



Diagnosics

**LightCycler<sup>®</sup> 480 Real-Time PCR System**  
*Rapid by Nature – Accurate by Design*



[www.roche-applied-science.com](http://www.roche-applied-science.com)

*Amplify your success in medium- and high-throughput real-time PCR applications with the innovative LightCycler® 480 System, from Roche Applied Science.*

*The plate-based LightCycler® 480 System is a highly adaptable and versatile real-time PCR system for gene expression and genetic variation analysis. The modern instrument design, outstanding technical and software features, as well as advanced reagents and disposables of the LightCycler® 480 System, exceed the demands for fast, accurate, and most challenging real-time PCR applications.*

<b>The LightCycler® 480 Real-Time PCR System</b>	<b>3</b>
<b>Introduction</b>	<b>4</b>
<b>Instrument Description</b>	<b>5</b>
<b>Software</b>	<b>7</b>
<b>System Components</b>	<b>10</b>
<b>Performance Data</b>	<b>12</b>
<b>Automatic Workflow Capabilities</b>	<b>14</b>
<b>System Service</b>	<b>15</b>
<b>System Characteristics</b>	<b>16</b>
<b>Ordering Information</b>	<b>17</b>



## The LightCycler® 480 Real-Time PCR System

*A standard for high-performance real-time PCR*

*Take your real-time PCR projects to new levels of sensitivity, specificity, and throughput based on the accuracy, versatility, and speed of the LightCycler® 480 System.*

### Compelling reasons for choosing the LightCycler® 480 System...

- Unique thermal block cycler technology for exceptional well-to-well data homogeneity.
- Easily interchangeable 96- and 384-well thermal block cycler units.
- Impressive short time-to-result periods (384-well format, 40 cycles: < 40 minutes).
- Advanced high-performance optical system for accurate data capturing.
- Highest flexibility with fluorescence dyes and detection formats.
- Availability of increased research time by the elimination of time-consuming maintenance calibration.
- Outstanding LightCycler® 480 software algorithms for sophisticated data analysis capabilities.
- Intuitive, user-friendly LightCycler® 480 software interface.
- Fast-tracking application-specific analysis workflows assisted by the modular LightCycler® 480 software design.
- Excellent PCR sensitivity with high-value LightCycler® 480 reagents and disposables.
- Convenient integration capabilities in automated high-throughput workflows.
- State-of-the-art LIMS connectivity.
- 21 CFR part 11 compliance data protection.
- Premium customer support and instrument service.



## The LightCycler® 480 Real-Time PCR System

*Proven, high performance LightCycler® Technology*

*Since their introduction in 1998, the LightCycler® Real-Time PCR Systems from Roche Applied Science have stood for maximum flexibility, high speed, and outstanding data accuracy. The latest innovation, the LightCycler® 480 System, continues this tradition and extends it to higher throughputs by using a plate-based analysis format.*

Innovative technological enhancements in the LightCycler® 480 Instrument pave the way for new standards of rapid and accurate real-time PCR data generation and analysis. In particular, the sophisticated design of the thermal block cycler unit, the optical system, and the software deliver the sensitivity, accuracy, and reproducibility one has come to expect only from Roche Applied Science carousel-based LightCycler® Instruments.

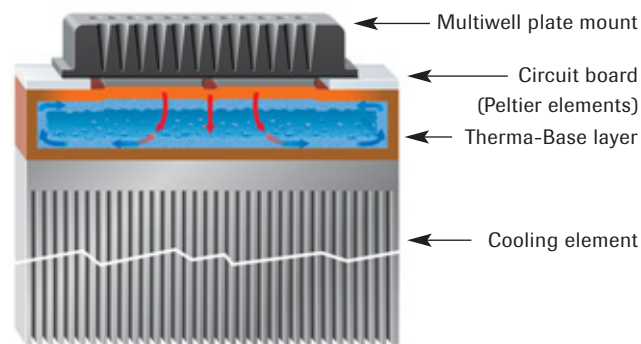
For maximum flexibility, many components of the LightCycler® 480 Instrument are modular in design. This setup enables users to easily interchange thermal block cyclers (96- and 384-well format), combine various optical filters, and benefit from modular software design.



▲ **Figure 1: Flexibility of the LightCycler® 480 block cycler unit.** The LightCycler® 480 block cycler units (96-well/384-well format) are easily interchangeable by the user, taking no longer than a few minutes. The exchanged block cycler unit is automatically detected and identified by the system, and experiments can be pursued without time-consuming recalibration runs.

Enhanced software capabilities allow seamless integration of the system into computer-controlled environments and automated workflows. This system setup facilitates data management that complies with 21 CFR Part 11 requirements.

The LightCycler® 480 System comprises versatile instrumentation and software as well as high-performance reagents, customized qPCR assays (Universal ProbeLibrary System) and specially engineered disposable products. This innovative system meets the tough demands of qualitative target detection, quantitative gene expression, and mutation analysis. In addition, its built-in versatility facilitates easy adaptation to new technologies in genomic research.



▲ **Figure 2: Schematic of the LightCycler® 480 thermal block cycler.** The Therma-Base layer, implemented in the block cycler unit architecture, is a thin cavity lined with a wick structure and filled with fluid. Utilizing a series of condensation and evaporation events, the Therma-Base rapidly adjusts to temperature changes by efficiently dissipating heat.

# The LightCycler® 480 Instrument

*An ideal combination of speed, accuracy and versatility*

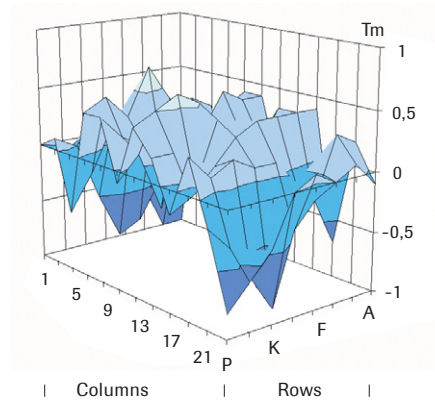
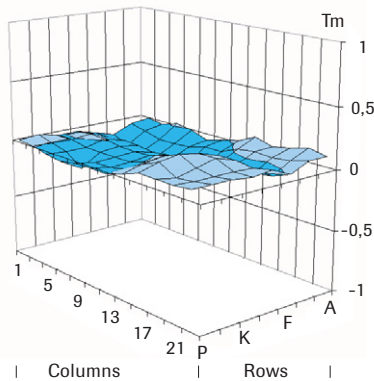
## Innovative PCR thermal block cycler design

The LightCycler® 480 System has revolutionized block cycler temperature control through the introduction of a highly efficient heat-equalizing technology (Therma-Base) between the heat block and the cooling element. By removing the effects of spreading resistance, the LightCycler® 480 thermal block cycler provides unparalleled well-to-well temperature homogeneity, as illustrated by minimal inter-well temperature variability across the entire multiwell plate. This innovative temperature control enables exceptional data uniformity, independent of

any assay formats or real-time PCR applications, even in fast PCR protocols.

