IgG antibody.
- † Extinction coefficient at λ_{max} in $\text{cm}^{-1}\text{M}^{-1}$
- ‡ Correction factor for absorbance readings at 280 nm; for example, $A_{280,\text{actual}} = A_{280,\text{observed}} - (\text{CF}_{280} \times \lambda_{\text{max}})$.
- § Correction factor for absorbance readings at 260 nm; for example, $A_{260,\text{actual}} = A_{260,\text{observed}} - (\text{CF}_{260} \times \lambda_{\text{max}})$
- ND = Not determined

Related products

Catalog No.	Product
A88071	Antibody Labeling Kits for 100 µg, 3 × 20 to 100 µg
A88072	Antibody Labeling Kits for 1 mg, 3 × 0.5 to 1 mg
D12345	DMSO, Anhydrous, 10 × 3 mL

Troubleshooting and FAQs

Visit our online FAQ database for tips and tricks for conducting your experiment, troubleshooting information, and FAQs. The online FAQ database is frequently updated to ensure accurate and thorough content.

For troubleshooting information, to browse the database and search using keywords, visit thermofisher.com/faqs.

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Life Technologies Corporation | 29851 Willow Creek Road | Eugene, Oregon 97402 USA

For descriptions of symbols on product labels or product documents, go to thermofisher.com/symbols-definition.

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Revision	Date	Description
A	6 October 2025	Created new publication for Alexa Fluor™ and Alexa Fluor™ Plus Reactive Esters.

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