

AlphaLISA Epidermal Growth Factor Receptor Detection Assay

Product number: AL340 HV/C/F

Caution: For Laboratory Use. A research product for research purposes only.

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Product Information

- Application:** The AlphaLISA kit presented here is designed for the quantitative determination of Epidermal Growth Factor Receptor (EGFR) in cell culture media and human serum using a homogeneous AlphaLISA assay (no wash steps). The assay shows only marginal cross-reactivity with mouse EGFR and no detectable cross reactivity with erbB2, erbB3, and erbB4.
- Sensitivity:** Lower Detection Limit (LDL): 1.46 pg/mL
Lower Limit of Quantification (LLOQ): 5.1 pg/mL
EC₅₀: 32.9 ng/ml
- Dynamic range:** Kit designed to detect [EGFR] between: 1.46 – 300,000 pg/mL (Figure 1).

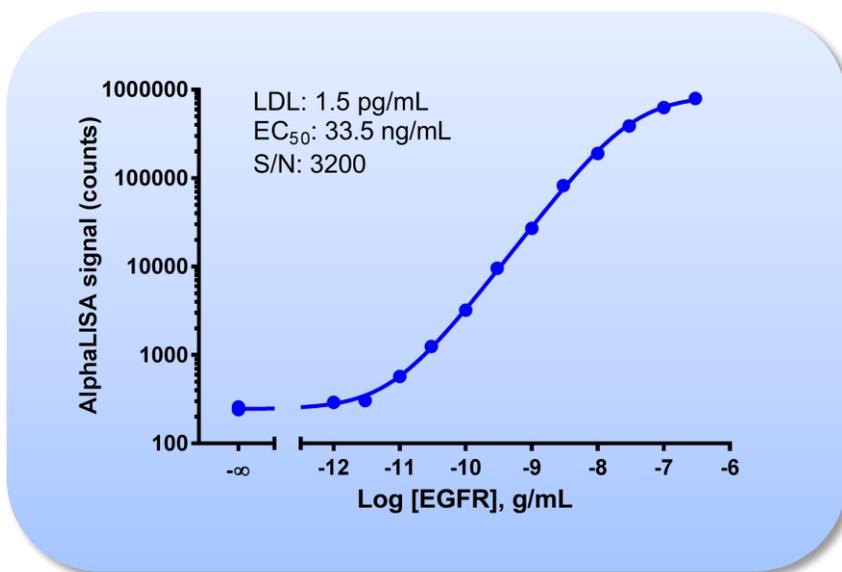


Figure 1. Typical sensitivity curve in AlphaLISA Hi-Block Buffer. The data was generated using a white Optiplate™-384 microplate and the EnVision® Multilabel Plate Reader 2103 with Alpha option.

- Storage:** Store kit in the dark at +4°C. The human EGFR analyte is stable for at least 6 months at 4°C. Store reconstituted analyte at 4°C short term or aliquot store at -20°C for long term storage. Limit the number of freeze-thaw cycles.
- Stability:** This kit is stable for at least 6 months from the manufacturing date when stored in its original packaging and the recommended storage conditions.

Quality Control

Lot to lot consistency is confirmed in an AlphaLISA assay. Maximum and minimum signals, EC₅₀ and LDL were measured on the EnVision Multilabel Plate Reader with Alpha option using the protocol described in this technical data sheet. We certify that these results meet our quality release criteria. Maximum counts may vary between bead lots and the instrument used, with no impact on LDL measurement.

Analyte of Interest

Epidermal Growth Factor Receptor (EGFR, Her1, ErbB1) is a 134 kDa cell surface receptor apart of a four member subfamily of receptor tyrosine kinases (erbB1, erbB2, erbB3, and erbB4). EGFR binds to a family of proteins called the epidermal growth factors, which upon association induces dimerization of the receptor and initiates signal transduction for the promotion of cell survival and growth. Mutations that cause EGFR overexpression have been linked with many different types of cancer such as lung cancer or gastrointestinal tract cancers. Measuring the EGFR levels is vital for the detection of these types of cancers and is also an important target for therapeutic intervention. The AlphaLISA kit presented here has been designed for the detection of EGFR in cell culture media and serum.