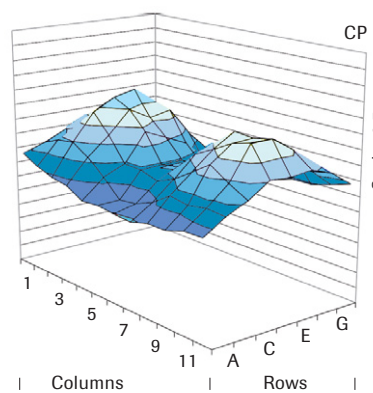
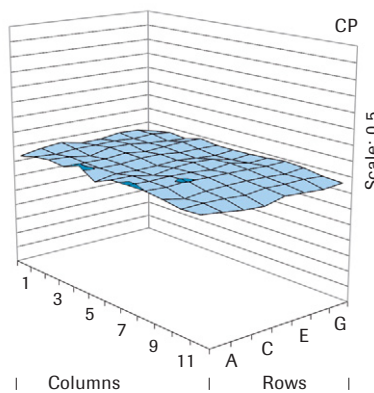
### Key benefits of the LightCycler® 480 thermal block cycler:

- Run any assay format or application with fast PCR protocols.
- Obtain rapid and accurate temperature adjustment: 40 cycles < 40 minutes (384-well plate format).
- Achieve exceptional data homogeneity across the entire multiwell plate.



**▲ Figure 3: Temperature homogeneity across a 384-well plate: a) LightCycler® 480 Instrument; b) another real-time PCR instrument.** The melting temperature ( $T_m$ ) of a given labeled oligonucleotide was used to demonstrate tem-

perature homogeneity across a multiwell plate (at 50°C). The variation between the measured  $T_m$  and the expected  $T_m$  of the oligonucleotide was plotted for all 384 wells using the expected  $T_m$  as zero.



**▲ Figure 4: Crossing point (CP) homogeneity across a 96-well plate: a) LightCycler® 480 Instrument; b) another real-time PCR instrument.** A low target concentration (100 copies) of a given target sequence (442 bp) was amplified using

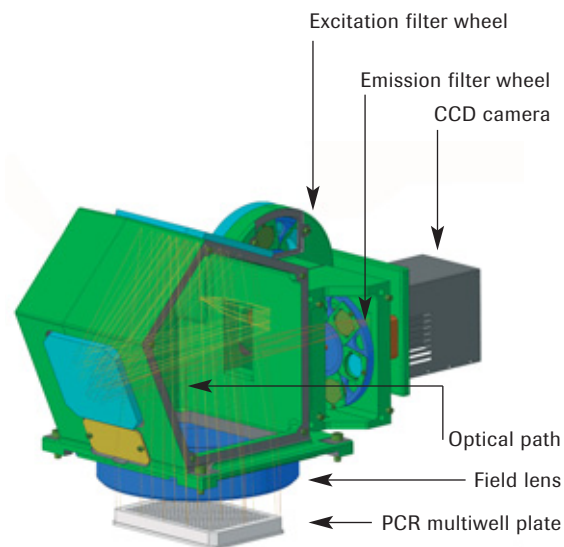
a fast PCR protocol (20  $\mu$ l reaction volume, hydrolysis probe format). CP values were plotted for all 96 wells using a 0.5-step CP scale resolution.

## The LightCycler® 480 Instrument

*An ideal combination of speed, accuracy and versatility*

### Advanced high-performance optical system

The excellent performance of the LightCycler® 480 Instrument's optical system stems from a high-intensity xenon lamp which emits light across a broad spectrum. A flexible combination of built-in filters for specific excitation and emission facilitates the use of a variety of fluorescent dyes and detection formats for any current real-time PCR application. The special arrangement of the optical components, and the optimum focal length in the LightCycler® 480 Instrument ensure excellent specific signal excitation and uniform data capturing across the entire multi-well plate, independent of sample position. This feature eliminates the need for passive reference dyes (e.g., ROX) for well-to-well signal normalization. As a result, the LightCycler® 480 System gives you the added flexibility to use all channels for target detection, extending multiplexing capabilities.



▲ **Figure 5: Schematic of the LightCycler® 480 detection unit.**

### Key benefits of the LightCycler® 480 optical system:

- Enjoy highest flexibility in the choice of fluorescence dyes and detection formats.
- Get advanced accurate data capture across the entire plate without fluorescence signal normalization.
- Work with enhanced multiplexing capabilities.

▼ **Table 1: Overview of excitation and emission filters, dyes and detection formats.** The LightCycler® 480 Instrument employs the high-intensity LightCycler® 480 Xenon Lamp that emits light over a broad wavelength range (430–630 nm). The five excitation and six emission filters of the instrument can be used in any combination.

Xenon lamp	430  630						
Excitation filters	450	483	483	523	558		615
Emission filters	500	533	533	568	610	640	670
Dyes (Examples)	LightCycler® Cyan 500	SYBR Green I	Fluorescein (Fluos / FAM)	HEX (VIC)	LightCycler® Red 610	LightCycler® Red 640	Cy5
Detection formats	Hydrolysis probes (R), HybProbe probes (D)	SYBR Green I	Hydrolysis probes (R), HybProbe probes (D), SimpleProbe probes (R)		Hydrolysis probes (R), HybProbe probes (A)		

Legend: Reporter (R), Donor (D), Acceptor (A).

# The LightCycler® 480 Software

## Excellent tools to generate high quality data

### Advanced high-value software capabilities

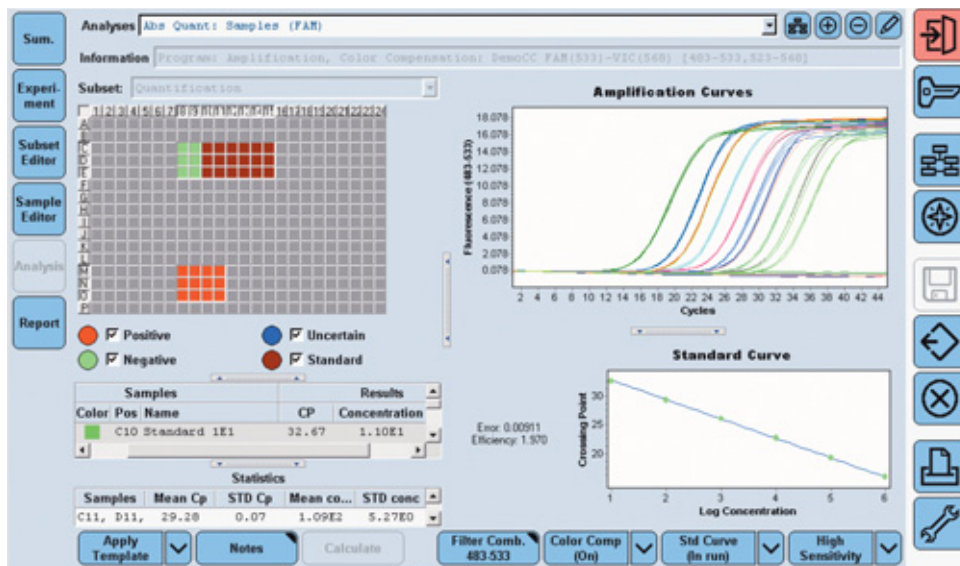
The innovative LightCycler® 480 software is characterized by a state-of-the-art design and unique LightCycler® 480 algorithms for fast, highly accurate data generation, without sacrificing comprehensive versatility. Advanced software tools facilitate intuitive, fast navigation, allowing easy programming, data capturing and analysis. Convenient import and export functionalities enable the seamless integration of the LightCycler® 480 Instrument into computer-controlled environments. Additionally, modern data management and effective data protection capabilities are implemented in the software.

The LightCycler® 480 software provides versatile solutions for the most common real-time PCR applications like gene detection, gene expression and

genotyping analysis. The software package comprises basic software and application-specific modules. Convenient manual analysis tools are implemented in the basic software. Sophisticated application-specific modules provide automated, guided analysis solutions. Thus, the LightCycler® 480 software meets all your research needs, from comprehensive customized scientific approaches to streamlined automated routine workflows.

