

Bio-Rad Thermal Cyclers



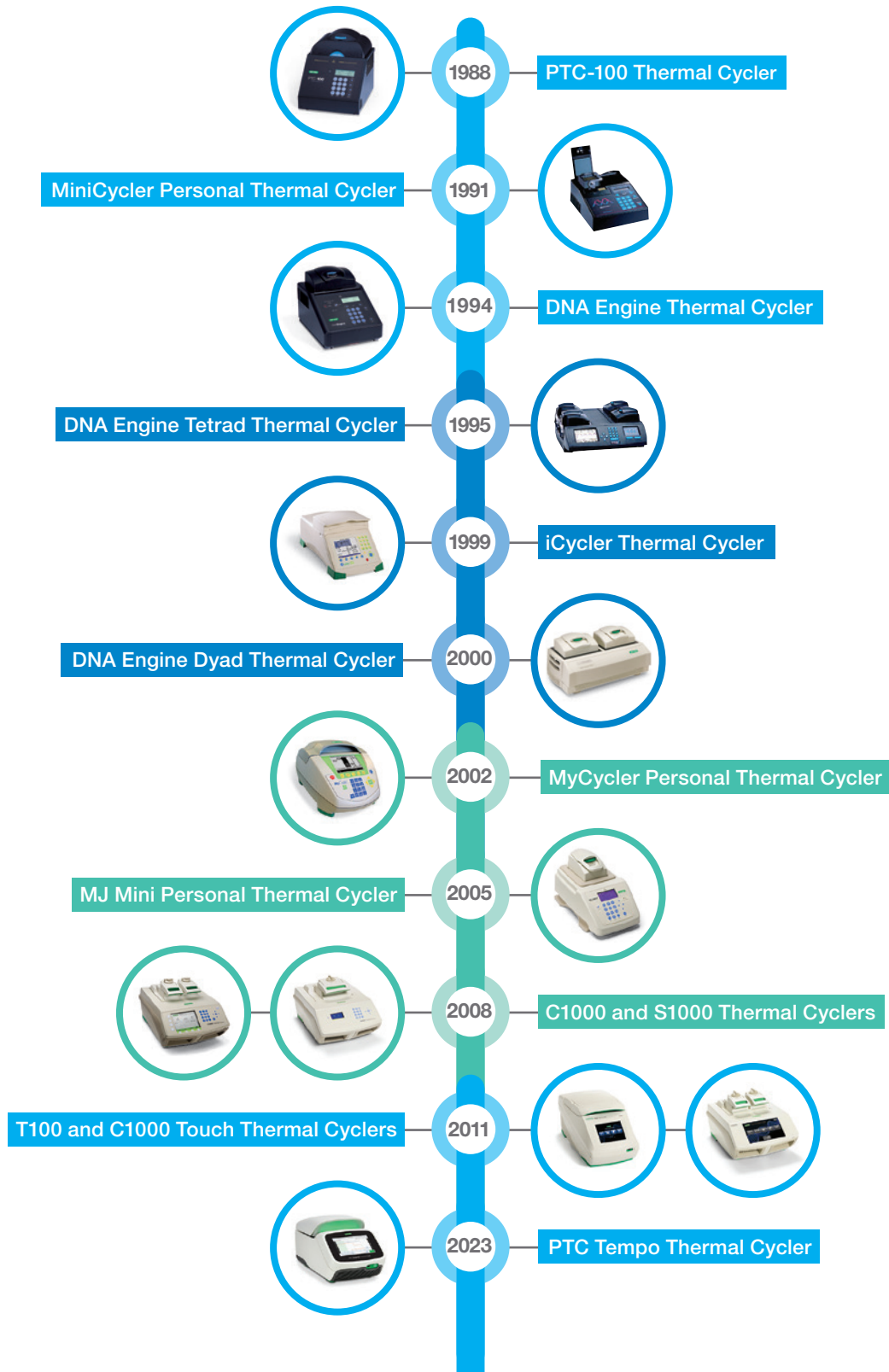
BIO-RAD THERMAL CYCLERS

PROVEN THERMAL CYCLERS



For more than 35 years, Bio-Rad Thermal Cyclers have continued to deliver the same reliability and high-quality performance. With its engineering expertise, Bio-Rad has developed and manufactured robust and efficient thermal cyclers that scientists not only want but need. These PCR systems offer enhanced usability with features designed to support academic, commercial, and biopharmaceutical laboratories in conducting basic and translational research, process development, and quality control.