Description of the AlphaLISA Assay

AlphaLISA technology allows for the detection of molecules of interest in buffer, cell culture media, serum and plasma in a highly sensitive, quantitative, reproducible and user-friendly mode. In an AlphaLISA assay, a biotinylated Anti-Analyte Antibody binds to the Streptavidin-coated Alpha Donor beads, while another Anti-Analyte Antibody is conjugated to AlphaLISA Acceptor beads. In the presence of the analyte, the beads come into close proximity. The excitation of the Donor beads provokes the release of singlet oxygen molecules that triggers a cascade of energy transfers in the Acceptor beads, resulting in a sharp peak of light emission at 615 nm (Figure 2). Combining this assay with an AlphaPlex 545 or AlphaPlex 645 based kits will allow for the quantification of 2 (or more) analytes in the same well.

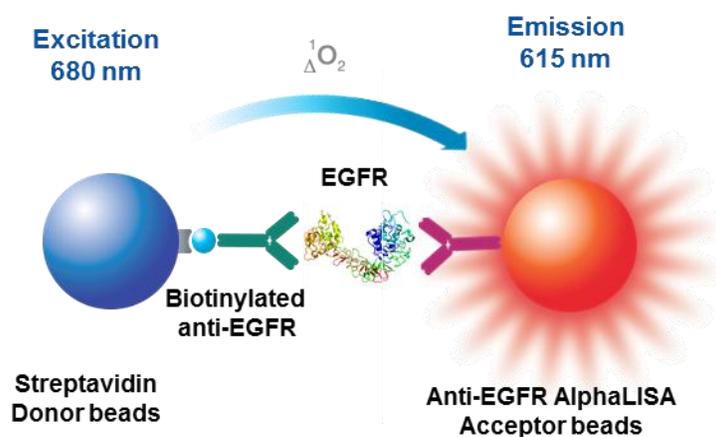


Figure 2. AlphaLISA assay principle.

Precautions

- The Alpha Donor beads are light-sensitive. All the other assay reagents can be used under normal light conditions. All Alpha assays using the Donor beads should be performed under subdued laboratory lighting (< 100 lux). Green filters (LEE 090 filters (preferred) or Roscolux filters #389 from Rosco) can be applied to light fixtures.
- All blood components and biological materials should be handled as potentially hazardous. The analyte included in this kit is from a source.
- Some analytes are present in saliva. Take precautionary measures to avoid contamination of the reagent solutions.
- The Biotinylated Anti-Analyte Antibody contains sodium azide. Contact with skin or inhalation should be avoided.

Kit Content: Reagents and Materials

Kit components	AL340HV (100 assay points ^{***})	AL340C (500 assay points ^{***})	AL340F (5000 assay points ^{***})
AlphaLISA Anti-EGFR Acceptor beads stored in PBS, 0.05% Proclin-300, pH 7.2	20 µL @ 5 mg/mL (1 brown tube, <u>white</u> cap)	50 µL @ 5 mg/mL (1 brown tube, <u>white</u> cap)	500 µL @ 5 mg/mL (1 brown tube, <u>white</u> cap)
Streptavidin (SA)-coated Donor beads stored in 25 mM HEPES, 100 mM NaCl, 0.05% Proclin-300, pH 7.4	80 µL @ 5 mg/mL (1 brown tube, <u>black</u> cap)	200 µL @ 5 mg/mL (1 brown tube, <u>black</u> cap)	2 x 1 mL @ 5 mg/mL (2 brown tubes, <u>black</u> caps)
Biotinylated Anti-EGFR Antibody stored in PBS, 0.1% Tween-20, 0.05% NaN ₃ , pH 7.4	20 µL @ 500 nM (1 tube, <u>black</u> cap)	50 µL @ 500 nM (1 tube, <u>black</u> cap)	500 µL @ 500 nM (1 tube, <u>black</u> cap)
Lyophilized Human EGFR *	0.3 µg, lyophilized (1 tube, <u>clear</u> cap)	0.3 µg, lyophilized (1 tube, <u>clear</u> cap)	0.3 µg, lyophilized (1 tube, <u>clear</u> cap)
AlphaLISA Hi-Block Buffer (10X)**	2 mL, 1 small bottle	10 mL, 1 small bottle	100 mL, 1 large bottle

* Please note that one EGFR analyte vial contains an amount of analyte sufficient for performing 10 standard curves. Additional vials can be ordered separately (cat # AL340S).