### Key benefits of the LightCycler® 480 software:

- Work with advanced, user-friendly, fast-tracking software tools.
- Speed up PCR analysis with unique application-specific software modules.
- Produce high value real-time PCR data using proven LightCycler® algorithms.



▲ Figure 6: Screenshot of the LightCycler® 480 software interface (analysis screen).

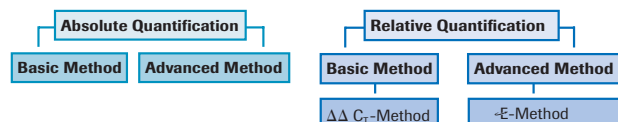
- Easy-to-learn and powerful to use button-driven user interface.
- Flexible data display options (e.g., CP values, concentrations, basic statistical information).
- Accurate, fast and flexible data analysis capabilities (e.g., use of different standard (Std) curves).
- User-friendly software functionalities for high-throughput studies (e.g., templates, macros).

# The LightCycler® 480 Quantification Software

## Ultimate innovations for gene quantification

### Highly versatile solutions for gene quantification

The LightCycler® 480 software provides innovative solutions for various quantitative real-time PCR (qPCR) analyses. Absolute and relative quantification analysis methods, and subtypes of these techniques are implemented in the LightCycler® 480 software. Based on unique LightCycler® algorithms, the sophisticated LightCycler® 480 quantification software facilitates reliable quantification data.



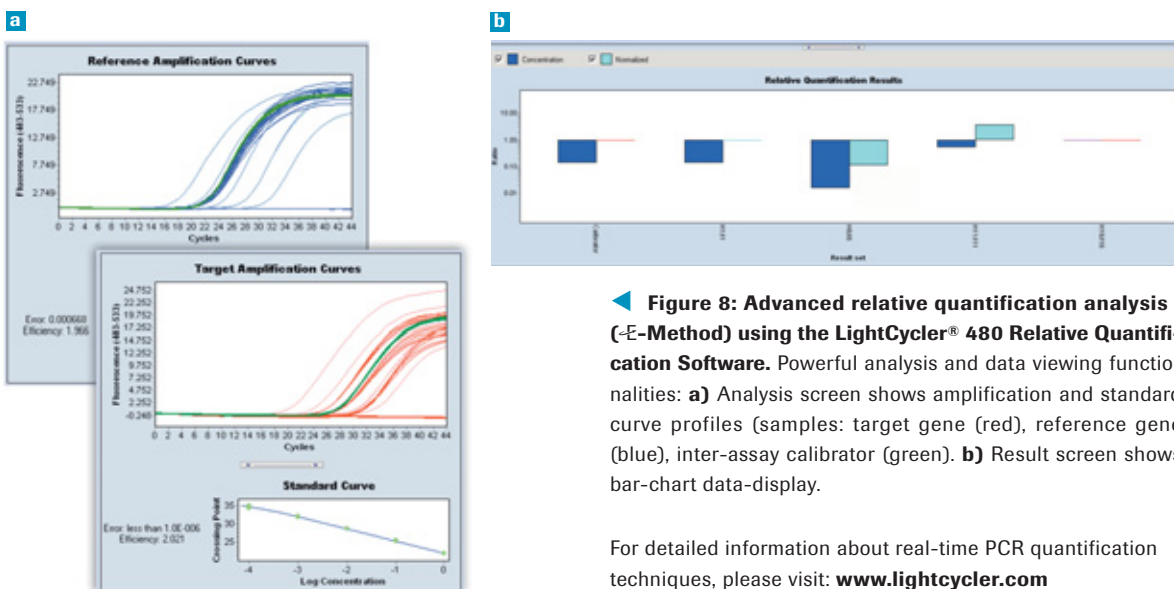
▲ **Figure 7:** Overview of the different PCR quantification principles.

### Peak performance for gene expression analysis

The versatile LightCycler® 480 Relative Quantification Software provides different relative quantification methods (e.g., basic  $\Delta\Delta C_T$ -Method, advanced  $-E$ -Method) for gene expression and gene dosage studies. This offers you various degrees of quantification reliabilities adaptable to your individual experiment needs. Benefited by the versatile structure of the LightCycler® 480 software, one single PCR result can be guided through the different analysis methods. The unique Roche Applied Science  $-E$ -Method is an innovative, scientifically sound solution for the most demanding relative quantification applications.

### Key benefits of the LightCycler® 480 quantification software:

- Easily customize data analysis with either basic, or advanced quantification methods.
- Achieve ultimate data accuracy with the  $-E$ -Method.
- Perform multiple quantification analyses for a single PCR result.



◀ **Figure 8:** Advanced relative quantification analysis ( $-E$ -Method) using the LightCycler® 480 Relative Quantification Software. Powerful analysis and data viewing functionalities: **a)** Analysis screen shows amplification and standard curve profiles (samples: target gene (red), reference gene (blue), inter-assay calibrator (green)). **b)** Result screen shows bar-chart data-display.

For detailed information about real-time PCR quantification techniques, please visit: [www.lightcycler.com](http://www.lightcycler.com)

# The LightCycler® 480 Genotyping Software

## Superior solutions for accurate SNP analysis

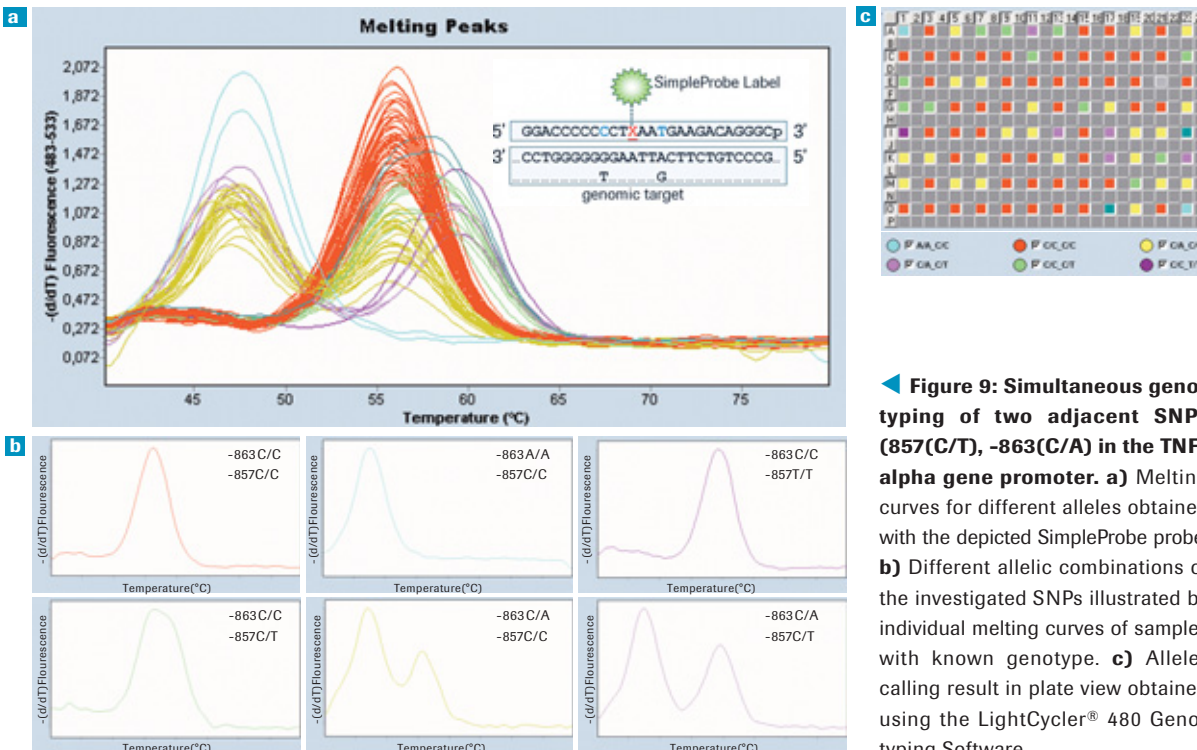
### Melting curve analysis for bias-free SNP analysis