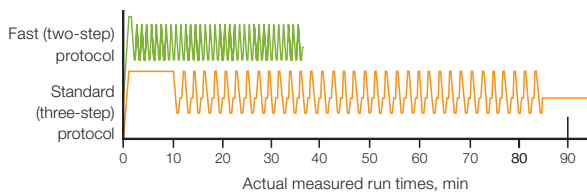
TIMELINE OF BIO-RAD THERMAL CYCLERS



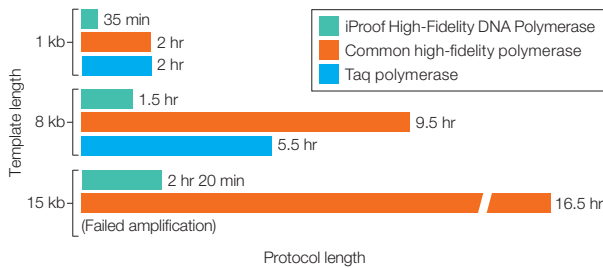
FAST AND RELIABLE PCR

PCR run times can be dramatically reduced without giving up the flexibility, modularity, and gradient capability of Bio-Rad Thermal Cyclers. With our thermal cyclers, enzymes, and reaction vessels, you can:

- Shorten PCR runs from 1.5 hr to 35 min
- Reliably amplify long (1 kb), longer (8 kb), and extra long (15 kb) targets 3–4 times faster than with standard protocols



Fast two-step protocol results are comparable to those generated using standard protocols. β-actin and β-globin targets were amplified from human genomic DNA using iTaq DNA Polymerase. Standard (S) protocol, 1.5 hr; fast (F) protocol, 35 min.

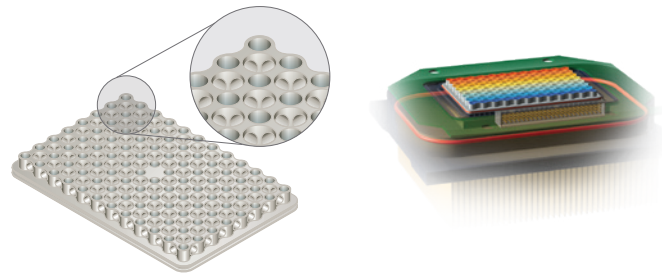


For long (1–15 kb) targets, use of iProof High-Fidelity DNA Polymerase reduces run times three- to fourfold. Targets of 1, 8, or 15 kb were amplified using three different polymerases. A two-step PCR protocol was used with iProof Polymerase; three-step protocols using the shortest recommended extension times were used with other polymerases. Because iProof Polymerase requires an annealing temperature 5–8°C above typical annealing temperatures, two-step protocols often can be run without redesigning primers.

UNIFORM THERMAL CYCLING

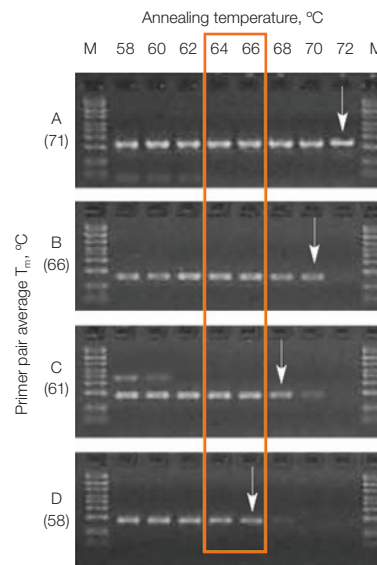
Superior Uniformity and Fast Ramping

It is critical that all wells maintain the proper temperature throughout each PCR step. The PTC Tempo Thermal Cycler has six independently controlled thermal electric modules (the heating and cooling elements of the thermal cycler) to maintain tight temperature uniformity at all points during a run — even during ramping. The patented reduced-mass sample block* heats and cools more quickly than standard blocks, improving thermal uniformity and minimizing edge effects.



