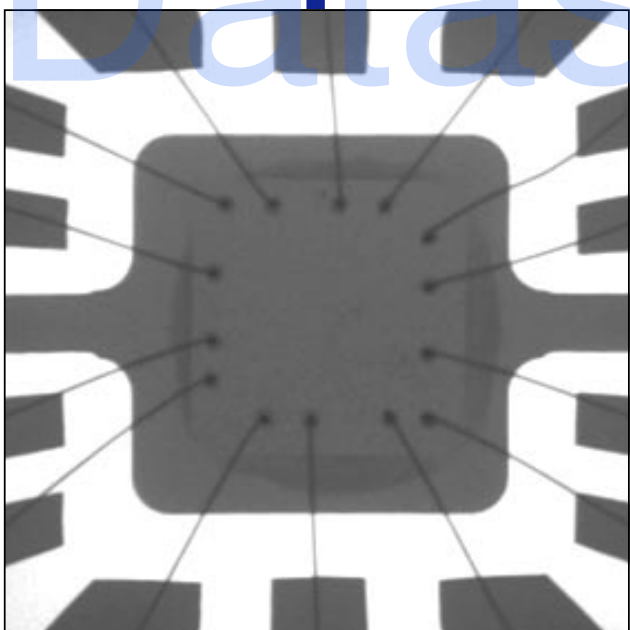


MICROFOCUS

80kV TYPE : L6731-01 / 130kV TYPE : L6622-01

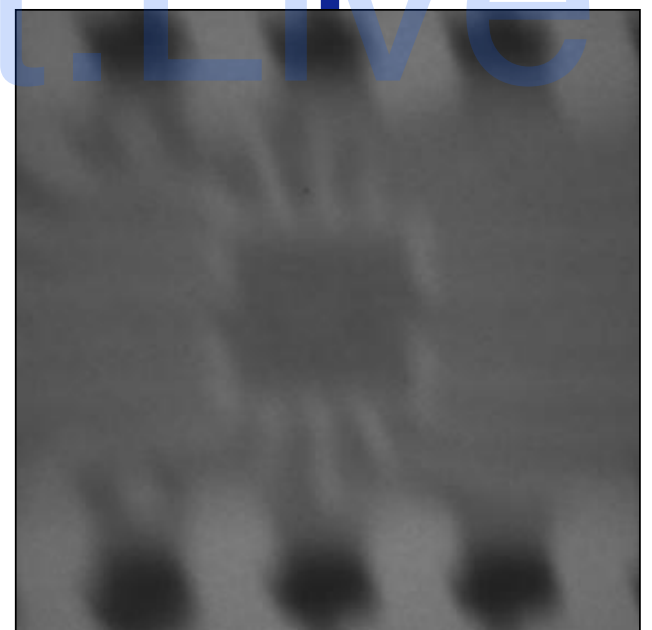
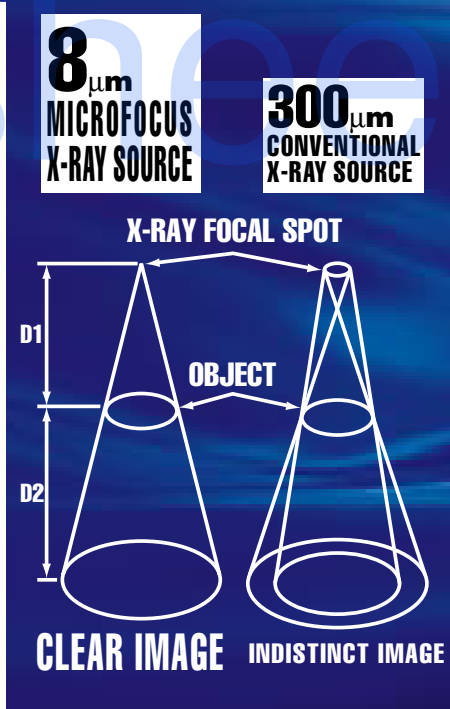
X-RAY SOURCE

