

## FLUOROGENIC PROBES & PRIMERS

for Real-Time qPCR

## *Fluorogenic Probes and Primers for Real-Time qPCR*

Since its invention, the Polymerase Chain Reaction (PCR) process has revolutionized life science research by enriching DNA from trace amounts of material. In its current evolutionary stage, PCR is used to monitor the amplification itself in order to measure the quantity of DNA through the kinetics of the reaction. This technique is known as real-time or quantitative PCR (qPCR) and is common practice in laboratories worldwide.

In its most advanced form, real-time PCR makes use of Förster Resonance Energy Transfer (FRET) probes. FRET probes have a spectrally paired 5' fluorophore and 3' quencher, each covalently linked to the oligo to provide certainty in amplification identity. FRET probes may also include an internal label or alternative labeling strategy. Unlike SYBR® Green intercalating dye chemistry, standard FRET probes only detect DNA containing the target sequence and will not bind to unwanted amplifications including primer-dimers, and other non-specific PCR products.

Biosearch Technologies has an economical and versatile selection of reporters, quenchers and probe formats for fluorogenic probe design. Continue reading to learn about the products and resources Biosearch has to offer for real-time PCR.



*Good probe & primer design is at the heart of any successful real-time qPCR assay...*

RealTimeDesign™ (RTD) software from Biosearch Technologies is a free, easy to use, and powerful design application for real-time qPCR. The software links directly to NCBI to retrieve sequences according to accession number, and allows you to confirm priming specificity. Whether you're a novice or seasoned expert, RTD will ensure that your probes and primers will demonstrate robust amplification and detection.

- » Design assays for gene expression analysis, multiplexed qPCR, and SNP genotyping
- » Design Dual-Labeled BHQ® Probes, BHQplus™ Probes, Amplifluor® primers, and the accompanying primers
- » Design individual assays or batched runs for high-throughput projects
- » Archive your assay designs in your account "Design Run History"
- » Choose from Biosearch's wide selection of dyes including our very own Black Hole Quencher® (BHQ) dye

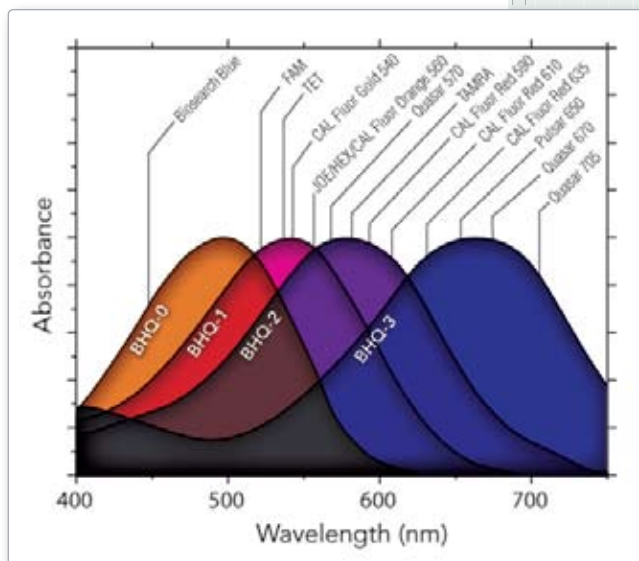


Visit [www.biosearchtech.com/realtimedesign](http://www.biosearchtech.com/realtimedesign) to try this free qPCR design software today!

# BLACK HOLE QUENCHER® DYES

## True Dark Quenchers

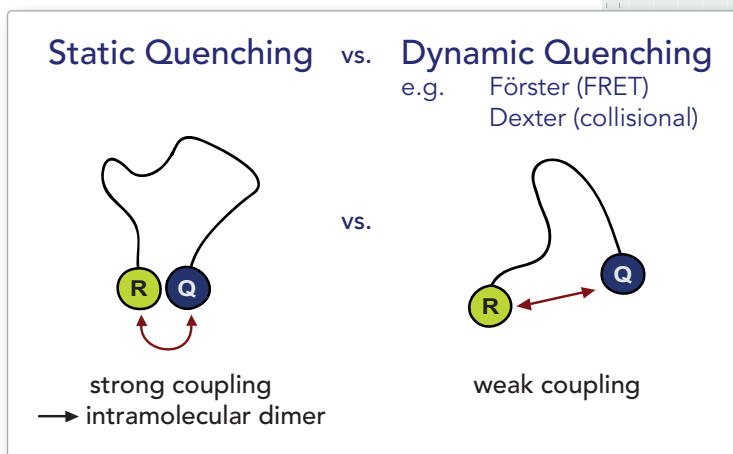
BHQ dyes can be paired with all common reporter dyes emitting between the ultraviolet and infrared wavelengths. Dual-Labeled BHQ probes have replaced earlier reporter-quencher dye pairings, such as FAM-TAMRA or FAM-DABCYL. In such sub-optimal probes, the quencher has inherent limitations including auto-fluorescence or a narrow quenching range which limits the choice of compatible fluorophores. In contrast, the BHQ dyes are highly efficient dark quenchers, have broad absorption spectra, and produce probes with high signal-to-noise ratios. Quenching versatility makes BHQ probes an excellent tool in gene expression and multiplexed qPCR assays.