Melting curve analysis with HybProbe (Fluorescence Resonance Energy Transfer, FRET) or SimpleProbe probes is a reliable method for studying genetic variation on Roche Applied Science's Real-Time PCR platforms. Like the carousel-based LightCycler® Systems, the LightCycler® 480 Instrument provides the temperature homogeneity, tightly controlled ramp rates and optical sensitivity required to obtain highly reliable and comprehensive genotype information. Alleles are identified from their varying strengths of interaction with the detection probe. Allele-specific primers or probes are not needed: the same sequence is used for all alleles of an investigated SNP (Single Nucleotide Polymorphism), or can even cover several nearby SNPs. This simple assay principle gives you the freedom to perform fast SNP assays, and straightforward multiplexing, and helps save reagent costs.

As a post-PCR process, melting curve analysis depends neither on the amplification efficiency nor on cleavage of a substrate (e.g., a dye attached to a probe) and is therefore very robust. The choice of acquisition rates and detection channels permit the use of novel high-resolution melting dyes with the LightCycler® 480 Instrument (e.g., to scan amplicons for unknown mutations).

### Key benefits of the LightCycler® 480 Genotyping Software:

- Let optimized software algorithms perform automated, bias-free allele-calling.
- Achieve reliable results based on superior post-PCR melting curve analysis.
- Save costs by covering all alleles of a given SNP with one probe.



**Figure 9: Simultaneous genotyping of two adjacent SNPs (857(C/T), -863(C/A) in the TNF-alpha gene promoter. a)** Melting curves for different alleles obtained with the depicted SimpleProbe probe. **b)** Different allelic combinations of the investigated SNPs illustrated by individual melting curves of samples with known genotype. **c)** Allele-calling result in plate view obtained using the LightCycler® 480 Genotyping Software.

# The LightCycler® 480 Reagents and Disposables

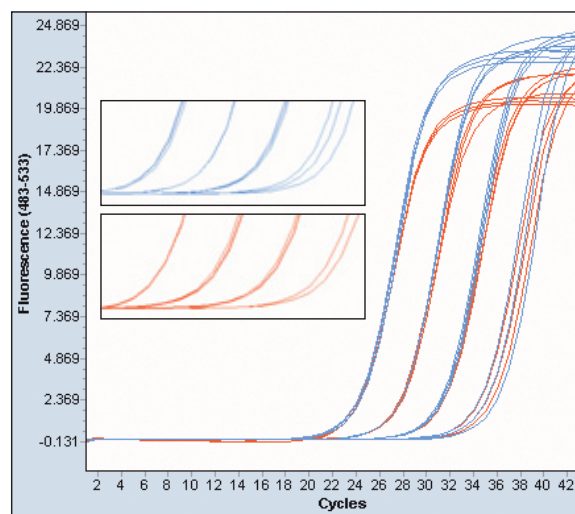
## Maximized convenience in fast real-time PCR

### High-performance reagents for all PCR application needs

The LightCycler® 480 reagents are based on Roche Applied Science's improved hot-start PCR enzyme formulation, delivering exceptional sensitivity and specificity for real-time PCR assays. The convenient ready-to-use LightCycler® 480 master mixes are specially designed to support each of the main real-time PCR applications (e.g., gene quantification, genotyping) for both standard and fast ramping PCR run protocols. Furthermore, these optimized master mixes offer extended room temperature stability for maximum robustness on automated high-throughput workflows, and improved storage conditions for added convenience with daily use.

#### Key benefits of the LightCycler® 480 reagents:

- Enjoy exceptional detection sensitivity and specificity for all standard and fast PCR protocols.
- Get maximum enzyme stability for automated high-throughput workflows at room temperature.
- Save time with ready-to-use one-component master mixes.



▲ **Figure 10: Stability of the LightCycler® 480 SYBR Green I Master.** Serial 1:10 dilutions (10,000 – 10 copies/reaction, three replicates) of a human DNA target sequence were assayed either immediately after PCR setup (blue curves) or after 24 hours standing in a loading robot at room temperature (red curves). The shape of the amplification curves demonstrates that the PCR performance was not affected by prolonged pre-PCR standing.

Reagents	Formats	Applications	Hot-start PCR	PCR Speed	
				Standard	Fast
<b>LightCycler® 480 SYBR Green I Master</b> (2× concentrated)	SYBR Green I	Qualitative/ Quantitative	✓	✓	✓
<b>LightCycler® 480 Probes Master</b> (2× concentrated)	Hydrolysis probes, UPL probes, HybProbe probes, SimpleProbe probes	Qualitative/ Quantitative	✓	✓	✓
<b>LightCycler® 480 Genotyping Master*</b> (5× concentrated)	HybProbe probes, SimpleProbe probes	Genotyping <sup>1)</sup>	✓	✓	✓

\* Enzyme lacks 5' exonuclease activity (5'-3' exo-minus).

<sup>1)</sup> Post-PCR melting curve analysis.

■ Sequence-independent DNA detection

■ Sequence-specific DNA detection

▲ **Table 2: Application areas of the LightCycler® 480 reagents.** All LightCycler® 480 reagents prevent carry-over contamination by employing dUTP for UNG (Uracil-DNA-Glycosylase)-mediated decontamination. Extended storage conditions enable storing at +4 to +8°C for up to four weeks, beside the usual conditions at -15 to -25°C.

### Optimized disposables

Specially designed LightCycler® 480 Multiwell Plates fit optimally in the thermal block cycler mount, ensuring maximum heat transfer, and therefore maximum PCR sensitivity and reproducibility. The opaque, white-colored plate design provides excellent optical sensitivity. Furthermore, these plates ensure reliable PCR results without the need for routine decontamination steps of the thermal block cycler mount (e.g., removal of fluorescence-labeled probes). Additionally, bar-codes on each plate enable simple and user-friendly workflow tracking.



#### Key benefits of LightCycler® 480 Multiwell Plates:

- Achieve high PCR sensitivity and reproducibility with special plate design.
- Eliminate the risk of false-positive influences in PCR results.
- Benefit from bar-code labeled multiwell plates for fast workflow tracking.

## The Universal ProbeLibrary System

*A fast-track approach to gene quantification analysis*

### Customized qPCR assay

Extraordinarily fast, flexible and accurate gene expression analysis can be achieved with the integration of the sophisticated LightCycler® 480 System, advanced RT-PCR reagents (e.g., Transcriptor First Strand cDNA Synthesis Kit) and the innovative Universal ProbeLibrary qPCR assays.

The unique combination of prevalidated Universal ProbeLibrary (UPL) real-time PCR probes, and the online assay design software [[www.universalprobelibrary.com](http://www.universalprobelibrary.com)] allow rapid and flexible quantification of virtually any transcript in the transcriptomes of a large number of organisms. The standardized UPL qPCR assays that work first time enhance throughput and efficiency without compromising on sensitivity and specificity.