Database at Live



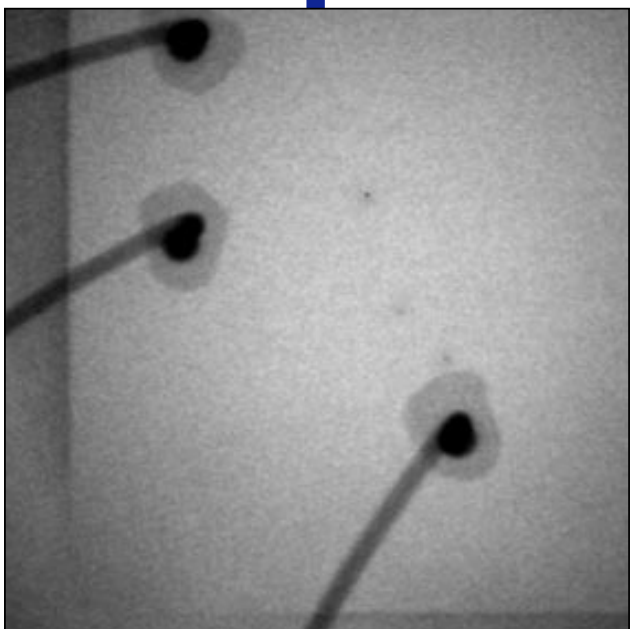
Target Voltage:45kV

×10



Target Voltage:70kV

×6



Target Voltage:70kV

×100

HAMAMATSU

In X-ray imaging, the magnification and resolution are determined by the focal spot size of the X-ray source. Hamamatsu is now offering microfocus X-ray sources ideal for those customers not satisfied with conventional X-ray imaging.

INDUSTRIAL

Aluminum die-cast would contain a number of "micro-crack" or "voids". Our Microfocus X-ray Source enables you to obtain fine images of these failures.

**Torque converter (Aluminum die-casting : 20mmt)
X-ray Source/Target Voltage : 110kV**

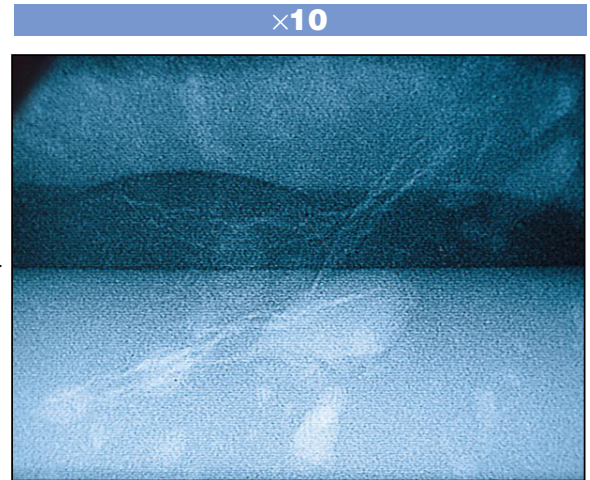
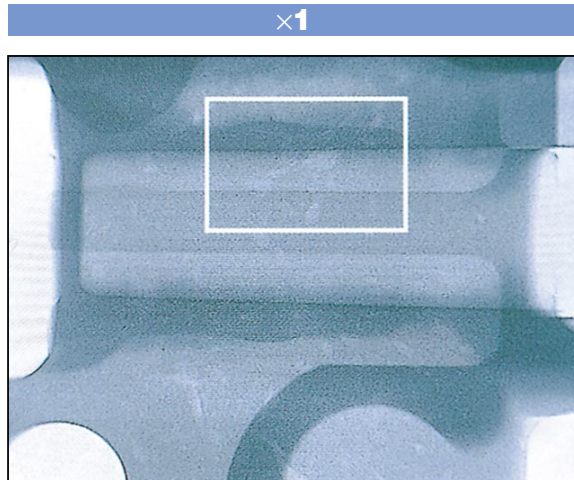
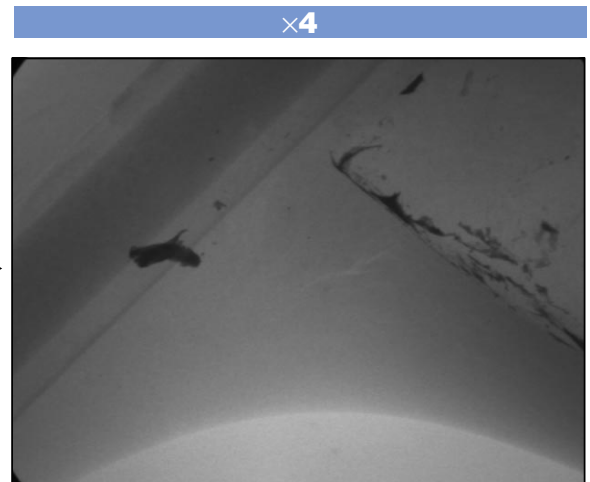


Photo courtesy of SHIMADZU MECTEM,INC

INDUSTRIAL

Golf Club Head
A golf club head is made from carbon or titanium. You can observe welded points.