Black Hole Quencher dyes are stable and highly efficient “dark” quenchers with no native fluorescence and broad absorption spectra. These characteristics lend high versatility to the potential uses for BHQ probes.

## FRET and Static Quenching

BHQ dyes quench fluorescent signals through Förster Resonance Energy Transfer (FRET) and in some instances static quenching, resulting in improved performance over other dark quencher dyes, such as DABCYL. For more on FRET and static quenching, see our website at [www.biosearchtech.com](http://www.biosearchtech.com).



# DYE SELECTION & COMPATIBILITY

## BLACK HOLE QUENCHER® AND DYE SELECTION CHART

FLUOROPHORE	DYE-5'-T <sub>10</sub>		BHQ Dye*
	EX	EM	
Biobsearch Blue™	352	447	BHQ - 0 $\lambda_{exc}$ 495 nm QR=430-520 nm
FAM	495	520	
TET	521	536	
CAL Fluor® Gold 540 (VIC/TET/JOE REPLACEMENT)	522	544	BHQ - 1 $\lambda_{exc}$ 534 nm QR=480-580 nm
JOE	529	555	
VIC	538	554	
HEX	535	556	
CAL Fluor Orange 560 (VIC/HEX/JOE REPLACEMENT)	538	559	
Quasar® 570 (CY3 REPLACEMENT)	548	566	BHQ - 2 $\lambda_{exc}$ 579 nm QR=559-670 nm <i>BHQ-2 dye is recommended for Pulsar 650, Quasar 670, and Quasar 705 dyes due to static quenching.</i>
Cy™ 3	549	566	
NED	546	575	
TAMRA	557	583	
CAL Fluor Red 590 (TAMRA REPLACEMENT)	569	591	
Cy3.5	581	596	
ROX	586	610	
CAL Fluor Red 610 (TEXAS RED/ROX REPLACEMENT)	590	610	
Texas Red®	597	616	
CAL Fluor Red 635 (LC RED 640 REPLACEMENT)	618	637	
Pulsar® 650	460	650	BHQ - 3 $\lambda_{exc}$ 672 nm QR=620-730 nm
Cy 5	646	669	
Quasar 670 (CY5 REPLACEMENT)	647	670	
Cy 5.5	675	694	
Quasar 705 (CY5.5 REPLACEMENT)	690	705	

## CAL Fluor and Quasar Dyes - Perfect Partners to the Black Hole Quencher Dyes:

To complement the BHQ dyes, Biosearch has since developed the CAL Fluor and Quasar dye series, which are low-cost fluorophores that partner perfectly with the BHQ dyes.

These vibrant fluorophores have emission spectra that span the visible spectrum and near infrared, matching the optics of most popular thermal cyclers, making them ideal for multiplexed real-time qPCR assays (for more information, please refer to our Multiplex Guide, or visit [www.biosearchtech.com/multiplexing](http://www.biosearchtech.com/multiplexing)). With such an expansive selection, Biosearch's CAL Fluor and Quasar dyes are great alternatives to TET, JOE, VIC, HEX, TAMRA, Texas Red® and CY™ dyes.

Dual-labeled probes incorporating a CAL Fluor or Quasar dye paired with a BHQ dye exhibit large signal-to-noise values, to produce amplification traces with robust  $\Delta R_n$ s and early  $C_T$  values.

## MULTIPLEXING RECOMMENDATIONS FOR DUAL-LABELLED DARK-QUENCHED PROBES AND PRIMERS

INSTRUMENT	COMPANY	CALIBRATION REQUIRED?	MULTIPLEXING DEGREE	DYE 1	DYE 2	DYE 3	DYE 4	DYE 5
Prism® 7700	ABI	Yes	Duplex	FAM	CAL Fluor® Gold 540	SuperROX®		
Prism 7900	ABI	Yes	Duplex	FAM	CAL Fluor Gold 540	SuperROX		
Prism 7000	ABI	Yes	Duplex	FAM	CAL Fluor Gold 540	SuperROX		
Prism 7300	ABI	Yes	Duplex	FAM	CAL Fluor Orange 560	SuperROX		
Prism 7500	ABI	Yes	4-Plex	FAM	CAL Fluor Orange 560	TAMRA	SuperROX	Quasar® 670
StepOne™	Life Technologies	Yes	Duplex	FAM	CAL Fluor Orange 560			
StepOnePlus™	Life Technologies	Yes	Triplex	FAM	CAL Fluor Orange 560	TAMRA		
CFX96™	Bio-Rad	Yes	5-Plex	FAM	CAL Fluor Gold 540	CAL Fluor Red 610	Quasar 670	Quasar 705
iCycler IQ®	Bio-Rad Laboratories	Yes	4-Plex	FAM	CAL Fluor Orange 560	CAL Fluor Red 610	Quasar 670	
iQ™ 5	Bio-Rad Laboratories	Yes	5-Plex	FAM	CAL Fluor Gold 540	CAL Fluor Red 590	CAL Fluor Red 610	Quasar 670
SmartCycler®	Cepheid	Yes	Triplex	FAM	CAL Fluor Orange 560	CAL Fluor Red 635		
SmartCycler II	Cepheid	Yes	4-Plex	FAM	CAL Fluor Orange 560	CAL Fluor Red 610	Quasar 670	
Rotor-Gene™ Q 2-plex	Qiagen	No	Duplex	FAM	CAL Fluor Orange 560			
Rotor-Gene Q 5-plex	Qiagen	No	5-Plex	FAM	CAL Fluor Orange 560	CAL Fluor Red 610	Quasar 670	Quasar 705
Mastercycler® ep Realplex	Eppendorf	Yes	Duplex	FAM	CAL Fluor Gold 540			
Opticon® 2	Bio-Rad Laboratories	Yes	Duplex	FAM	CAL Fluor Orange 560			
Chromo™ 4	Bio-Rad Laboratories	Yes	4-Plex	FAM	CAL Fluor Orange 560	CAL Fluor Red 610	Quasar 670	
MX3000P™	Stratagene	No	4-Plex	FAM	CAL Fluor Orange 560	CAL Fluor Red 610	Quasar 670	
MX4000®	Stratagene	No	4-Plex	FAM	CAL Fluor Orange 560	CAL Fluor Red 610	Quasar 670	
LightCycler® 1.2	Roche	Yes	Duplex	FAM	Pulsar® 650			
LightCycler 2.0	Roche	Yes	Triplex	FAM	CAL Fluor Red 610	Pulsar 650		
LightCycler 480	Roche	Yes	4-Plex	FAM	CAL Fluor Orange 560	CAL Fluor Red 610	Quasar 670	

