TECHNICAL DATA SHEET

AlphaLISA® Research Reagents

Research Use Only. Not for use in diagnostic procedures.

AlphaLISA KRAS G12C GTP binding kit

Product No.: AL3149 C/F

Contents

Product Information

Application: This kit is designed to assess competitors of GTP on KRAS G12C protein using a homogeneous no wash AlphaLISA binding assay.

Sensitivity: $IC_{50:}$ 33nM (average, using GDP). To calculate binding affinity (Ki) with the Cheng-Prusoff equation, use Kd_{ligand} of 80nM.

Signal to background ratio: 323 (average) using 30 nM GST-KRAS G12C protein and 60 nM biotinylated ligand

Kit contents: The kit contains 5 components: Glutathione AlphaLISA Acceptor beads, Streptavidin-coated Donor beads, Biotinylated KRAS ligand (GTP-biotin), GST tagged KRAS G12C protein and AlphaLISA PPI buffer.

Storage: The kit components must be stored at 4 ˚C in the dark. Reconstituted reagents can be aliquoted (not under 10µL) then frozen, and can be stored at -20°C or -80°C for 28 days. Avoid multiple freeze-thaw cycles.

Stability: This kit is stable for at least 6 months from the manufacturing date when stored in its original packaging (lyophilized) and the recommended storage conditions (+4°C).

Quality Control

Lot to lot consistency is confirmed in an AlphaLISA assay. Maximum and minimum signals 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 and minimum counts may vary between bead lots and the instrument used.

Analyte of Interest

KRAS is a small GTPase implicated in various biological processes, such as cell proliferation, cell survival, and cell metabolism. This proto-oncogene is well known to be mutated in many cancer subtypes, inducing an uncontrolled proliferation and cell metabolism modifications. It thereby contributes to the Warburg effect in cancer cells. Like the majority of small GTPases, KRAS binds to GDP in its inactive form or binds to GTP to switch to the active form. KRAS G12C is one of the most commonly present mutant forms in cancer which lead to a permanently active state of KRAS.

Identifying new KRAS / GTP competitors is therefore a relevant strategy to control biological processes involved in cancer growth by reducing the KRAS activity, as well as the associated pathways.

Description of the AlphaLISA Assay

The AlphaLISA detection of KRAS G12C binding uses Glutathione AlphaLisa acceptor beads to capture the GST-tagged KRAS G12C protein and Streptavidin-coated donor beads to capture the biotinylated ligand. Donor beads and acceptor beads come into proximity through ligand binding to KRAS G12C protein. Excitation of the Donor beads lead to the release of singlet oxygen that triggers a cascade of energy transfer reactions in the Acceptor beads, resulting in a sharp peak of light emission at 615 nm (Figure 1). The compounds being tested as GTP competitors, prevent the binding of the GTP-biotin ligand and AlphaLISA signal from occurring.

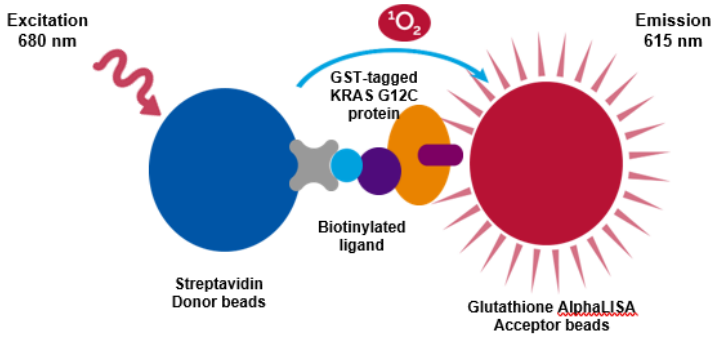


Figure 1. AlphaLISA Assay Principle.

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.

Kit Content: Reagents and Materials

Kit components	AL3149C*** (500 assay points)	AL3149F*** (5000 assay points)
Glutathione AlphaLISA Acceptor beads stored in 50 mM Tris pH 8.0, 150 mM NaCl, 0.1% Tween-20, 0.05% Kathon CG/ICP II	40 µL @ 5 mg/mL (1 brown tube, white cap)	400 µL @ 5 mg/mL (1 brown tube, white cap)
Streptavidin (SA)-coated Donor beads stored in 25 mM HEPES, 100 mM NaCl, 0.05% Kathon CG/ICP II, pH 7.4	40 µL @ 5 mg/mL (1 brown tube, black cap)	400 µL @ 5 mg/mL (1 brown tube, black cap)
Biotinylated KRAS ligand (GTP-biotin)*	869 ng lyophilized (1 tube, clear cap)	869 ng lyophilized (10 tubes, clear cap)

KRAS G12C protein (GST tagged)*	13.89 µg lyophilized (1 tube, clear cap)	13.89 µg lyophilized (10 tubes, clear cap)
AlphaLISA PPI Buffer (5X)**	10 mL, 1 small bottle	100 mL, 1 large bottle

* Reconstitute KRAS G12C protein and ligand in 100 µL Milli-Q® grade H_2O respectively. The reconstituted reagents should be used within 60 minutes.