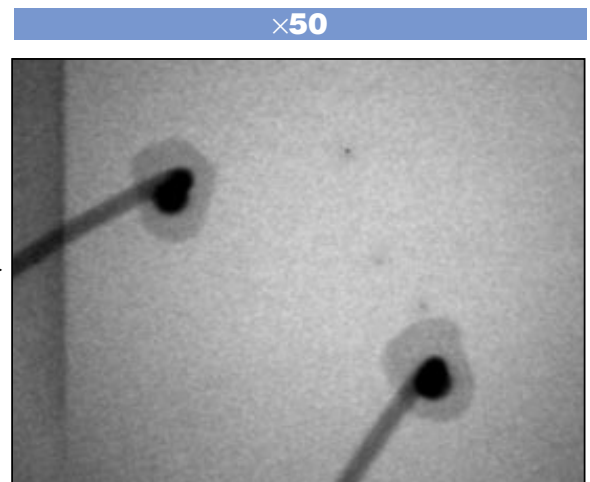
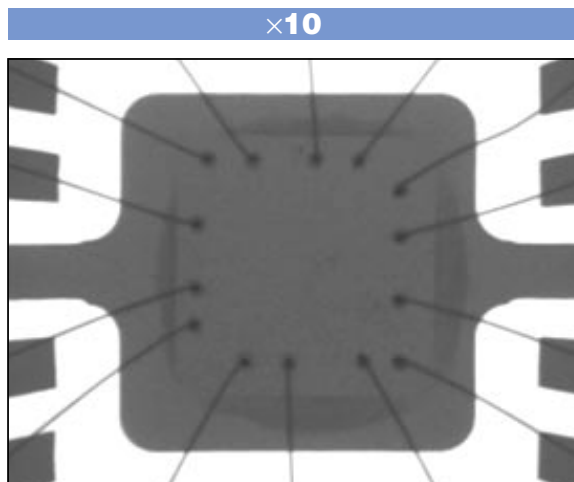
**Golf club head (Carbon)
X-ray Source/Target Voltage : 50kV**



ELECTRONICS

An X-ray image of IC/LSI bonding wire, displayed in a very high magnification yet retaining a high quality image. This image shows resolution good enough to allow you to find the critical details of discontinuity in bonding wires whose dimensions are steadily being made small these days.

**IC (Bonding Wire)
X-ray Source/Target Voltage : 40kV**



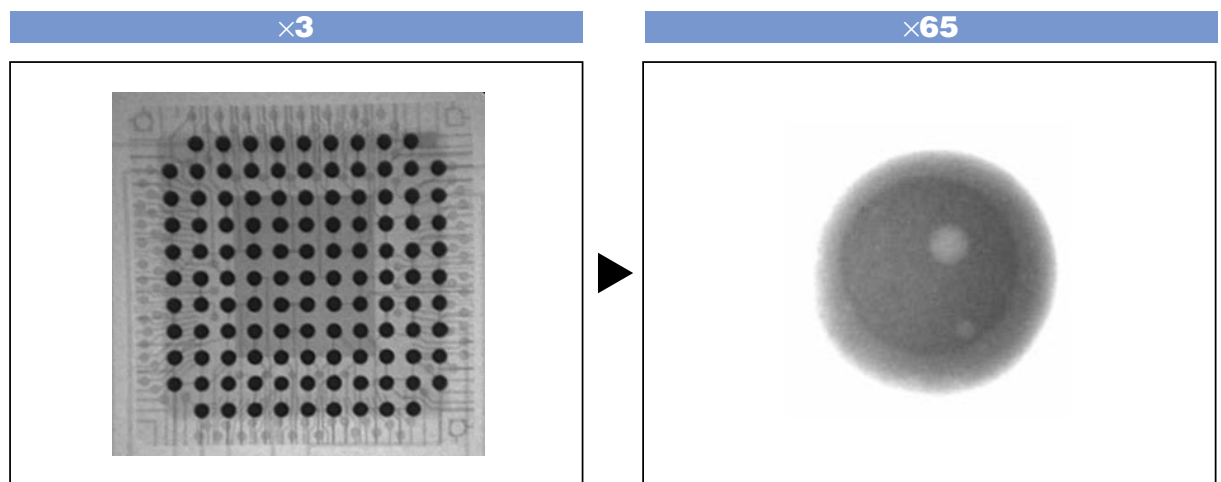
MICROFOCUS X-RAY SOURCE

80kV TYPE : L6731-01 / 130kV TYPE : L6622-01

SOLDERING

Observing voids in a CSP solder ball. Voids can be clearly seen in the 100 μ m diameter solder ball.