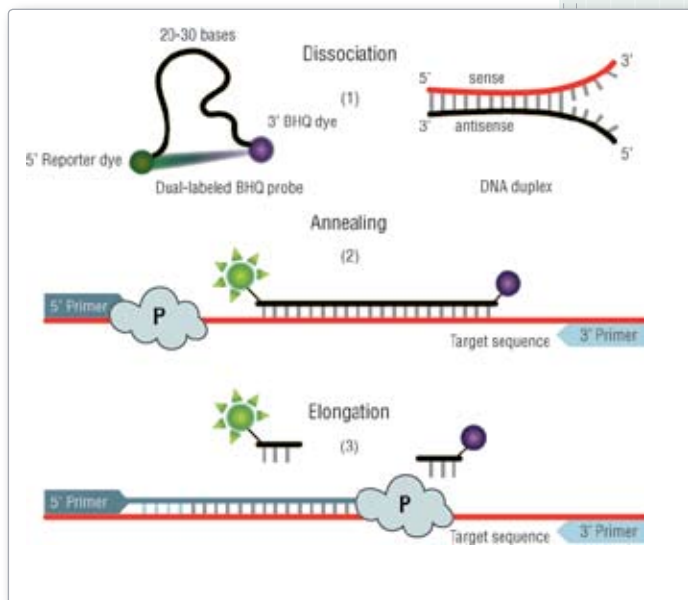
Determined through research at Biosearch
  Determined through research of a collaborator
  Predicted based on instrument specifications

# DUAL-LABELED BHQ® PROBES

A BHQ® Probe is a linear, dual-labeled oligonucleotide covalently labeled with a fluorophore and a Black Hole Quencher® (BHQ) dye. BHQ dyes are placed 10 to 30 nucleotides from the reporter dye when used in qPCR hybridization studies. Dyes can be attached either at the 5'-end, 3'-end or at internal thymidine bases, as necessary.

## Mechanism of Dual-Labeled BHQ Probes in qPCR

1. Heat denatures the sense and antisense strands of a DNA duplex. As the temperature cools, the BHQ probe and primers anneal to their target sequences. During hybridization, the BHQ probe changes conformation, distancing the fluorophore from the quencher, which disrupts FRET quenching and releases fluorescent signal.
2. During elongation, the DNA polymerase extends the strand in a 5' to 3' direction from the primer. When the polymerase encounters the 5' end of the probe, it cleaves off the reporter-bound nucleotide(s) permanently separating the reporter and quencher dyes.
3. The accumulation of fluorescence signal over repeated cycling allows determination of quantitative and qualitative information from the kinetics of fluorescence-signal amplification.



Mechanism of dual-labeled BHQ probes in qPCR. In solution, the BHQ Probe exists as a random coil when it is in a stoichiometric excess. Hydrophobicity and electrostatics promote dye-dye attractions and enhance fluorescence-quenching.

## DESIGN CONSIDERATIONS FOR BHQ PROBES

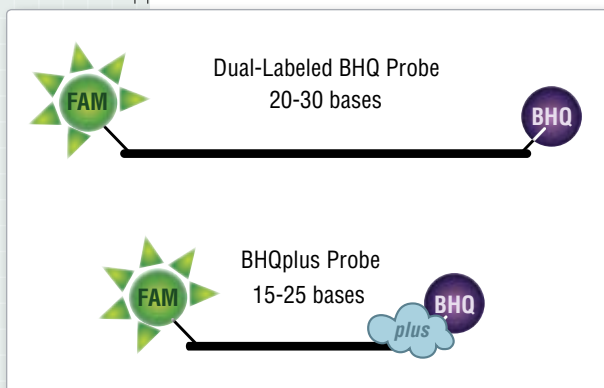
### Sequence Design

- » Probe sequences should be target specific
- » For gene expression measurement, the assay design may cross an exon-exon junction (excised intron) to ensure replication of only the desired splice variant
- » Sequence design should be no longer than 30 bases to ensure efficient quenching
- » If more than 30 bases are required, use an internal BHQ label for more efficient quenching and a Spacer 3 at the 3' end to block polymerase extension
- » The probe  $T_m$  should be higher than that of the primers

