Typhoon 9410 Gel and Blot Imager Data Sheet

Typhoon Variable Mode Imager

Multicolor fluorescence, filmless autoradiography, and chemiluminescence

Amersham Biosciences has been manufacturing highly sensitive imaging instrumentation for over a decade. Typhoon™ Variable Mode Imager unites proven storage phosphor autoradiography technology with four-color fluorescent labelling techniques for maximum data quality in a single, high-throughput system (Fig 1).

For DNA, RNA, and protein samples, users can choose from:
- storage phosphor autoradiography
- direct green (532 nm) excited fluorescence
- direct red (633 nm) excited fluorescence
- direct blue (457 nm) excited fluorescence (Typhoon 9400/9410 only)
- direct blue (488 nm) excited fluorescence (Typhoon 9400/9410 only)
- chemiluminescence

When one of the six scanning modes is selected, the appropriate optical components are automatically activated. Typhoon scans mounted and unmounted storage phosphor screens, plus gels and blots up to 35 × 43 cm as well as microarray slides for Typhoon 9210 and 9410 models. Typhoon Variable Mode Imager exhibits outstanding linearity and quantitative accuracy, and includes ImageQuant™ Image Analysis Software for Windows™ 2000.

Typhoon is fully optimized as part of the Ettan™ DIGE system, and seamless integration with DeCyder™ Differential Analysis Software is ensured for all models. Special tray templates that are part of the latest scanner control software and new optional Gel Alignment Guides add higher throughput and ease of handling 2-D gels run on Ettan DALT and SE600.

Typhoon Model	**9200**	**9210**	**9400**	**9410**
Phosphorimaging	Yes	Yes	Yes	Yes
633 nm-Fluorescence	Yes	Yes	Yes	Yes
532 nm-Fluorescence	Yes	Yes	Yes	Yes
488 nm-Fluorescence	–	–	Yes	Yes
457 nm-Fluorescence	–	–	Yes	Yes
Chemiluminescence	Yes	Yes	Yes	Yes
Microarray	–	Yes	–	Yes

Table 1. Each Typhoon model offers different features, and for maximum flexibility, each model has an upgrade path.

Components

- Typhoon scanner with TCP/IP, scan control software for Windows 2000
- ImageQuant Image Analysis Software for Windows 2000
- User's guide
- Microarray slide holder (Typhoon 9210/9410 only)
- Ettan DIGE components sold separately

Detection threshold

Storage phosphor
Storage phosphor screens retain energy from beta particles, X-rays, and gamma rays. The lower limit of detection for a 1-h exposure is less than 2 dpm/mm2 for 14C (200 µm only). The lower limit of detection for 32P is typically 5–10 times lower than the limit for 14C.

• 488 nm-excited fluorescence (Typhoon 9400/9410 only) 100 amol fluorescein end-labelled DNA oligonucleotide
in 12% polyacrylamide gel sandwich, 0.4 mm thick.
• 532 nm-excited fluorescence 200 amol HEX™, TAMRA™, ROX™, and 400 amol fluorescein end-labelled DNA oligo-nucleotide in 12% polyacrylamide gel sandwich, 0.4 mm thick.
• 633 nm-excited fluorescence 200 amol Cy™5 end-labelled DNA oligonucleotide in 12% polyacrylamide gel sandwich, 0.4 mm thick.

Light measurement

Storage phosphor
Light is emitted from the storage phosphor screen in proportion to the amount of radioactivity in the sample upon laser-induced stimulation. Emitted light is collected and converted to an electrical signal by a photomultiplier. The electrical signal is digitized to permit image display and analysis.

Fluorescence
Upon excitation, light is emitted from a fluorescently-labelled sample in proportion to the amount of labelled compound in the sample. Emitted light is collected and converted to an electrical signal by a photomultiplier. The electrical signal is digitized for image display and analysis.

Chemiluminescence

Emitted light from a chemiluminescent reaction is collected and converted to an electrical signal by a photomultiplier. The electrical signal is digitized for image display and analysis.

Data Storage
Data are stored in a square root encoded 16-bit TIFF to provide the digital resolution required to characterize subtle signal intensity differences over the wide dynamic range of the instrument.

Specifications

Spatial Resolution

	Typhoon 9200	Typhoon 9210	Typhoon 9400	Typhoon 9410
Storage phosphor autoradiography	2 line pairs/mm	2 line pairs/mm	2 line pairs/mm	2 line pairs/mm
Green-excited fluorescence	8 line pairs/mm	10 line pairs/mm	8 line pairs/mm	10 line pairs/mm
Red-excited fluorescence	8 line pairs/mm	10 line pairs/mm	8 line pairs/mm	10 line pairs/mm
Blue-excited fluorescence	N/a	N/a	8 line pairs/mm	10 line pairs/mm

Emission filters

Filter type	Wavelength range (nm)	Fluorochromes
520 nm-bandpass (520 BP 40)*	500–540	Cy2, ECL Plus™, Vistra Green™ fluorescein**
555 nm-bandpass (555 BP 20)	545–565	R6G, HEX
580 nm-bandpass (580 BP 30)	565–595	Cy3, TAMRA
610 nm-bandpass (610 BP 30)	595–625	ROX, ethidium bromide, SYPRO™ Ruby
670 nm-bandpass (670 BP 30)	655–685	Cy5
526 nm-short-pass (526 SP)	< = 526	Fluorescein$, Vistra Green
560 nm-long-pass (560 LP)	<= 560	TRITC

** For Typhoon 9400/9410 models only.*
*** With blue excitation*
$ With green excitation

Exposure time
Typically, storage phosphor screen exposure takes 10% of the time for an equivalent exposure to conventional film.

Single or dual-channel scanning time (min)

pixel size (µm)		1000*	500	200	100	50	25
20 × 25 cm	1	2	5	9	19	92	
35 × 43 cm	2	4	10	21	40	167	

For Typhoon 9210/9410 models only

pixel size (µm)	10
2 × 8 cm (1 slide)	8
2 × 18 cm (2 slides)	16

Green light source
- Type: 20 mW solid state, doubled frequency SYAG laser
- Estimated average lifetime: ~10 000 h
- Wavelength: 532 nm

Blue light source (Typhoon 9400/9410 only)
• Type: 30 mW, Argon ion laser
• Estimated average lifetime: ~5 000 h
• Wavelength: 488 nm (20 mW), 457 nm (4 mW)

Four-channel linked scanning time (min)

pixel size (µm)	1000*	500	200	100	50	25
20 × 25 cm	3	5	9	19	37	186
35 × 43 cm	6	10	21	40	80	335

For Typhoon 9210/9410 models only

pixel size (µm)	10
2 × 8 cm (1 slide)	17
2 × 18 cm (2 slides)	32

**Not recommended for quantitative analysis.*

Uniformity
± 5% over entire scan area

Pixel accuracy
± 0.15%

Data format
16-bit (65 536 levels), TIFF (.GEL file extension)

Linearity
Less than 7.5% relative standard deviation for entire dynamic range

Linear dynamic range
Five orders of magnitude (100000:1)

External interface
10 Base-T Ethernet using the TCP/IP protocol

Software
• Scan control software for Windows 2000
• ImageQuant image analysis software for Windows 2000

Red light source
• Type: 10 mW Helium-Neon laser
• Estimated average lifetime: ~10 000 h
• Wavelength: 632.8 nm