** Extra buffer can be ordered separately (cat # AL015C: 10 mL, cat # AL015F: 100 mL).

*** The number of assay points is based on an assay volume of 20 µL in 384 well 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.

Specific additional required reagents and materials:

The following materials are recommended:

Item	Suggested source	Catalog #
TopSeal™-A Adhesive Sealing Film	PerkinElmer Inc.	6050185
AlphaPlate-384, Shallow Well (ProxiPlate)	PerkinElmer Inc.	6008350 6008359
EnVision®-Alpha Reader	PerkinElmer Inc.	-

The following reagent might be required as positive control for the experiments:

Item	Supplier	Catalog number
KRAS GTP binding Standard	PerkinElmer Inc. Cisbio	64BDKRASCDA

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 the beads by vortexing before use. Do not vortex the proteins.
- Use Milli-Q® grade H_2O to dilute 5X AlphaLISA PPI Buffer and to reconstitute the lyophilized 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 Plus Adhesive Sealing Films to reduce evaporation during incubation. Microplates can be read with the TopSeal-A Film.

- The AlphaLISA signal is detected with an EnVision Multilabel Reader equipped with the Alpha option using the AlphaScreen standard settings (e.g. Total Measurement Time: 550 ms, Laser 680 nm Excitation Time: 180 ms, Mirror: D640as, Emission Filter: M570w, Center Wavelength 570 nm, Bandwidth 100 nm, Transmittance 75%).
- AlphaLISA signal will vary with temperature and incubation time. For consistent results, identical incubation times and temperature should be used for each plate.

Competition Assay Procedure

IMPORTANT: PLEASE READ THE RECOMMENDATIONS BELOW BEFORE USE

- The protocol described below is an ***example*** for generating 1 dose response curve by using the KRAS GTP binding Standard in a 20 µL final assay volume per well (36 wells). These calculations do not include excess reagent to account for losses during transfer of solutions or dead volumes. If a different number of samples are tested, the volumes of all reagents must be adjusted accordingly.
- The dilution protocol is provided for information only. As needed, the number of replicates or the range of concentrations covered can be modified.

One Incubation Step Protocol described as below:

1. Preparation of 1X PPI Buffer (for 10 mL):

Add 2 mL of 5X AlphaLISA PPI buffer and 8 mL of MilliQ water.

2. Preparation of KRAS GTP Binding Standard (64BDKRASCDA) :

a. Prepare serial dilutions in 1x AlphaLISA PPI buffer as mentioned in the table below (do no forget to change tips between each dilution):

Tube	Volume of standard	Volume of 1X buffer	[standard] (µM) (4X)	[standard] (µM) (1X)
A	20 µL of 4mM solution stock standard	180 µL	400	**100**
B	60 µL of tube A	140 µL	120	**30**
C	60 µL of tube B	120 µL	40	**10**
D	60 µL of tube C	140 µL	12	**3**
E	60 µL of tube D	120 µL	4	**1**
F	60 µL of tube E	140 µL	1.2	**0.3**
G	60 µL of tube F	120 µL	0.4	**0.1**
H	60 µL of tube G	140 µL	0.12	**0.03**
I	60 µL of tube H	120 µL	0.04	**0.01**
J	60 µL of tube I	140 µL	0.012	**0.003**
K	60 µL of tube J	120 µL	0.004	**0.001**
L	0	140 µL	0	0

3. Preparation of GST tagged KRAS G12C protein:

   a. Reconstitute lyophilized KRAS G12C protein in 100 µL H_2O to make a 3000 nM KRAS G12C stock solution.
   b. Add 10 µL of the 3000nM KRAS G12C stock solution to 240 µL of 1X AlphaLISA PPI buffer to obtain a 120nM working solution of GST-KRAS G12C protein.

   Prepare just before use.