**Amplicon Length** – Amplicon length should be between 50 and 200 bases for optimum PCR efficiency. Adding another hold step to the thermal cycling protocol may help produce longer amplicons

**Applications** – Single and multiplex, quantitative and qualitative, real-time and endpoint PCR analysis; and allelic discrimination

# BHQplus™ PROBES

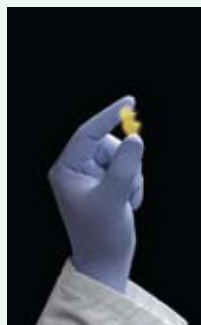
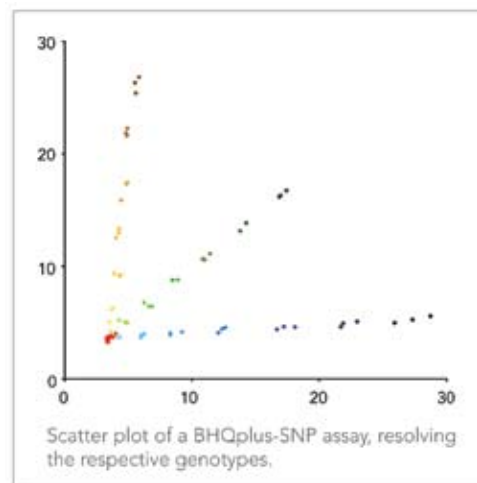
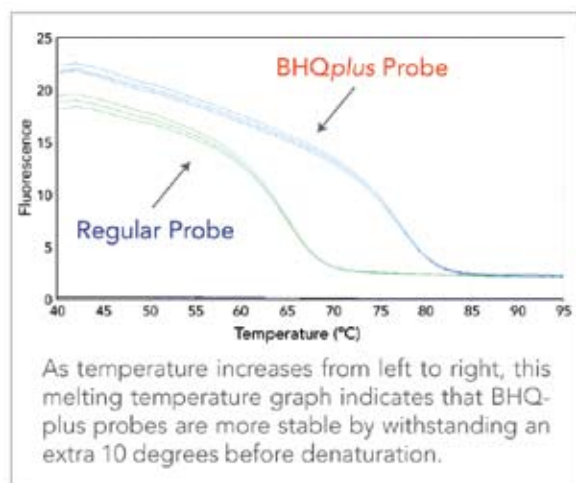


Standard Dual-Labeled BHQ Probes have limited use in SNP analysis and genotyping because such methods require shorter probes for heightened discrimination. Biosearch offers BHQplus probes to address these issues and to provide an alternative to MGB™ probes for qPCR applications.

BHQplus probes form highly stable duplexes with DNA targets to allow shorter probe design while maintaining the proper melting temperature ( $T_m$ ). Typically, BHQplus probes are 15-25 bases in length, whereas BHQ probes are 20-30 bases long. With compact sequence lengths, BHQplus probes have enhanced target specificity making them ideal for SNP genotyping.

Additionally, BHQplus probe chemistry allows for better interrogation of difficult targets such as AT-rich sequences.

Below are representative results demonstrating the binding characteristics and reporting capacity of BHQplus probes.



## BHQplus PROBE DESIGN FOR SNP GENOTYPING

- » Both allele-specific probes should target the same strand
- » The  $T_m$  may be lower than that of the primers to enhance discrimination further
- » Does not represent a direct substitute for MGB™ probes

**Applications:** Single and multiplex, quantitative and qualitative, real-time and endpoint PCR analysis; allelic discrimination and SNP genotyping

# MOLECULAR BEACONS

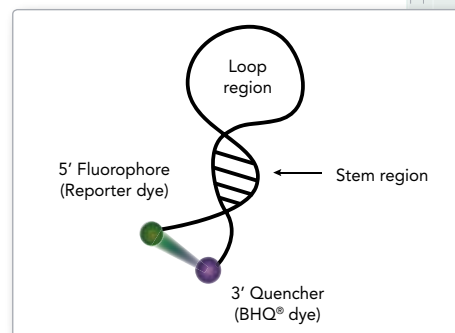
Molecular Beacons are a type of dual-labeled oligonucleotide probe that relies on a structured probe conformation to heighten assay specificity. This property allows Beacons to discriminate mismatches as specific as a single nucleotide polymorphism (SNP).

Beacons have a hairpin loop modality with a 5'-fluorophore and a 3'-quencher dye at alternate ends of a short stem sequence, which serves to position the dyes in very close proximity. The loop region contains a sequence complementary to its target. Beacons generate fluorescence through hybridization and under non-hydrolytic conditions allow for post-PCR melt curve analyses.