** Extra buffer can be ordered separately (cat # AL000C: 10 mL, cat # AL000F: 100 mL).

*** The number of assay points is based on an assay volume of 100 µL in 96-well plates (AL340HV) or 50 µL in 96- or 384-well assay plates using the kit components at the recommended concentrations.

Sodium azide should **not** be added to the stock reagents. High concentrations of sodium azide (> 0.001 % final in the assay) might decrease the AlphaLISA signal. Note that sodium azide from the Biotinylated Antibody stock solution will not interfere with the AlphaLISA signal (0.0001% final in the assay).

Specific additional required reagents and materials:

The following materials are recommended:

Item	Suggested source	Catalog #
TopSeal™-A Adhesive Sealing Film	PerkinElmer Inc.	6050195
EnVision®-Alpha Reader	PerkinElmer Inc.	-

Recommendations

General recommendations:

- The volume indicated on each tube is guaranteed for single pipetting. Multiple pipetting of the reagents may reduce the theoretical amount left in the tube. To minimize loss when pipetting beads, it is preferable not to pre-wet the tip.

- Centrifuge all tubes (including lyophilized analyte) before use to improve recovery of content (2000g, 10-15 sec).
- Re-suspend all reagents by vortexing before use.
- Use Milli-Q® grade H₂O (18 MΩ•cm) to dilute 10X AlphaLISA Hi-Block Buffer.
- When diluting the standard or samples, change tips between each standard or sample dilution. When loading reagents in the assay microplate, change tips between each standard or sample addition and after each set of reagents.
- When reagents are added to the microplate, make sure the liquids are at the bottom of the well.
- Small volumes may be prone to evaporation. It is recommended to cover microplates with TopSeal-A Adhesive Sealing Films to reduce evaporation during incubation. Microplates can be read with the TopSeal-A Film.
- AlphaLISA signal is detected using an EnVision Multilabel Reader equipped with the Alpha option using the following settings: Total Measurement Time: 550 ms, Laser 680 nm Excitation Time: 180 ms, Mirror: 640as (Barcode# 444), Emission Filter: Wavelength 570nm, bandwidth: 100nm, Transmittance 75%, (Barcode# 244).
- The standard curves shown in this technical data sheet are provided for information only. A standard curve must be generated for each experiment. The standard curve should be performed in AlphaLISA Hi-Block buffer.

Assay Procedure

IMPORTANT: PLEASE READ THE RECOMMENDATIONS BELOW BEFORE USE

- The protocol described below is an **example** for generating one standard curve in a 50 µL final assay volume (48 wells, triplicate determinations) and 452 samples. The protocols also include testing samples in 384 well plates. If different amounts of samples are tested, the volumes of all reagents must be adjusted accordingly, as shown in the table below. **** These calculations do not include excess reagents to account for losses during transfer of solutions or dead volumes.*
- The standard dilution protocol is provided for information only. As needed, the number of replicates or the range of concentrations covered can be modified.
- Use of four background points in triplicate (12 wells) is recommended when LDL/LLOQ is calculated. One background point in triplicate (3 wells) can be used when LDL/LLOQ is not calculated.

Format	# of data points	Volume					Plate recommendation
		Final	Sample	AlphaLISA beads	Biotin Antibody	SA-Donor beads	
AL340 HV	100	100 µL	10 µL	20 µL	20 µL	50 µL	White OptiPlate-96 (cat # 6005290) White ½ AreaPlate-96 (cat # 6005560)
AL340C	250	100 µL	10 µL	20 µL	20 µL	50 µL	White OptiPlate-96 (cat # 6005290) White ½ AreaPlate-96 (cat # 6005560)
	500	50 µL	5 µL	10 µL	10 µL	25 µL	White ½ AreaPlate-96 (cat # 6005560) White OptiPlate-384 (cat # 6007290) Light gray AlphaPlate™-384 (cat # 6005350)
	1 250	20 µL	2 µL	4 µL	4 µL	10 µL	Light gray AlphaPlate-384 (cat # 6005350) ProxiPlate™-384 Plus (cat # 6008280) White OptiPlate-384 (cat # 6007290)
	2 500	10 µL	1 µL	2 µL	2 µL	5 µL	Light gray AlphaPlate-1536 (cat # 6004350)
AL340F	5 000	50 µL	5 µL	10 µL	10 µL	25 µL	White ½ AreaPlate-96 (cat # 6005560) White OptiPlate-384 (cat # 6007290) Light gray AlphaPlate-384 (cat # 6005350)
	12 500	20 µL	2 µL	4 µL	4 µL	10 µL	Light gray AlphaPlate-384 (cat # 6005350) ProxiPlate-384 Plus (cat # 6008280) White OptiPlate-384 (cat # 6007290)
	25 000	10 µL	1 µL	2 µL	2 µL	5 µL	Light gray AlphaPlate-1536 (cat # 6004350)