Optimize Reactions with Thermal Gradients

- Optimized annealing temperatures to improve speed and specificity of PCR
- Multizone temperature control ensures accuracy and reproducibility for dependable results
- Dynamic ramping keeps incubation times constant
- Thermal gradient feature is available on all Bio-Rad Thermal Cyclers



Gradient optimization of different PCR reactions. All reactions were evaluated in a single run. Four different primer sets (A, B, C, and D) were designed and tested for amplification. Arrows indicate the annealing temperature that provided the highest specificity while maintaining good yield. Orange box indicates optimal temperatures. M, markers; T_m , melting temperature.

* U.S. patents 7,955,573, 8,367,014, 8,557,196, and 7,632,464.

DEPENDABLE SERVICE AND SUPPORT



Bio-Rad provides a comprehensive suite of services to ensure that your instruments are cared for and perform to our standard of quality, run after run. Our professional, knowledgeable, and experienced technical support specialists and service engineers are committed to quality and service. From research to regulated environments, Bio-Rad will help care for your investment and keep your projects in motion. Confirm that your PTC Tempo Thermal Cycler is performing at its highest accuracy and uniformity with thermal qualification services. Guarantee with documentation the proper installation and operation of your instrument by taking advantage of Installation Qualification and Operational Qualification Services.



Thermal Qualification Services

To confirm optimal performance of your PTC Tempo Thermal Cycler, a trained and certified Bio-Rad service engineer will:

- Assess PCR block accuracy, thermal uniformity, and instrument ramp rate
- Complete a rapid temperature cycling protocol mimicking an actual experiment to confirm that thermal block setting times are within specifications
- Provide an accurate qualification in accordance with National Institute of Standards and Technology (NIST) standards

Visit bio-rad.com/ThermalValidation for more information.



Installation Qualification (IQ) and Operational Qualification (OQ) Services

A certified service engineer will document that instruments are installed and functioning properly and ensure that instruments will generate reliable and reproducible data.

- Maximize instrument uptime with planned instrument qualification services that ensure your instruments are performing according to specifications
- Increase your confidence with instrument validation that helps minimize loss of precious samples and valuable time
- Meet regulatory compliance requirements

Visit bio-rad.com/IQOQ for more information.

Expertise

35+ years in **PCR**

Reliability

Thousands of systems installed in **160+** countries

Innovation

Top market leader in PCR

COMPATIBLE PCR PLASTICS

Bio-Rad offers a broad selection of reaction vessels, including 0.5 and 0.2 ml tubes, high-profile and low-profile microplates, and high-density 384-well plates, allowing you to choose the best vessel for your application. A full selection of reliable sealers is available and can be selected based on vessel type, cycling application, or storage method. Use the table below to find the best vessels and sealers to use in your Bio-Rad Thermal Cycler.

Thermal Cycler Compatibility with PCR Plastic Consumables

Catalog #	Tubes			384-Well Plate		
	Individual, High-Profile	Strips, High-Profile	Strips, Low-Profile	Hard-Shell™ Standard		
	TFI0201, TWI0201	TBSxxxx, TBCxxxx	TLSxxxx	HSP3xxx		
PTC Tempo Thermal Cycler	✓	▲	✓	✓		
C1000, C1000 Touch, S1000 Thermal Cyclers	✓	▲	✓	✓		
T100, iCycler, MyCycler Thermal Cyclers	✓	✓				
DNA Engine, DNA Engine Tetrad, DNA Engine Tetrad 2, DNA Engine Dyad, Dyad Disciple, PTC-100 Thermal Cyclers	✓	▲	✓	✓		
MJ Mini Thermal Cycler	✓	▲	✓			

Catalog #	96- and 48-Well Plates					
	Hard-Shell Semi-Skirted High-Profile	Hard-Shell Skirted Low-Profile	Hard-Shell Semi-Skirted Low-Profile	Multiplate Unskirted High-Profile	Multiplate Unskirted Low-Profile	iQ Semi-Skirted High-Profile
	HSS9xxx	HSP9xxx	HSL9xxx	MLPxxxx	MLLxxxx	2239441
PTC Tempo Thermal Cycler	✓	✓	✓	✓	✓	✓
C1000, C1000 Touch, S1000 Thermal Cyclers	▲	✓	▲	▲	▲	▲
T100 Thermal Cycler	✓			▲		▲
DNA Engine, DNA Engine Tetrad, DNA Engine Tetrad 2, DNA Engine Dyad, Dyad Disciple, PTC-100 Thermal Cyclers	▲	✓		▲	▲	▲
iCycler Thermal Cycler	✓			✓		▲
MyCycler Thermal Cycler				✓		▲
MJ Mini Thermal Cycler				▲	✓	