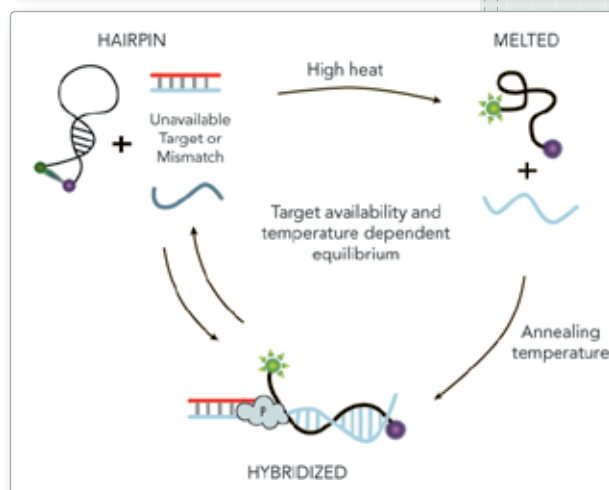
## Mechanism of Molecular Beacons in qPCR

1. Heat denaturation melts the Beacon into a random coil conformation
2. Upon lowering the temperature for primer annealing, the Beacon either hybridizes to the fully complementary target or else refolds into the hairpin conformation
3. Polymerization in a 5' to 3' direction dislodges the Beacon from the target sequence, until the next cycle of amplification

The increase in fluorescence intensity with repeated PCR cycles correlates with the accumulation of product and allows for accurate quantification of template.



In the absence of target or prior to amplification, the stem anneals to form a closed hairpin conformation which holds the reporter and quencher close together to enable efficient FRET quenching and to promote contact or static quenching.



## DESIGN CONSIDERATIONS FOR MOLECULAR BEACONS

### Loop region:

- » Designed sequence length and GC content should ensure that the perfect-match probe-target hybrid is more stable than the hairpin conformation
- » Loop sequence should exclude regions of substantial complementarity to the stem region and to either PCR primer

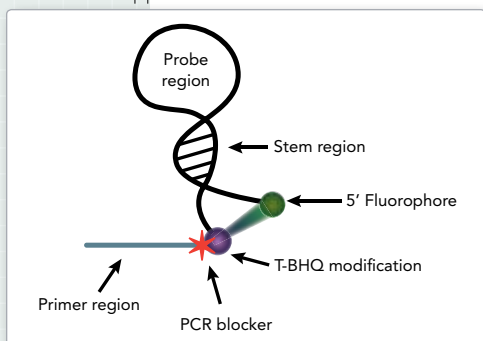
### Stem region:

- » Stem length should be 5-7 base pairs
- » Hairpin stem has a  $T_m$  that is 7-10 degrees lower than the probe-target hybrid

**Applications:** Single and multiplexed, quantitative and qualitative, real-time and end point PCR analysis; allelic discrimination; SNP detection; DNA microarray-immobilized probes and biosensors

Mechanism of Molecular Beacons in qPCR. Molecular Beacons can exist in three conformations depending upon target availability and temperature.

# SCORPIONS® PRIMERS



Scorpions® primers are dual-labeled probes that combine a Molecular Beacon-like probe structure and a PCR primer element in a single oligonucleotide, allowing for target detection through a unimolecular mechanism. Scorpions primers consist of three distinct features:

- » Target-binding sequence representing the primer region at the 3' end
- » PCR blocker, often a hexethylene glycol modification linker sequence
- » Target-binding region comprising a stem-loop structure, an internal BHQ dye, and a 5'-fluorophore covalently bound to the probe termini.

## Mechanism of Scorpions Primers in qPCR

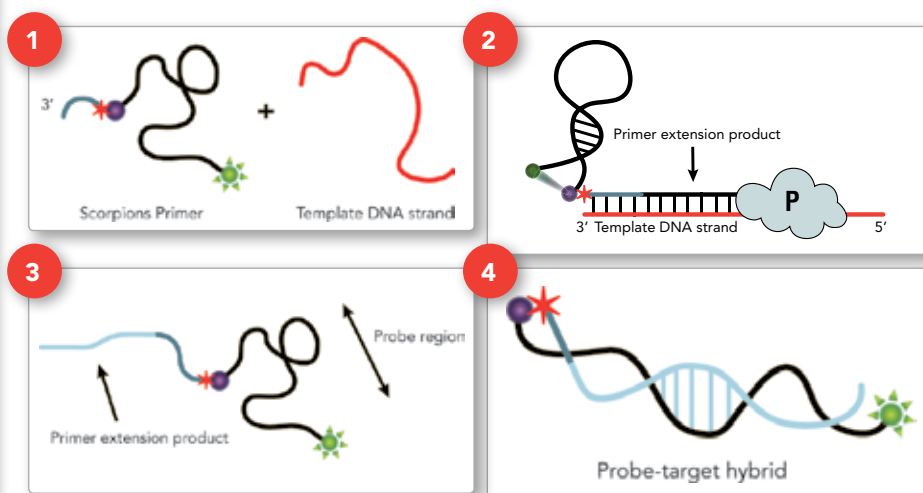
1. Heat denaturation melts Scorpions Primers into random coils
2. During annealing, the probe region remains in a hairpin conformation while the primer region anneals to its target sequence

### DESIGN CONSIDERATIONS FOR SCORPIONS PRIMERS:

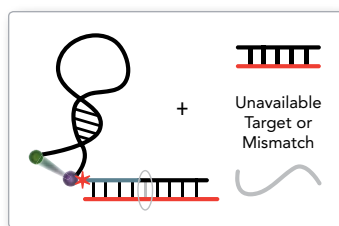
#### Probe region:

- » Design the probe region to be the reverse complement of the primer-extension product
- » Design the probe region to bind within 40 bases of the end of the Scorpion Primer region
- » Probe region  $T_m$  can be lower than that of the primers to enhance discrimination

**Applications** – Single and multiplexed, quantitative and qualitative, real-time and end point PCR analysis; allelic discrimination and SNP genotyping.