Protocol for EGFR AlphaLISA Assay

3 Step Protocol – Dilution of standards in 1X AlphaLISA Hi-Block Buffer. The protocol described below is for one standard curve (48 wells) and 452 sample wells. *If a different amount of samples are tested, the volumes of all reagents have to be adjusted accordingly.*

Steps for Preparing Reagents

- 1) Preparation of 1X AlphaLISA Hi-Block Buffer:
Add 10 mL of 10X AlphaLISA Hi-Block Buffer to 90 mL H₂O.

2) Preparation of EGFR analyte standard dilutions:

- a. Reconstitute 0.3 ug lyophilized EGFR with 100 µl of water and vortexing briefly.
- b. Store unused analyte at 4°C or aliquot and place at -20°C for long term storage.
- c. Prepare standard dilutions as follows in 1X AlphaLISA H-Block Buffer (change tip between each standard dilution):

Tube	Vol. of EGFR (µL)	Vol. of diluent (µL) *	[EGFR] in standard curve	
			(g/mL in 5 µL)	(pg/mL in 5 µL)
A	10 µL of reconstituted EGFR	90	3.00E-07	300 000
B	60 µL of tube A	120	1.00E-07	100 000
C	60 µL of tube B	140	3.00E-08	30 000
D	60 µL of tube C	120	1.00E-08	10 000
E	60 µL of tube D	140	3.00E-09	3 000
F	60 µL of tube E	120	1.00E-09	1 000
G	60 µL of tube F	140	3.00E-10	300
H	60 µL of tube G	120	1.00E-10	100
I	60 µL of tube H	140	3.00E-11	30
J	60 µL of tube I	120	1.00E-11	10
K	60 µL of tube J	140	3.00E-12	3
L	60 µL of tube K	120	1.00E-12	1
M ** (background)	0	100	0	0
N ** (background)	0	100	0	0
O ** (background)	0	100	0	0
P ** (background)	0	100	0	0

* Dilute standards in diluent (e.g. 1X AlphaLISA Hi-Block Buffer).
At low concentrations of analyte, a significant amount of analyte can bind to the vial. Therefore, load the analyte standard dilutions in the assay microplate within 60 minutes of preparation.

** Four background points in triplicate (12 wells) are used when LDL is calculated. If LDL does not need to be calculated, one background point in triplicate can be used (3 wells).

3) Preparation of 5X Anti-EGFR AlphaLISA Acceptor beads (50 µg/mL):

- a. Prepare just before use.
- b. Add 50 µL of 5 mg/mL AlphaLISA Anti-EGFR Acceptor beads to 4950 µl of 1X AlphaLISA Hi-Block Buffer.