#### Key benefits of the Universal ProbeLibrary System:

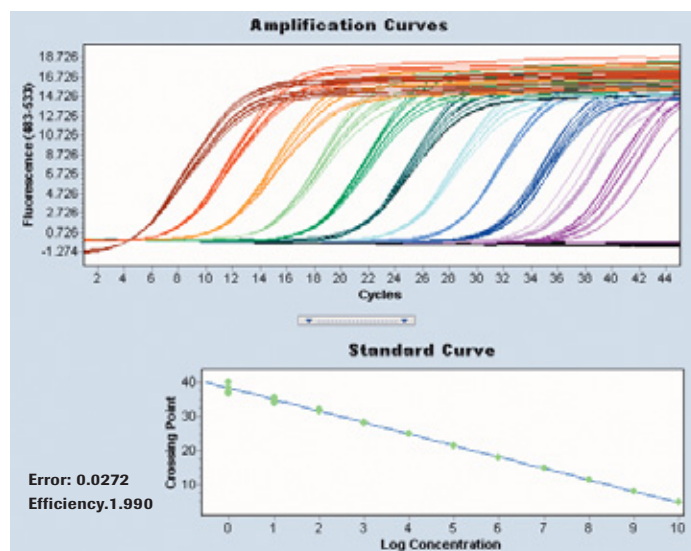
- Significantly reduce the assay design time for any target.
- Enjoy excellent flexibility, specificity and convenience.
- Simplify multitarget analysis conditions with the UPL standard PCR protocol profile.



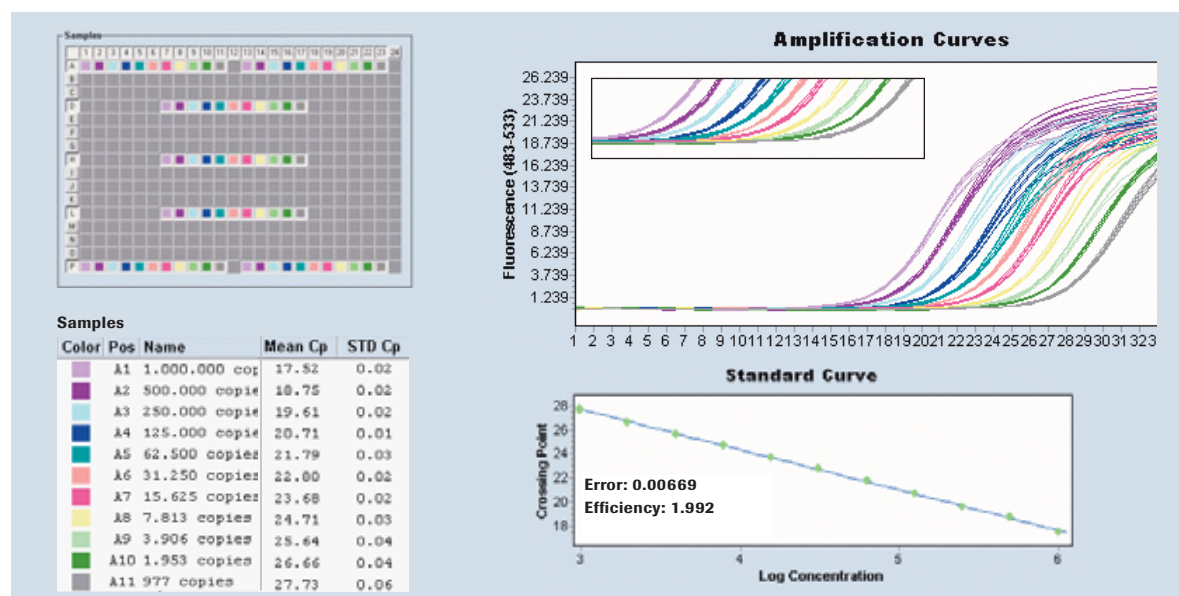
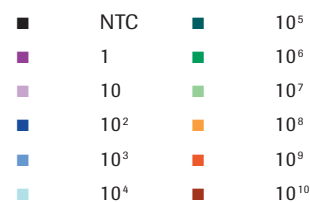
▲ Figure 11: The Universal ProbeLibrary System.

# The LightCycler® 480 System Performance

*Excellent dynamic range, sensitivity, and reproducibility*

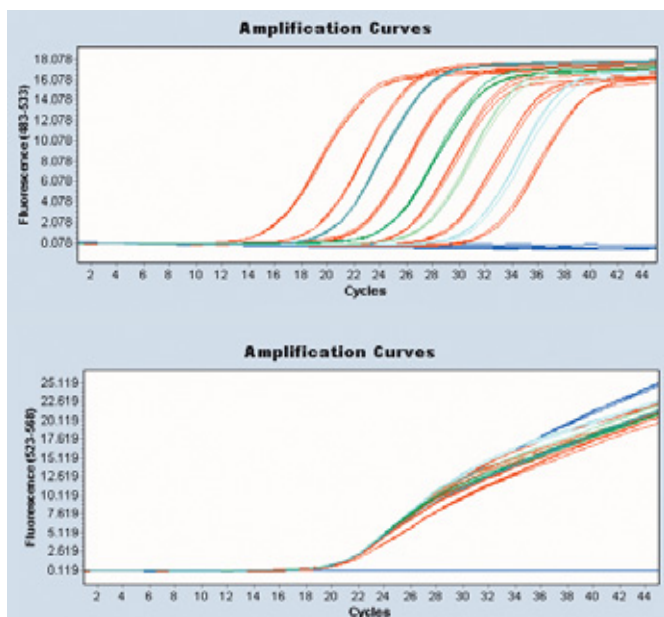


◀ **Figure 12: Linear range of the LightCycler® 480 System.** Serial 1:10 dilutions (nine replicates each) of a plasmid DNA sequence were amplified with the LightCycler® 480 Probes Master and detected with a UPL probe. The PCR result shows a log-linear relationship over a broad dynamic range (10 log-intervals) and highly reproducible CP values for replicates of each dilution.



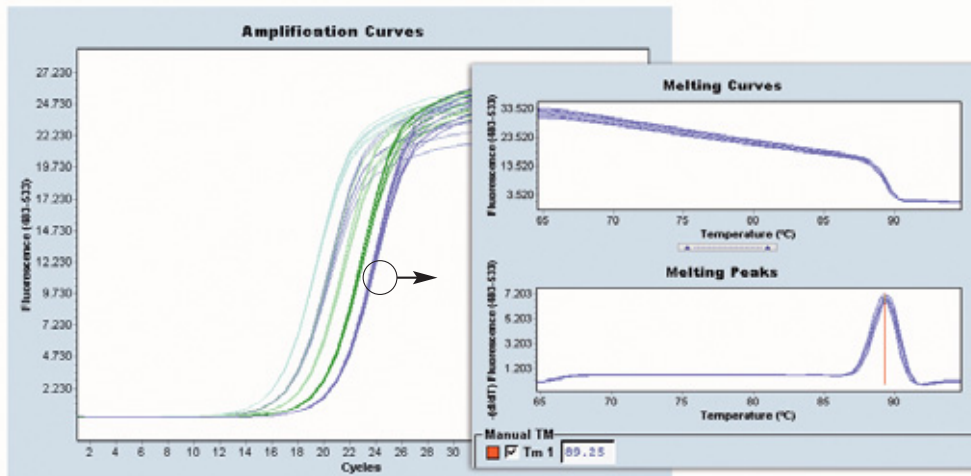
▲ **Figure 13: Sensitivity and reproducibility of the LightCycler® 480 System.** Serial 1:2 dilutions (seven replicates each) of a viral target sequence were assayed with the LightCycler® 480 SYBR Green I Master. A special pipetting scheme was used to distribute the samples across the entire

plate. Results obtained from every position demonstrate the outstanding resolution, sensitivity, reproducibility and data homogeneity of the LightCycler® 480 System. Reproducibility is shown by the uniformity of CP values within replicate groups and low coefficients of variation (CV < 0.2 %).