3. Elongation during polymerization results in a newly synthesized strand, which contains the probe binding site and retains the probe on the 5' end. The binding site is not available while hybridized to the complementary strand
4. After another round of denaturation, the fluorescence-quenched probe attached to the 5' end of this PCR product recognizes the available binding site and unfolds the hairpin to release fluorescence



**Note:** Mismatched hybrids are less stable than the reformed stem region. Therefore, the Scorpions Primers only produce signal when the probe region hybridizes to a perfect-match target sequence within the primer extension product.

# ONLINE ORDERING

1. On fluorogenic probe and primer product pages, you may view our complete selection of fluorophore-quencher combinations for all qPCR probe formats by accessing the Product Listings tab (as shown).

- If you already know which catalog number you would like to order, click on your desired catalog number in the left-hand column and your order form will pre-populate itself with the appropriate 5' and 3' labels.

2. This is the online order form provided for Dual-Labeled BHQ Probes, BHQplus Probes, and Molecular Beacons.

- You may also pre-populate the fields of your order form by typing in a catalog number. If you do not have a catalog number at hand, you may also select your probe labels using the 5' Fluorophore and the 3' Quencher drop down menus.
- After entering your probe name and sequence information, proceed to selecting a synthesis scale to see the catalog number and price of your probe.
- You may also expand the order form by clicking on "Primer Pair" at the bottom to enter sequence information for your accompanying primers.

3. This is the online order form for Scorpions Primers.

- You may also pre-populate the fields of your order form by typing in a catalog number. If you do not have a catalog number at hand, you may select your probe labels using the 5' Fluorophore drop down menu.
- After entering a probe name and sequence information, select a synthesis scale to see the catalog number and price of your probe. You may also order reverse primers using the bottom portion of the order form.

4. This is the Checkout page.

- Once you are finished adding items into your shopping cart, you may proceed directly to the checkout page to enter your billing, shipping, and payment information.
- If you have an online account at [www.biosearchtech.com](http://www.biosearchtech.com), your contact and billing information will be pre-populated.
- With an online account you may save carts, view your order history, and update your account information. This account also provides free access to our qPCR assay design program, RealTimeDesign Software.

**1** Product Listings for Dual-Labeled BHO Probes

Catalog #	Item Name	Price	Size/Scale	Note
DUO-BHQ-1	YalProbe™, 5' FAM/3' BHO-1	\$5.00	50 reed	Provides 20 reed pure.
DUO-BHQ-2	Dual-labeled Probe, 5' FAM/3' BHO-1	\$50.00	100 reed	Provides 30 reed pure.
DUO-BHQ-3	Dual-labeled Probe, 5' FAM/3' BHO-1	\$20.00	200 reed	Provides 30 reed pure.
DUO-BHQ-4	Dual-labeled Probe, 5' FAM/3' BHO-1	\$80.00	1 µmol	Provides 30 reed pure.
DUO-BHQ-5	Dual-labeled Probe, 5' FAM/Internal T-BHQ-1/3' CI	\$40.00	200 reed	Provides 30 reed pure.
DUO-BHQ-6	Dual-labeled Probe, 5' FAM/Internal T-BHQ-1/3' CI	\$10.00	1 µmol	Provides 30 reed pure.
DUO-BHQ-7	Dual-labeled Probe, 5' FAM/TAMRA	\$20.00	100 reed	Provides 30 reed pure.

**2** Quick Order form for Dual-Labeled BHO Probes

Sequence Name: [input] 5' Fluorophore: [dropdown] Sequence Entry 5' to 3': [input] 3' Quencher: [dropdown] Synthesis Scale / Purification: [dropdown] [Delivered Amount]

You are Ordering: (Catalog #, Price per Unit)

Quantity: [input] Item Total: [input]

**PRIMER PAIR**

Sequence Name: [input] Sequence Entry 5' to 3': [input]

Sequence Name: [input] Sequence Entry 5' to 3': [input] Synthesis Scale / Purification: [dropdown] Quantity: [input] Item Total: [input]

[See Our]

You are Ordering: (Catalog #, Price per Unit)

**3** Quick Order form for Scorpions Primers

Sequence Name: [input] 5' Fluorophore: [dropdown] Stem-loop Sequence 5' to 3': [input] Internal Quencher: [dropdown] Blocker: [dropdown] Primer Sequence 5' to 3': [input] Synthesis Scale / Purification: [dropdown] [Delivered Amount]

You are Ordering: (Catalog #, Price per Unit)

Quantity: [input] Item Total: [input]

Reverse Primer: Sequence Name: [input] Primer Sequence 5' to 3': [input] Synthesis Scale / Purification: [dropdown] Quantity: [input] Item Total: [input]

**4** Checkout page

**LOG IN**

Log In below to view your account, order history and status, and to place new orders.