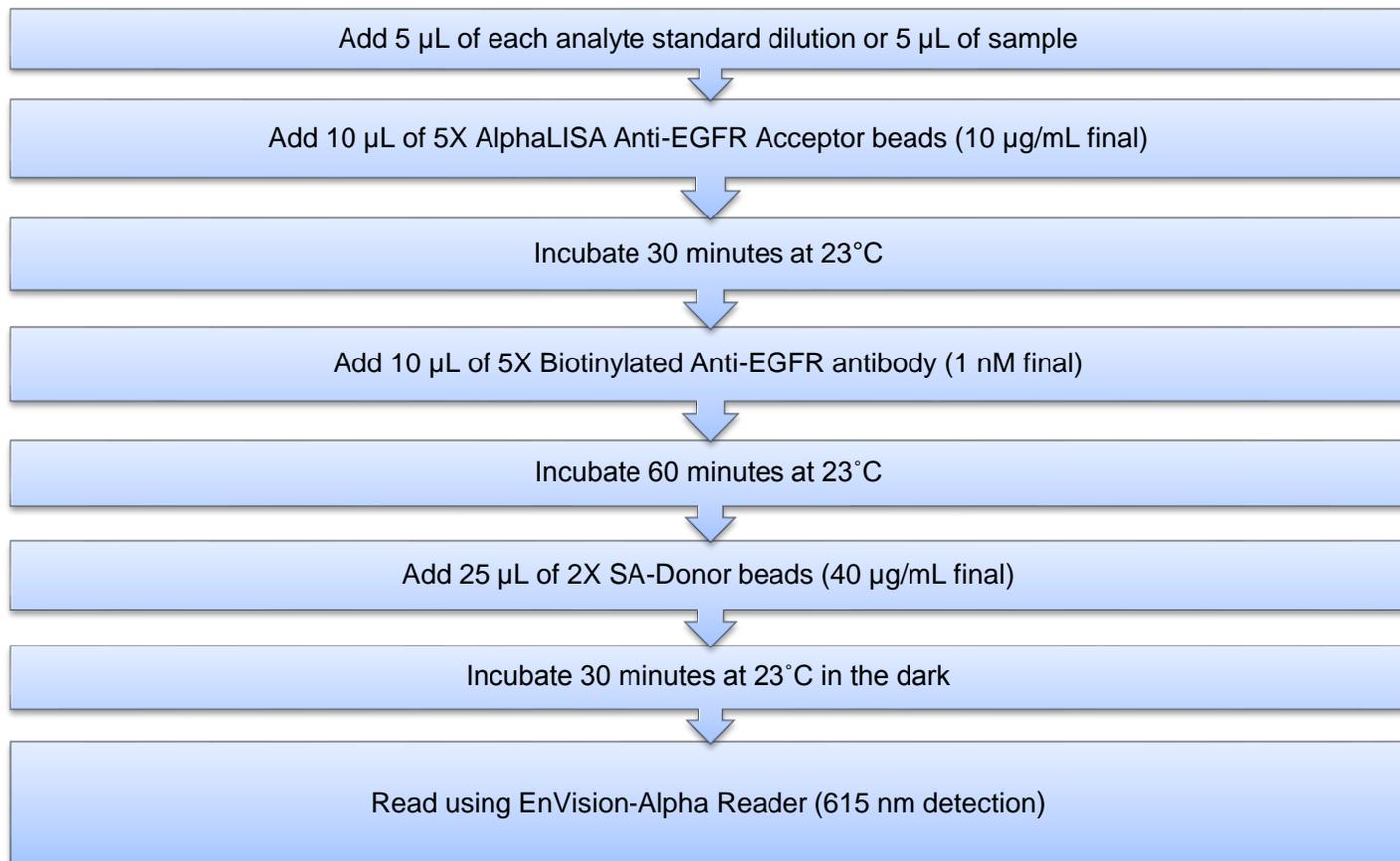
4) Preparation of 5X biotinylated Anti-EGFR Antibody (5 nM):

- a. Prepare just before use.
- b. Add 50 µL of 500 nM biotinylated Anti-EGFR Antibody to 4950 µl of 1X AlphaLISA Hi-Block Buffer.

5) Preparation of 2X Streptavidin (SA) Donor beads (80 µg/mL):

- a. Prepare just before use.
- b. Keep the beads under subdued laboratory lighting.
- c. Add 200 µL of 5 mg/mL SA-Donor beads to 12300 µL of 1X AlphaLISA Hi-Block Buffer.

6) In a white Optiplate (384 wells):



Read Settings: AlphaLISA signal is detected using an EnVision Multilabel Reader equipped with the Alpha option using the following settings: Total Measurement Time: 550 ms, Laser 680 nm Excitation Time: 180 ms, Mirror: 640as (Barcode# 444), Emission Filter: Wavelength 570nm, bandwidth: 100nm, Transmittance 75%, (Barcode# 244).