Samples		
Color	Pos	Name
Blue	C8	no template control
Blue	C9	negative control
Orange	C10	Standard 1E1
Orange	C11	Standard 1E2
Orange	C12	Standard 1E3
Orange	C13	Standard 1E4
Orange	C14	Standard 1E5
Orange	C15	Standard 1E6
Green	M8	Sample 1
Light Green	M9	Sample 2
Light Blue	M10	Sample 3
Dark Blue	M11	Sample 4

◀ **Figure 14: Dual-color detection with the LightCycler® 480 System.** These data illustrate an absolute quantification assay. Serially diluted standards (1:10 dilutions, three replicates each) were assayed along with unknown samples. In addition, an internal PCR control (IC) was added to each sample to prevent misinterpretation of negative PCR results. The specific sequences were amplified with the LightCycler® 480 Probes Master and detected with hydrolysis probes (target: FAM-labeled, IC: VIC-labeled).



▲ **Figure 15: Melting curve analysis for DNA product identification with the LightCycler® 480 System.** Serial 1:2 dilutions (eight replicates each) of a plasmid DNA sequence were amplified with the LightCycler® 480 SYBR Green I Master. Post-PCR melting-curve analysis was performed to identify the amplified products by their melting temperatures. The melting curve result illustrates a pure, homogenous PCR product that depicts the highest dilution step (purple line, T<sub>m</sub> of 89.25°C). The LightCycler® 480 software conveniently supports T<sub>m</sub> analysis by displaying melting curves (sample fluorescence versus temperature) and melting peak charts (first negative derivative of the sample fluorescence versus temperature) and calculating the T<sub>m</sub>.

#### Key benefits of the LightCycler® 480 System performance:

- Work in a broad dynamic range from 10<sup>10</sup> down to one copy in a single run.
- Obtain exceptional two-fold resolution below 1000 copies.
- Experience new standards for well-to-well consistency and low copy-detection sensitivity.
- Achieve high reproducibility (CV < 0.3).

# The LightCycler® 480 Real-Time PCR System

## *Advanced automated high-throughput workflows*

### True workflow capabilities

The LightCycler® 480 System can be seamlessly integrated into a computer-controlled environment, or automated laboratory workflow via the LightCycler® 480 LIMS/Bar-Code Software Module. This module facilitates two-way information exchange between the LightCycler® 480 System and a Laboratory Information Management System (LIMS). Furthermore, the LIMS/Bar-Code Module can control system loading procedures, the PCR run, and data analysis, thereby enabling integration of the LightCycler® 480 System into a completely automated workflow. The bar-code function of the LightCycler® 480 LIMS/Bar-Code Module can recognize the bar-code labeled LightCycler® 480 Multiwell Plates via the internal bar-code reader.

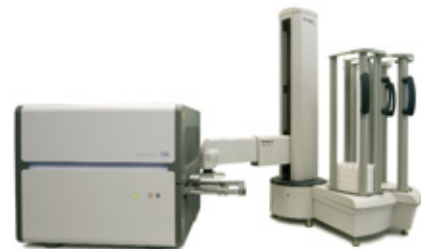
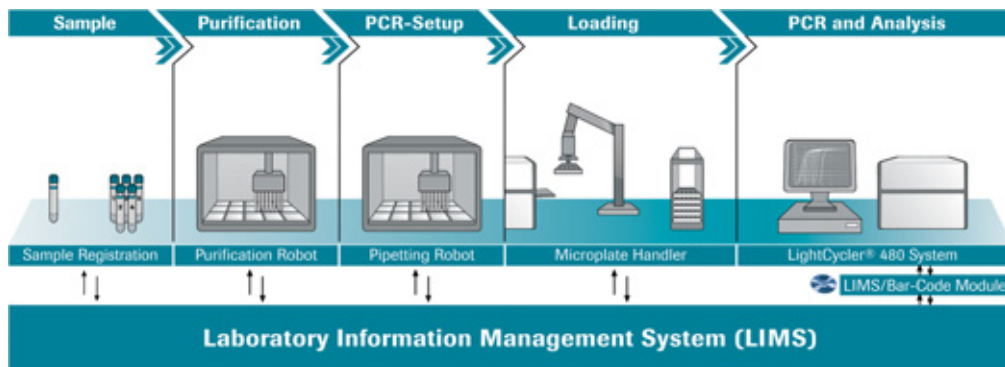
### Dependable data management

The LightCycler® 480 System supports 21 CFR Part 11, and meets the general regulatory data management requirements.

#### Key benefits of the LightCycler® 480 System workflow capabilities:

- Work with true walk-away and automation workflow capabilities.
- Get easy LIMS connectivity with innovative software design.
- Ensure regulatory data management requirements.

▼ **Figure 16: Schematic overview of the LightCycler® 480 System's integration into an automated laboratory workflow.**



▲ **Figure 17: Automated LightCycler® 480 Instrument loading process.**

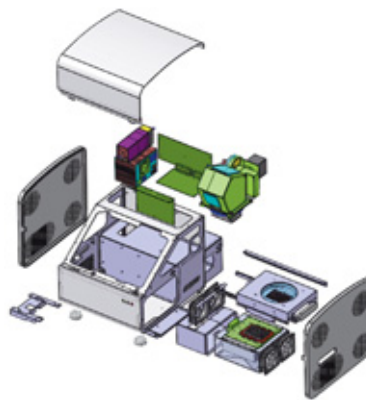
# The LightCycler® 480 Real-Time PCR System

*It's service all around ...*

Roche Applied Science, part of Roche Diagnostics, can rely on 30 years success in laboratory diagnostics instrumentation, and nearly a decade of innovative development in real-time PCR instruments. Based on this vast expertise, we can offer a highly professional service concept that meets your most demanding needs.

## Built for serviceability

The LightCycler® 480 Instrument's excellent modular design facilitates easy maintenance and optimal serviceability. In addition, the instrument has the added advantage that no routine maintenance is required (e.g., standard instrument calibration runs). Replacement parts, like the affordable LightCycler® 480 Xenon Lamp, can be easily exchanged by the user in minutes without any recalibration.



## LightCycler® 480 services

Roche Applied Science is committed to providing innovative systems with highly professional service channels, worldwide. Furthermore, our ISO 9001 certified local and central support organizations can offer you solutions to meet your specific LightCycler® 480 needs.

### The LightCycler® 480 service includes:

- Up-to-date web-based LightCycler® 480 System information.
- Comprehensive LightCycler® 480 System online support (e.g., webinars, e-learning tools).
- Custom-made convenient LightCycler® 480 System hotline.
- On-site LightCycler® 480 System technical support.
- Premium LightCycler® 480 Instrument Q<sup>3</sup> Qualification Service Package.<sup>1,2)</sup>
- Customized LightCycler® 480 System service plans and contracts.<sup>2)</sup>

<sup>1)</sup> The LightCycler® 480 Instrument Q<sup>3</sup> Qualification Service Package consists of three service modules performed at your laboratory at three different times: IQOQ (Installation Qualification Operational Qualification), OQ (Operational Qualification) and PQ (Performance Qualification).