Catalog #	PCR Plate Seals and Cap Strips					
	Microseal™ 'A' PCR Plate and PCR Tube Sealing Film	Microseal 'B' PCR Plate Sealing Film	Microseal 'C' PCR Plate Sealing Film	Microseal 'F' PCR Plate Seal	Domed 8-Cap Strips	Optical Flat 8-Cap Strips
	MSA5001	MSB1001	MSC1001	MSF1001	TCS0801	TCS0803
PTC Tempo Thermal Cycler	✓	✓	✓	✓	▲	✓
C1000, C1000 Touch, S1000, T100, iCycler, MyCycler, DNA Engine, DNA Engine Tetrad, DNA Engine Tetrad 2, DNA Engine Dyad, Dyad Disciple, PTC-100 Thermal Cyclers	▲	✓	✓	✓	▲	▲
MJ Mini Thermal Cycler					✓	✓

PCR Plate Sealer and Heat Seals

Catalog #	PCR Plate Heat Seals			
	Optically Clear Heat Seal	Permanent Clear Heat Seal	Pierceable Foil Heat Seal	Peelable Foil Heat Seal
	1814030	1814035	1814040	1814045
PX1 PCR Plate Sealer	✓	✓	✓	✓

✓ Recommended ▲ Compatible

For more information, request [bulletin 6090](#).

SYSTEM SPECIFICATIONS

Thermal cyclers are essential laboratory equipment for scientists performing sequencing, cloning, genotyping, mutagenesis, and many other applications. Features common to all Bio-Rad Thermal Cyclers include Peltier effect technology, which allows precise temperature control, and gradient capability with 8 or 16 temperature points for optimizing PCR assays easily in a single run. Instruments range from the economical T100 Thermal Cycler to the various models of PTC Tempo Thermal Cyclers.

Specifications

	PTC Tempo Thermal Cycler	T100 Thermal Cycler
Key features	<ul style="list-style-type: none"> Flexible performance for demanding applications and multiple users Secure user mode for enhanced security Automation compatibility (96-well, deepwell, and 384-well) 	<ul style="list-style-type: none"> Robust and economical for routine PCR Compact footprint
System tour	bio-rad.com/PTCTempoTourVideo	bio-rad.com/T100TourVideo
Block formats	<ul style="list-style-type: none"> Independent blocks: dual 48/48-well (0.2 ml) Faster ramping: 96-well (0.2 ml) Higher volume: deepwell (0.2 and 0.5 ml) High throughput: 384-well 	96-well (0.2 ml high-profile)
Lid type	<ul style="list-style-type: none"> Automated: 96-well, deepwell, 384-well Nonautomated: 48/48-well 	Nonautomated: 96-well
User interface	8 in. graphical touch screen	5.7 in. graphical touch screen
PCR consumables	Both high- and low-profile tubes and plates	Only high-profile tubes and plates
Thermal accuracy	±0.2°C of programmed target at 90°C	±0.5°C of programmed target
Thermal uniformity	±0.4°C well-to-well within 10 sec of arrival at 90°C	±0.5°C well-to-well within 30 sec
Ramp rate	<ul style="list-style-type: none"> 96-well: maximum is 5°C/sec; average is 3.3°C/sec Deepwell: maximum is 2.5°C/sec; average is 2°C/sec 48/48-well: maximum is 4°C/sec; average is 3°C/sec 384-well: maximum is 2.5°C/sec; average is 2°C/sec 	Maximum is 4°C/sec; average is 2.5°C/sec
Temperature range	4–100°C	4–100°C
Thermal gradient	<ul style="list-style-type: none"> Operational range: 30–100°C Programmable span: <ul style="list-style-type: none"> 96-well, deepwell, 48/48-well: 8 rows, 1–24°C 384-well: 16 rows, 1–24°C 	<ul style="list-style-type: none"> Operational range: 30–100°C Programmable span: 8 rows, 1–25°C
Dimensions (W x D x H)	28 x 50 x 26 cm (11 x 20 x 10 in.)	26 x 47 x 23 cm (10 x 18 x 9 in.)
Weight	<ul style="list-style-type: none"> 96-well, deepwell, and 384-well: 15 kg (33 lb) 48/48-well: 14 kg (31 lb) 	9 kg (20 lb)
Communications	WiFi, BR.io, USB-A 2.0, Ethernet, USB barcode scanner	USB-A 2.0
Estimated memory capacity	100,000 files, which include protocols and run reports	500 protocols

* Depending on reaction module. Go to bio-rad.com/CyclersMore for complete specifications.