Data Analysis

- Calculate the average count value for the background wells.
- Generate a standard curve by plotting the AlphaLISA counts versus the concentration of analyte. A log scale can be used for either or both axes. No additional data transformation is required.
- Analyze data according to a nonlinear regression using the 4-parameter logistic equation (sigmoidal dose-response curve with variable slope) and a $1/Y^2$ data weighting (the values at maximal concentrations of analyte after the hook point should be removed for correct analysis).
- The LDL is calculated by interpolating the average background counts (12 wells without analyte) + 3 x standard deviation value (average background counts + (3xSD)) on the standard curve.
- The LLOQ as measured here is calculated by interpolating the average background counts (12 wells without analyte) + 10 x standard deviation value (average background counts + (10xSD)) on the standard curve. Alternatively, the true LLOQ can be determined by spiking known concentrations of analyte in the matrix and measuring the percent recovery, and then determining the minimal amount of spiked analyte that can be quantified within a given limit (usually +/- 20% or 30% of the real concentration).
- Read from the standard curve the concentration of analyte contained in the samples.

- If samples have been diluted, the concentration read from the standard curve must be multiplied by the dilution factor.

Assay Performance Characteristics

AlphaLISA assay performance described below was determined using the 3 step protocol.

Assay Sensitivity:

The LDL and LLOQ were calculated as described above. The values correspond to the lowest concentration of analyte that can be detected in a volume of 5 μ L using the recommended assay conditions.

LDL (pg/mL)	LLOQ (pg/mL)	Buffer/Cell culture media	# of experiments
1.5	5.1	AlphaLISA Hi-Block Buffer	8
2.6	9.4	DMEM+ 10% FBS	8
5.6	18.6	RPMI+ 10% FBS	8

- * Note that LDL/ LLOQ can be decreased (i.e. sensitivity increased) by increasing the volume of analyte in the assay (e.g. use 10 μ L of analyte in a final assay volume of 50 μ L).
- ** Only the analytes were prepared in Cell Culture media. All of other components were prepared in AlphaLISA Hi-Block Buffer.

Assay Precision:

The following assay precision data were calculated from the three independent assays using two different kit lots. In each lot, the analytes were prepared in AlphaLISA Hi-Block Buffer (HBB), DMEM medium, or RPMI medium supplemented with 10% FBS. Each assay consisted of one standard curve comprising 12 data points in triplicate and 12 background wells containing no analyte. The assays were performed in a 384-well format using AlphaLISA Hi-Block Buffer.

- Intra-assay precision:

The intra-assay precision was determined using 3 independent experiments for a total of 16 independent determinations in triplicate. CV% were calculated for each individual experiment then averaged. Shown is the average intra-experimental CV%.

EGFR	HBB	DMEM	RPMI
CV%	6	6	7

- Inter-assay precision:

The inter-assay precision was determined using the data across 3 independent experiments with 16 measurements in triplicate. CV% was calculated by comparing the same measurement in each experiment. The CV% for all 16 measurements was then averaged. Shown is the inter-experimental CV%.

EGFR	HBB	DMEM	RPMI
CV%	8	8	10

- Spike Recovery:

Three known concentrations of EGFR were spiked into AlphaLISA Hi-Block Buffer (HBB), DMEM medium or RPMI medium supplemented with 10% FBS. All samples, including non-spiked Hi-Block Buffer were measured in the assay. The average recovery was reported from the average of 12 wells and compared to a standard prepared in that diluent.

Spiked EGFR (ng/mL)	% Recovery		
	HBB	DMEM	RPMI
3	94	98	91
1	91	97	100
0.3	78	83	94

Human Serum Experiments

Pooled normal Human Serum (HS) was utilized and AlphaLISA Hi-Block Buffer (HBB) was used as the diluent. EGFR was detected in the normal Human Serum (data not shown). EGFR was expected to be present at detectable levels in HS from normal healthy subjects.

- Dilutional Linearity:

Dilutional linearity was determined by serial dilutions of Human Serum supplemented with 30 ng/mL of EGFR and then diluted in HBB. Each point was measured in triplicate.

Dilution Factor	% Recovery
1	27
2	48
4	72
8	86
16	100
32	114
64	111
128	112

- Spike Recovery:

Three known concentrations of EGFR were spiked into 8x diluted human serum. The average recovery was reported from the average of 12 wells and compared to a HBB standard.

EGFR Spike ng/mL	% Recovery
3	84
1	74

0.3	97
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Specificity

Cross-reactivity to other similar proteins was assessed for the AlphaLISA EGFR Kit by performing full 12 point curves in triplicate in AlphaLISA Hi-Block buffer. Cross reactivity percentages were calculated at the EC₅₀.

Protein	% Cross Reactivity
Human erbB2	0
Human erbB3	0
Human erbB4	0
Mouse EGFR	8.6

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