USERNAME: [input] PASSWORD: [input] GO

Forgot Log In info? Create Account.

**Quick Links**

- YalPanel™ Reagents
- Dual-Labeled BHO Probes
- Build Your Custom Oligo
- Oligos for Molecular Diagnostics
- RealTimeDesign™ Software

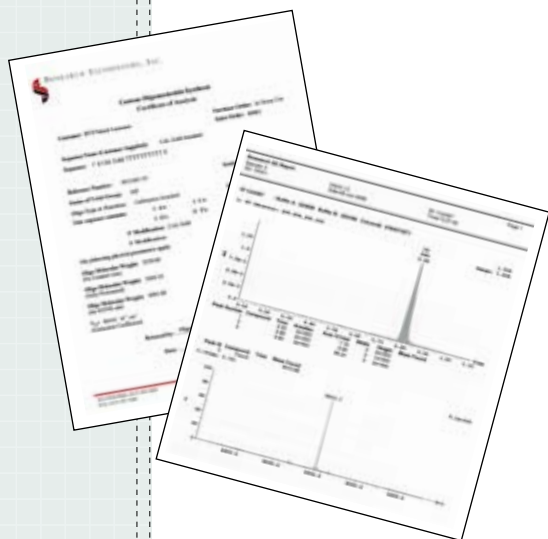
**Checkout**

Contact Information: Company Name: [input] First Name: [input] Last Name: [input] Phone: [input] Fax: [input] Email: [input] Promotion Code: [input]

Shipping Address: Address: [input] City: [input] State: [input]

Billing Address (Same as Shipping): Address: [input] City: [input] State: [input]

# PURIFICATION & QUALITY CONTROL



## PURIFICATION & QUALITY CONTROL

In our ISO 9001:2008 certified facilities, Biosearch purifies all probes using Reverse-Phase HPLC or dual HPLC. Typical purity levels can range from 85% to 90%. All probe formats are processed by HPLC and ESI-TOF mass spectrometry to confirm the identity of the manufactured oligo. Biosearch's production group barcodes all orders to ensure quick and accurate traceability and a quality final product. Certificates of Analysis are available on request.

## ORDER INFORMATION

### Pricing and Turnaround

Probe Format	Turnaround Time*	Starting Price
Dual-Labeled BHQ Probes	3-5 business days	\$95 for 10 nmol delivered
BHQplus Probes	5-7 business days	\$255 for 10 nmol delivered
Molecular Beacons	5-7 business days	\$375 for >3 nmol delivered
Scorpions Primers	7-10 business days	\$450 for >10 nmol delivered

\* Probes with a Quasar 705 label will require a 5-7 business day turnaround. Probes either with an internal BHQ, JOE or ROX label will require a 7-10 business day turnaround

### Synthesis Scales and Yield

Probe Format	Synthesis Scale	Yield	Purification
Dual-Labeled BHQ Probes	25 nmol	Provides 5 nmol pure	Dual-HPLC
	50 nmol	Provides 10 nmol pure	RP-HPLC
	100 nmol	Provides >10 nmol pure	Dual-HPLC
	200 nmol	Provides >25 nmol pure	Dual-HPLC
	1 umol	Provides >60 nmol pure	Dual-HPLC
BHQplus Probes	50 nmol	Provides 10 nmol pure	RP-HPLC
	200 nmol	Provides 20 nmol pure	RP-HPLC
	1 umol	Provides 60 nmol pure	RP-HPLC
Molecular Beacons	50 nmol	Provides >3 nmol pure	Dual-HPLC
	200 nmol	Provides >10 nmol pure	Dual-HPLC
	1 umol	Provides >40 nmol pure	Dual-HPLC
Scorpions Primers	200 nmol	Provides >10 nmol pure	Dual-HPLC
	1 umol	Provides >30 nmol pure	Dual-HPLC

All orders are shipped via FedEx Priority (overnight delivery) for domestic orders and FedEx International for all orders outside the US. Oligos are delivered lyophilized unless specified otherwise.

# ORDER INFORMATION

## Fluorogenic Probes and Primers Product Information

This is a sample list of our real-time qPCR oligonucleotides. Other probe & primer formats, synthesis scales and dye selections are also available. For Biosearch's complete panel of fluorophore-quencher combinations, please visit:

[www.biosearchtech.com](http://www.biosearchtech.com) or call **1.800.GENOME.1**

### Scorpions® Primers

5' Label	5' Ex/Em (nm)	3' Label	Catalog #	Synthesis Scale	Price
FAM	495 / 520	Internal BHQ-1	SCP-FB1-2	200 nmol	\$450
			SCP-FB1-1	1 µmol	\$650
CAL Fluor Gold 540	522 / 544	Internal BHQ-1	SCP-CGB1-2	200 nmol	\$500
			SCP-CGB1-1	1 µmol	\$700
CAL Fluor Orange 560	538 / 559	Internal BHQ-1	SCP-COB1-2	200 nmol	\$500
			SCP-COB1-1	1 µmol	\$700
TAMRA	557 / 583	Internal BHQ-2	SCP-TB2-2	200 nmol	\$550
			SCP-TB2-1	1 µmol	\$700
CAL Fluor Red 610	590 / 610	Internal BHQ-2	SCP-CAB2-2	200 nmol	\$500
			SCP-CAB2-1	1 µmol	\$700
Quasar 670	647 / 667	Internal BHQ-2	SCP-Q6B2-2	200 nmol	\$600
			SCP-Q6B2-1	1 µmol	\$750