4. Preparation of Biotinylated KRAS ligand (GTP-biotin):

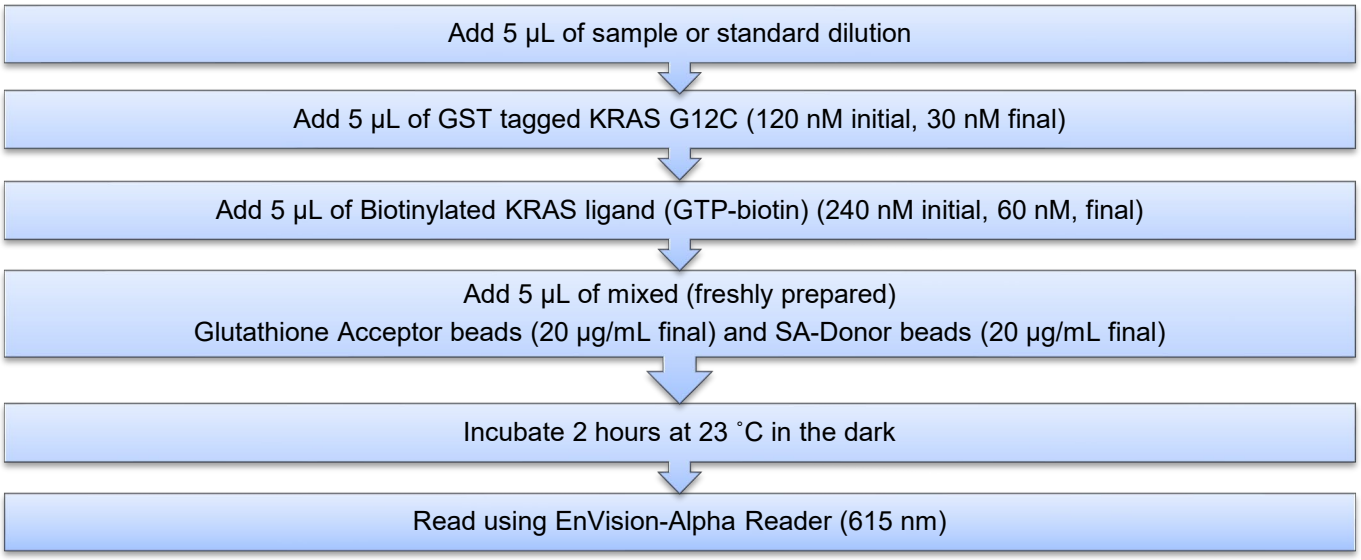
   a. Reconstitute lyophilized Biotinylated KRAS ligand (GTP-biotin) in 100 µL H_2O to make a 6000 nM stock solution.

   b. Add 10 µL of 6000 nM Biotinylated KRAS ligand (GTP-biotin) to 240 µL 1X AlphaLISA PPI buffer to obtain a 240nM stock solution of Biotinylated KRAS ligand (GTP-biotin).

   Prepare just before use.

5. Preparation of the mix of Glutathione Acceptor beads and Streptavidin (SA) Donor beads:
   a. Keep the beads under subdued laboratory lighting.
   b. Add 4 µL of 5 mg/mL Glutathione Acceptor beads and 4 µL of 5 mg/mL SA-Donor beads to 242 µL of 1X AlphaLISA PPI buffer
   c. Prepare just before use.

6. Distribute the prepared reagents in a shallow well AlphaPlate (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).

Typical competitive binding Data:

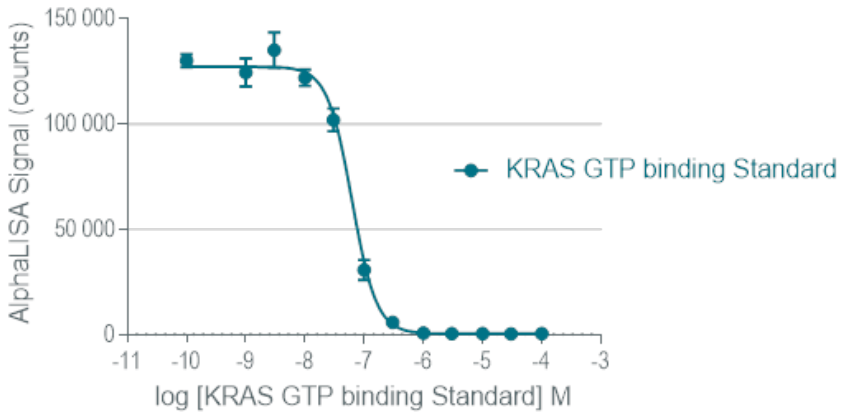


Figure 2. Illustration with KRAS GTP binding Standard (ref 64BDKRASCDA) which competitively binds to KRAS G12C with IC50=56nM. IC50 value was calculated by using a nonlinear regression fitting with GraphPad Prism.

Troubleshooting Guide

You will find below recommendations for common situations that you might encounter with your AlphaLISA binding assay. If further assistance is needed, do not hesitate to contact our technical support team for assistance.

Issue	Recommendations and Comments
High background signal	• Buffer is not freshly made. Make new. • Incubation time is longer than recommended range.
Low AlphaLISA signal	• Optimize EnVision with Plate format.
High variation between replicates or low Z' values	• Make sure that reagents are at the bottom of the well by tapping or swirling the plate gently on a smooth surface after each addition.

You will find detailed recommendations for common situations you might encounter with your AlphaLISA Assay kit at:

https://www.perkinelmer.com/lab-products-and-services/application-support-knowledgebase/alphalisa-alphascreen-no-wash-assays/alpha-troubleshooting.html

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