Roche Diagnostics

Q<sup>3</sup> Qualification Services

**CERTIFICATE**

FOR INSTALLATION QUALIFICATION (IQ)

Light Cycler® 480

Well Block: 96  384

Certificate Date: \_\_\_\_\_

Instrument Serial No.: \_\_\_\_\_

Company/Lab: \_\_\_\_\_

Instrument Location: \_\_\_\_\_

This Certificate confirms that at the time of the installation qualification the aforementioned instrument was functioning in accordance with the Roche Installation Specifications.

The following have been tested and found to perform successfully:

- INSTRUMENT DELIVERED COMPLETELY AND UNDAMAGED
- INSTRUMENT INSTALLED CORRECTLY (PLACEMENT AND ENVIRONMENTAL PARAMETERS)
- INSTRUMENT AND SOFTWARE ARE CORRECTLY INSTALLED AND CONNECTED

Customer Name: \_\_\_\_\_ Roche Affairs: \_\_\_\_\_

Address: \_\_\_\_\_ Address: \_\_\_\_\_

Customer Signature / Date: \_\_\_\_\_ PIR Signature / Date: \_\_\_\_\_

Furthermore, the service provides all the necessary documentation, including a detailed report and instrument certification.

<sup>2)</sup> For further details on these optional services, please contact your local representative.

## LightCycler® 480 Instrument Characteristics

<b>Dimensions</b>	W 57.4 cm × D 58.8 cm × H 49.7 cm
<b>Weight</b>	55.6 kg
<b>Power consumption</b>	200–240 Vac (50/60 Hz, 1500 VA)
<b>Reaction volumes</b>	5 µl–20 µl (384-well), 10 µl–100 µl (96-well)
<b>Temperature control</b>	Peltier-based heating/cooling from 37°C–95°C
<b>Heating rate</b>	4.8°C/s
<b>Cooling rate</b>	2.5°C/s
<b>Excitation</b>	LightCycler® 480 Xenon Lamp
<b>Detector</b>	Cooled monochrome CCD camera
<b>Filter</b>	Excitation wavelengths (nm): 450, 483, 523, 558, 615 Detection wavelengths (nm): 500, 533, 568, 610, 640, 670
<b>Computer</b>	Pentium PC with Windows XP
<b>Basic Software Configuration</b>	LightCycler® 480 Basic Software LightCycler® 480 Relative Quantification Software LightCycler® 480 Genotyping Software
<b>Automation</b>	LightCycler® 480 System LIMS/Bar-Code Module-based: - Interface with Laboratory Information Management System (LIMS) - Bar-code assisted multiwell plate scanning - Plate loading capability
<b>Data management</b>	21 CFR Part 11 compatibility

### Order a LightCycler® 480 System, and additionally receive:

- On-site LightCycler® 480 System installation.
- Customized LightCycler® 480 System start-up training.
- Comprehensive LightCycler® 480 Operator's Manual.
- Supreme LightCycler® 480 System user support.



## Ordering Information

### *LightCycler® 480 Instruments and Additional Products*

Product	Cat. No.	Pack Size
LightCycler® 480 Instrument, 96-well block *●▼	04 640 268 001	1 Instrument <sup>1)</sup>
LightCycler® 480 Instrument, 384-well block *●▼	04 545 885 001	1 Instrument <sup>1)</sup>
LightCycler® 480 Block Kit 96 ●	04 643 640 001	1 Kit <sup>2)</sup>
LightCycler® 480 Block Kit 384 ●	04 643 631 001	1 Kit <sup>2)</sup>
LightCycler® 480 Bar-Code Scanner	04 710 606 001	1 Scanner
LightCycler® 480 Xenon Lamp	04 686 136 001	1 Lamp
LightCycler® 480 Basic Software ●	04 722 205 001	1 Software Package
LightCycler® 480 LIMS/Bar-Code Module *●	04 727 886 001	1 Software Package
LightCycler® 480 Relative Quantification Software ●	04 727 851 001	1 Software Package
LightCycler® 480 Genotyping Software *●	04 727 860 001	1 Software Package
LightCycler® 480 Multiwell Plate 96 ●	04 729 692 001	50 Plates / 50 Foils
LightCycler® 480 Multiwell Plate 384 ●	04 729 749 001	50 Plates / 50 Foils
LightCycler® 480 Sealing Foil ●	04 729 757 001	50 Foils

<sup>1)</sup> Instrument package includes LightCycler® 480 Instrument, LightCycler® 480 thermal block cycler unit (96- or 384-well), LightCycler® 480 software, LightCycler® 480 Instrument Operator's Manual, LightCycler® 480 Xenon Lamp (spare lamp), LightCycler® 480 Multiwell Plates and Foils (96- or 384-well). A Pentium desktop PC is supplied with the instrument.

<sup>2)</sup> Kit package includes LightCycler® 480 thermal block cycler unit (96- or 384-well), block cycler cover, storage box.

## Ordering Information

### LightCycler® 480 Reagents and RT-PCR Products

Product	Cat. No.	Pack Size
LightCycler® 480 SYBR Green I Master *•+○ (2× concentrated)	04 707 516 001	5 × 1 ml (500 × 20 µl reactions)
	04 887 352 001	10 × 5 ml (5000 × 20 µl reactions)
LightCycler® 480 Probes Master •◆○ (2× concentrated)	04 707 494 001	5 × 1 ml (500 × 20 µl reactions)
	04 887 301 001	10 × 5 ml (5000 × 20 µl reactions)
	04 902 343 001	1 × 50 ml (5000 × 20 µl reactions)
LightCycler® 480 Genotyping Master *•× (5× concentrated)	04 707 524 001	4 × 384 µl (384 × 20 µl reactions)
LightCycler® 480 High Resolution Melting Master <sup>1)</sup>	04 909 631 001	5 × 1ml (500 × 20 µl reactions)
LightCycler® 480 CYAN 500 Labeling Reagent *	04 764 153 001	1 vial
LightCycler® 480 Control Kit *•◆	04 710 924 001	1 Kit (3 control runs)
Transcriptor First Strand cDNA Synthesis Kit <sup>2)</sup>	04 379 012 001	1 Kit (50 reactions)
	04 896 866 001	1 Kit (100 reactions)
	04 897 030 001	1 Kit (200 reactions)
Universal ProbeLibrary Set, Human ◆○▶	04 683 633 001	1 Set <sup>3)</sup>
Universal ProbeLibrary Set, Mouse ◆○▶	04 683 641 001	1 Set <sup>3)</sup>
Universal ProbeLibrary Set, Rat ◆○▶	04 683 650 001	1 Set <sup>3)</sup>
Universal ProbeLibrary Extension Set ◆○▶	04 869 877 001	1 Set <sup>3)</sup>

<sup>1)</sup> Available soon

<sup>2)</sup> For detailed information, visit [www.roche-applied-science.com/pcr](http://www.roche-applied-science.com/pcr)

<sup>3)</sup> For detailed information, visit [www.universalprobelibrary.com](http://www.universalprobelibrary.com)

### Limited Label Licenses and Disclaimers

\* This product is covered in-part by US 5,871,908 or any foreign equivalents, co-exclusively licensed from Evotec OAI AG. The purchase price includes a license to practice the methods covered by US 5,871, 908 by using the product. Purchase of this product, however, does not convey to the purchaser a license or right to (i) commercially make, have made or sell reagents and/or kits, or (ii) buy or use reagents and/or kits provided by a third party used in conjunction with the product or any other thermocycler to practice the methods covered by US 5,871,908 or any foreign equivalents.