Ordering Information

Catalog #	Description	Catalog #	Description
Instruments			
12015382	PTC Tempo 96 Thermal Cycler	MSA5001	Microseal 'A' PCR Plate and PCR Tube Sealing Film, nonadhesive sealing film, 50
12015392	PTC Tempo Deepwell Thermal Cycler	MSB1001	Microseal 'B' PCR Plate Sealing Film, adhesive, optical, 100
12015309	PTC Tempo 48/48 Thermal Cycler	MSC1001	Microseal 'C' PCR Plate Sealing Film, adhesive, optical, 100
12015394	PTC Tempo 384 Thermal Cycler	MSF1001	Microseal 'F' PCR Plate Seal, foil, pierceable, 100
1814000	PX1 PCR Plate Sealer	1814030	PCR Plate Heat Seal, clear, optical, 100
Accessories			
12018650	PTC Tempo Thermal Cycler WiFi Adapter, U.S. only	1814040	PCR Plate Heat Seal, foil, pierceable, 100
12018509	PTC Tempo Thermal Cycler WiFi Adapter, global	1814045	PCR Plate Heat Seal, foil, peelable, 100
1849000	Tube Frame for 0.2 ml Tubes, for use with 48/48- and 96-well reaction modules	Agaroses	
1849001	Tube Frame for 0.2 ml Tubes, for use with 96-deep well and deepwell reaction modules	1613102	Certified Molecular Biology Agarose, 500 g
12020274	Tube Frame for 0.5 ml Tubes, for use with 96-deep well and deepwell reaction modules	1613107	Certified Low Range Ultra Agarose, 125 g
12014294	Plate Lifter for 384-Well Reaction Module	1613112	Certified Low Melt Agarose, 125 g, for DNA fragments ≥1,000 bp
12019776	PTC Tempo Thermal Cycler API, 1 license	1613115	Certified PCR Low Melt Agarose, 500 g, for DNA fragments ≤1,000 bp
12013205	Ethernet Cable	1613105	Certified PCR Agarose, 500 g, for DNA fragments ≤1,000 bp
Reagents			
1725310	iProof HF Master Mix, 100 x 50 µl reactions, 2.5 ml	Buffers	
1725320	iProof GC Master Mix, 100 x 50 µl reactions, 2.5 ml	1610770	10x TBE (Tris/Boric Acid/EDTA) Buffer, 5 L
1708870	iTaq DNA Polymerase, 250 U (5 U/µl), 50 µl	1610733	10x TBE (Tris/Boric Acid/EDTA) Buffer, 1 L
1708872	MgCl ₂ Solution for PCR, 50 mM, 1.25 ml	1610773	50x TAE (Tris/Acetic Acid/EDTA) Buffer, 5 L
1708874	dNTP Solution Mix, 10 mM, 200 µl	1610743	50x TAE (Tris/Acetic Acid/EDTA) Buffer, 1 L
12012802	Reliance Select cDNA Synthesis Kit, 25 x 20 µl reactions	1610433	Ethidium Bromide Solution, 10 mg/ml
1708840	iScript Reverse Transcription Supermix, 25 x 20 µl reactions	1610729	EDTA, 500 g, ≥99% pure
1725034	iScript gDNA Clear cDNA Synthesis Kit, 25 x 20 µl reactions	1610716	Tris, 500 g, ≥99.8% pure
1725037	iScript Advanced cDNA Synthesis Kit, 25 x 20 µl reactions	Horizontal Electrophoresis	
1708896	iScript Select cDNA Synthesis Kit, 25 x 20 µl reactions	1704486	Mini-Sub™ Cell GT Horizontal Electrophoresis System
1708890	iScript cDNA Synthesis Kit, 25 x 20 µl reactions	1640300	Mini-Sub Cell GT Horizontal Electrophoresis System and PowerPac Basic Power Supply
Plastics			
TLS0801	0.2 ml 8-Tube PCR Strips without Caps, low profile, clear, 120	1704485	Wide Mini-Sub Cell GT Horizontal Electrophoresis System
TFI0201	0.2 ml PCR Tubes with Flat Caps, high profile, clear, 1,000	1640301	Wide Mini-Sub Cell GT Horizontal Electrophoresis System and PowerPac Basic Power Supply