### Molecular Beacons

5' Label	5' Ex/Em (nm)	3' Label	Catalog #	Synthesis Scale	Price
FAM	495 / 520	BHQ-1	MBO-FB1-5	50 nmol	\$375
			MBO-FB1-1	1 µmol	\$590
FAM	495 / 520	DABCYL	MBO-FD-5	50 nmol	\$375
			MBO-FD-1	1 µmol	\$590
TET	521 / 536	BHQ-1	MBO-TEB1-5	50 nmol	\$400
			MBO-TEB1-1	1 µmol	\$630
CAL Fluor Gold 540	522 / 544	BHQ-1	MBO-CGB1-5	50 nmol	\$390
			MBO-CGB1-1	1 µmol	\$615
HEX	535 / 556	BHQ-1	MBO-HB1-5	50 nmol	\$410
			MBO-HB1-1	1 µmol	\$645
CAL Fluor Orange 560	538 / 559	BHQ-1	MBO-COB1-5	50 nmol	\$390
			MBO-COB1-1	1 µmol	\$615
CAL Fluor Red 610	590 / 610	BHQ-2	MBO-CAB2-5	50 nmol	\$415
			MBO-CAB2-1	1 µmol	\$650
Quasar 670	647 / 667	BHQ-2	MBO-Q6B2-5	50 nmol	\$415
			MBO-Q6B2-1	1 µmol	\$650

### Dual Labeled BHQ® Probes

5' Label	5' Ex/Em (nm)	3' Label	Catalog #	Synthesis Scale	Price
FAM ValuProbe™ (single RP-HPLC)	495 / 520	BHQ-1	DLO-RFB-5	50 nmol	\$95
FAM (dual HPLC)	495 / 520	BHQ-1	DLO-FB1-5	100 nmol	\$150
			DLO-FB1-1	1 µmol	\$365
FAM	495 / 520	TAMRA	DLO-FT-5	100 nmol	\$150
			DLO-FT-1	1 µmol	\$365
TET	521 / 536	BHQ-1	DLO-TEB1-5	50 nmol	\$200
			DLO-TEB1-1	1 µmol	\$420
TET	521 / 536	TAMRA	DLO-TET-5	50 nmol	\$200
			DLO-TET-1	1 µmol	\$420
CAL Fluor Gold 540 (replaces TET)	522 / 544	BHQ-1	DLO-CGB1-5	50 nmol	\$195
			DLO-CGB1-1	1 µmol	\$400
HEX	535 / 556	BHQ-1	DLO-HB1-5	50 nmol	\$205
			DLO-HB1-1	1 µmol	\$450
CAL Fluor Orange 560 (replaces VIC/HEX/JOE)	538 / 559	BHQ-1	DLO-COB1-5	50 nmol	\$195
			DLO-COB1-1	1 µmol	\$400
TAMRA	557 / 583	BHQ-2	DLO-TB2-5	50 nmol	\$200
			DLO-TB2-1	1 µmol	\$400
CAL Fluor Red 610 (replaces Texas Red® dye)	590 / 610	BHQ-2	DLO-CAB2-5	50 nmol	\$215
			DLO-CAB2-1	1 µmol	\$475
Quasar 670 (replaces Cy5™ dye)	647 / 667	BHQ-2	DLO-Q6B2-5	50 nmol	\$230
			DLO-Q6B2-1	1 µmol	\$475
Quasar 705	690 / 705	BHQ-2	DLO-Q7B2-5	50 nmol	\$230
			DLO-Q7B2-1	1 µmol	\$475

### BHQplus™ Probes

5' Label	5' Ex/Em (nm)	3' Label	Catalog #	Synthesis Scale	Price
FAM	495 / 520	BHQ-1 plus	DLO-FBP-5	50 nmol	\$255
			DLO-FBP-1	1 µmol	\$600
TET	521 / 536	BHQ-1 plus	DLO-TBP-5	50 nmol	\$255
			DLO-TBP-1	1 µmol	\$600
CAL Fluor Orange 560	538 / 559	BHQ-1 plus	DLO-CBP-5	50 nmol	\$255
			DLO-CBP-1	1 µmol	\$600
CAL Fluor Red 610	590 / 610	BHQ-1 plus	DLO-RBP-5	50 nmol	\$255
			DLO-RBP-1	1 µmol	\$600
Quasar 670	647 / 667	BHQ-1 plus	DLO-QBP-5	50 nmol	\$255
			DLO-QBP-1	1 µmol	\$600



Biosearch Technologies, Inc.  
81 Digital Drive, Novato, CA 94949-5728 USA  
www.biosearchtech.com | info@biosearchtech.com  
+1.415.883.8400 | +1.800.GENOME.1 (1.800.436.6631)

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