• Parts of the Software used for the LightCycler® 480 System are licensed from Idaho Technology Inc., Salt Lake City, UT, USA.

▼ This LightCycler® 480 Real-Time PCR System is a real-time thermal cycler licensed for use in research under U.S. Patent No. 6,814,934 and corresponding claims in its non-U.S. counterparts, and under one or more of U.S. Patents Nos. 5,038,852, 5,656,493, 5,333,675, or corresponding claims in their non-U.S. counterparts, owned by Applied Biosystems. No right is conveyed expressly, by implication or by estoppel under any other patent claim, such as claims to apparatus, reagents, kits, or methods such as 5' nuclease methods. This instrument is for research use only. For further information on purchasing licenses other than for *in vitro* diagnostics, contact the Director of Licensing at Applied Biosystems, 850 Lincoln Centre Drive, Foster City, California 94404, USA.

◆ The purchase price of this product includes a limited, non-

transferable license under U.S. Patent Nos. 5,994,056 and 6,171,785 and corresponding patent claims outside the United States, owned by Roche Molecular Systems, Inc. and F. Hoffmann-La Roche Ltd ("Roche"), and under U.S. Patent No. 6,569,627 and corresponding patent claims outside the United States, licensed from Idaho Technology Inc., for using only this amount of the product for dsDNA-binding dye processes covered by said patent solely for the purchaser's own internal research and development activities. This product is also a Licensed Dye Binding Kit for use with service sublicenses available from Applied Biosystems. No right under any other patent claims (such as apparatus or system claims in U.S. Patent No. 6,814,934) and no right to use this product for any other purpose or for commercial services of any kind, including without limitation reporting the results of purchaser's activities for a fee or other commercial consideration, is hereby granted expressly, by implication, or by estoppel. This product is for research use only. Diagnostic uses require a separate license from Roche.

Further information on purchasing licenses to practice real-time PCR processes may be obtained by contacting the Director of Licensing at Applied Biosystems, 850 Lincoln Centre Drive, Foster City, California 94404, USA.

◆ A license to perform the 5' nuclease process for research requires the use of a Licensed 5' Nuclease Kit (containing Licensed Probe), or the combination of an Authorized Core Kit plus Licensed Probe, or license rights that may be purchased from Applied Biosystems. This product is an Authorized Core Kit without Licensed Probe. Its purchase price includes a limited, non-transferable immunity from suit under U.S. Patents Nos. 5,210,015, 5,487,972, 5,476,774, and 5,219,727, and corresponding patent claims outside the United States, owned by Roche Molecular Systems, Inc. or F. Hoffmann-La Roche Ltd ("Roche"), for using only this amount of the product in the practice of the 5' nuclease process solely for the purchaser's own internal research and development activities. This product is also an Authorized Core Kit for use with service sublicenses available from Applied Biosystems. This product conveys no rights under U.S. Patents Nos. 5,804,375, 6,214,979, 5,538,848, 5,723,591, 5,876,930, 6,030,787, or 6,258,569, or corresponding patent claims outside the United States, expressly, by implication, or by estoppel.

No right under any other patent claims (such as apparatus or system claims in U.S. Patent No. 6,814,934) and no right to perform commercial services of any kind, including without limitation reporting the results of purchaser's activities for a fee or other commercial consideration, is hereby granted expressly, by implication, or by estoppel. This product is for research purposes only. Diagnostic uses require a separate license from Roche. Further information on purchasing licenses to practice real-time PCR processes may be obtained by contacting the Director of Licensing, Applied Biosystems, 850 Lincoln Centre Drive, Foster City, California 94404, USA.

✕ The purchase price of this product includes a limited, non-transferable license under U.S. Patent Nos. 6,174,670, 6,245,514 and corresponding patent claims outside the United States, licensed from Idaho Technology Inc., to use only this amount of the product for HybProbe assays and related processes described in said patents solely for the research and development activities of the purchaser.

No right under any other patent claims (such as apparatus or system claims in U.S. Patent No. 6,814,934) and no right to use this product for any other purpose or for commercial services of

any kind, including without limitation reporting the results of purchaser's activities for a fee or other commercial consideration, is hereby granted expressly, by implication or estoppel.

This product is for research use only. Diagnostic uses require a separate license from Roche.

Further information on purchasing licenses to practice real-time PCR processes may be obtained by contacting the Director of Licensing, Applied Biosystems, 850 Lincoln Centre Drive, Foster City, California 94404, USA.

❖ A license to perform the 5' nuclease process for research requires the use of a Licensed 5' Nuclease Kit (containing Licensed Probe), or the combination of an Authorized Core Kit plus Licensed Probe, or license rights that may be purchased from Applied Biosystems. This product contains Licensed Probe. Its purchase price includes a limited, non-transferable immunity from suit under U.S. Patents Nos. 6,214,979 and 5,804,375 (claims 1-12 only) and corresponding patent claims outside the United States, owned by Roche Molecular Systems, Inc. or F. Hoffmann-La Roche Ltd ("Roche"), for using only this amount of probe in the practice of the 5' nuclease process solely for the purchaser's own internal research and development activities. This product is also a Licensed Probe for use with service sublicenses available from Applied Biosystems. This product conveys no rights under U.S. Patents Nos. 5,210,015 and 5,487,972, which claim 5' nuclease processes, or U.S. Patents Nos. 5,476,774 and 5,219,727, which claim quantification methodology, and corresponding patent claims outside the United States of any of the foregoing patents and no right under any other patent claims (such as apparatus or system claims in U.S. Patent No. 6,814,934) and no right to perform commercial services of any kind, including without limitation reporting the results of purchaser's activities for a fee or other commercial consideration, is hereby granted expressly, by implication, or by estoppel. This product is for research purposes only. Diagnostic uses require a separate license from Roche. Further information regarding the 5' nuclease licensing program may be obtained from the Director of Licensing, Applied Biosystems, 850 Lincoln Centre Drive, Foster City, California 94404, USA.

○ The technology used for the LightCycler® System is licensed from Idaho Technology Inc., Salt Lake City, UT, USA.

▶ ProbeLibrary is covered by US and other patent applications owned by Exiqon A/S. Locked Nucleic Acids (LNA) are covered by U.S. Patents No US 6,794,499, US 6,670,461, US 6,268,490 & US 6,770,748 and other patents and patent applications owned by Exiqon A/S and Prof. Takeshi Imanishi. The quencher used in the probes is covered by patent applications owned by Exiqon A/S.

★ This product is sold for use by purchaser only. The sale or distribution of this product or any product derived from the use of this product to any third party is expressly excluded. Especially excluded is the commercial use or sale of oligonucleotides or other products labeled with this product.

For general laboratory use. Not for use in diagnostic procedures.

## Trademarks

LIGHTCYCLER, HYBPROBE, and SIMPLEPROBE are trademarks of Roche. SYBR is a registered trademark of Molecular Probes, Inc. PROBELIBRARY and LNA are registered trademarks of Exiqon A/S, Vedbaek, Denmark. Other brands and product names are trademarks of their respective holders.



Diagnostics

Roche Diagnostics GmbH  
Roche Applied Science  
68298 Mannheim  
Germany