TWI0201	0.2 ml PCR Tubes with Domed Caps, high profile, clear, 1,000	1704482	Sub-Cell™ GT Horizontal Electrophoresis System
TBS0201	0.2 ml 8-Tube PCR Strips without Caps, high profile, clear, 125	1640302	Sub-Cell GT Horizontal Electrophoresis System and PowerPac Basic Power Supply
TBC0802	0.2 ml 8-Tube PCR Strips and Domed Cap Strips, high profile, clear	Rulers	
TCS0803	0.2 ml Flat PCR Tube 8-Cap Strips, optical, ultraclear	1708351	EZ Load 20 bp Molecular Ruler, 20–1,000 bp, 50 bands
HSP9601	Hard-Shell 96-Well PCR Plates, low profile, thin wall, skirted, white/clear, 50	1708352	EZ Load 100 bp Molecular Ruler, 100–1,000 bp, 10 bands
MLL9601	Multiplate 96-Well PCR Plates, low profile, unskirted, clear, 25	1708353	EZ Load 100 bp PCR Molecular Ruler, 100–3,000 bp, 30 bands
HSL9601	Hard-Shell 96-Well PCR Plates, low profile, semi-skirted, clear/clear, 25	1708354	EZ Load 500 bp Molecular Ruler, 500–8,000 bp, 16 bands
HSL9605	Hard-Shell 96-Well PCR Plates, low profile, semi-skirted, clear/white, 25	1708355	EZ Load 1 kb Molecular Ruler, 1–15 kb, 15 bands
HSL9905	Hard-Shell 96-Well PCR Plates, low profile, semi-skirted, clear/white, barcoded, 25	1708200	AmpliSize™ Molecular Ruler, 50–2,000 bp, 10 bands
HSS9601	Hard-Shell 96-Well PCR Plates, high profile, semi-skirted, clear/clear, 25	Imaging	
HSS9901	Hard-Shell 96-Well PCR Plates, high profile, semi-skirted, clear/clear, barcoded, 25	12009077	GelDoc Go Gel Imaging System with Image Lab Touch Software, includes UV/Stain-Free Imaging Tray
MLP9601	Multiplate 96-Well PCR Plates, high profile, unskirted, clear, 25	1660531	UView Mini Transilluminator
MLL4801	Multiplate 48-Well PCR Plates, low profile, unskirted, clear, 50	Visit bio-rad.com/CyclersMore for more information.	
MLP4801	Multiplate 48-Well PCR Plates, high profile, unskirted, clear, 50	 Bio-Rad PCR reagents and analytical instruments are manufactured under an ISO 13485:2016 certified Quality Management System and are quality control tested to ensure consistent product performance you can trust.	
HSP3801	Hard-Shell 384-Well PCR Plates, thin wall, skirted, clear/clear, 50	BIO-RAD, AMPLISIZE, DDPCR, HARD-SHELL, MICROSEAL, MINI-SUB, and SUB-CELL are trademarks of Bio-Rad Laboratories, Inc. in certain jurisdictions. All trademarks used herein are the property of their respective owner. © 2023 Bio-Rad Laboratories, Inc.	
HSP3901	Hard-Shell 384-Well PCR Plates, thin wall, skirted, clear/clear, barcoded, 50	The Mini-Sub Cell GT, Wide Mini-Sub Cell GT, and Sub-Cell GT Cell Systems and/or their use are covered by the following U.S. patent and/or pending U.S. patent application or their foreign counterparts owned by or under license to Bio-Rad Laboratories, Inc., including, but not limited to, U.S. Patent No.8,262,889.	
12001925	ddPCR™ 96-Well Plates, semi-skirted, clear/clear, 25		

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