C.S.P (Chip Size Package) X-ray Source/Target Voltage : 80kV

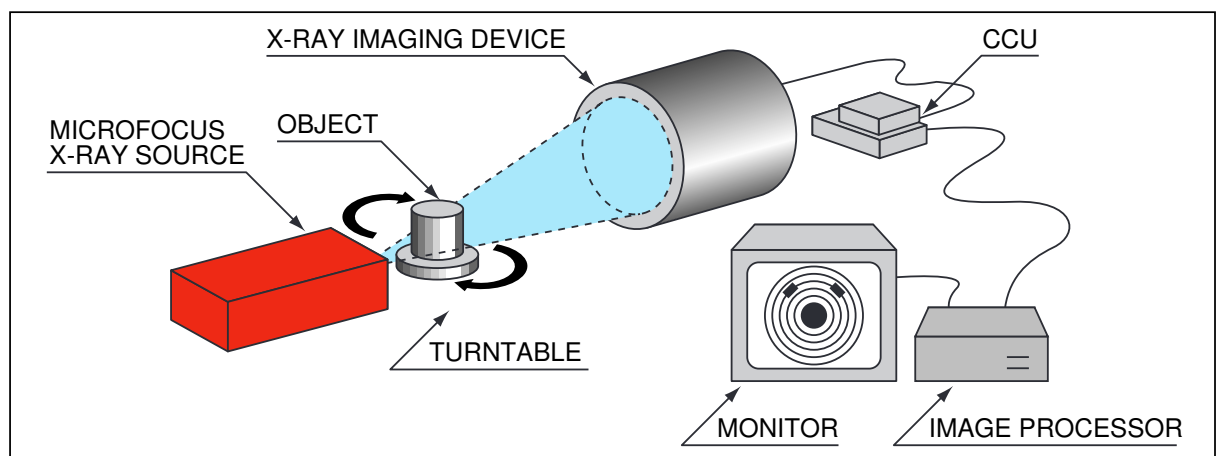


X-RAY CT IMAGING

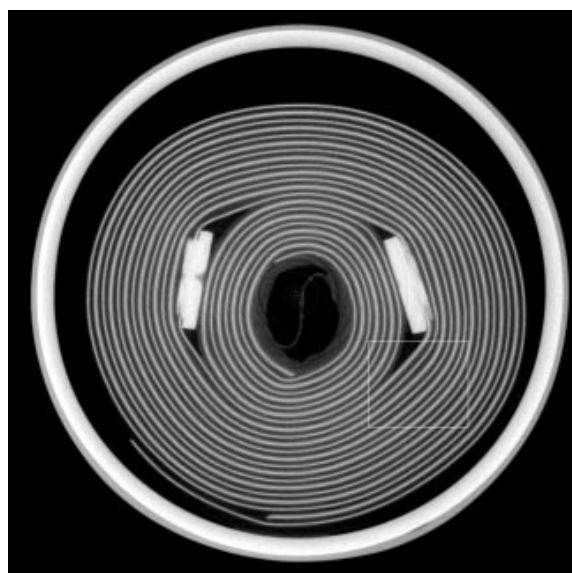
A clear tomographic image of an object can be obtained by X-ray CT technique using microfocus X-ray sources. Even when the imaging device or method is changed, high resolution and high magnification X-ray images can still be taken as demanded by the application.

IMAGING METHOD

An object is placed on a turntable and X-rays are irradiated on the rotating object. X-ray images transmitting through the object are computed and processed to reconstruct a tomographic image as shown below.



Bipolar Electrolytic Capacitor
(X-ray Source / Target Voltage:75kV)



Rat Thighbone
(X-ray Source / Target Voltage:80kV)

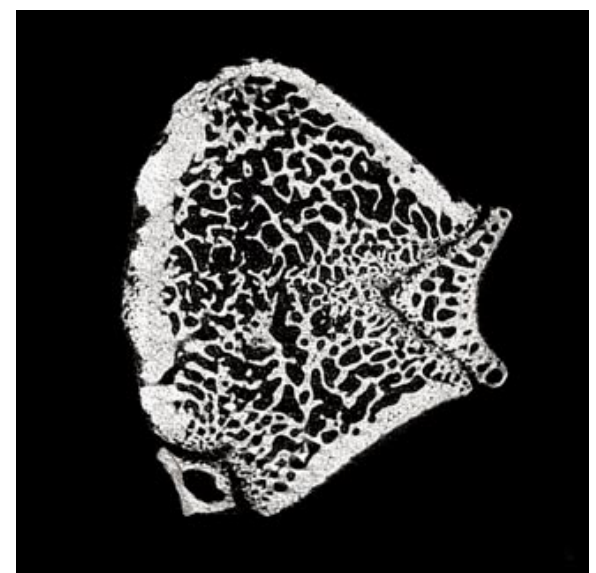


Photo courtesy of NITTETSU ELEX CO.,LTD

The appeal of Hamamatsu microfocus X-ray sources doesn't lie just in the size of the focal point.

REASON

SAFETY

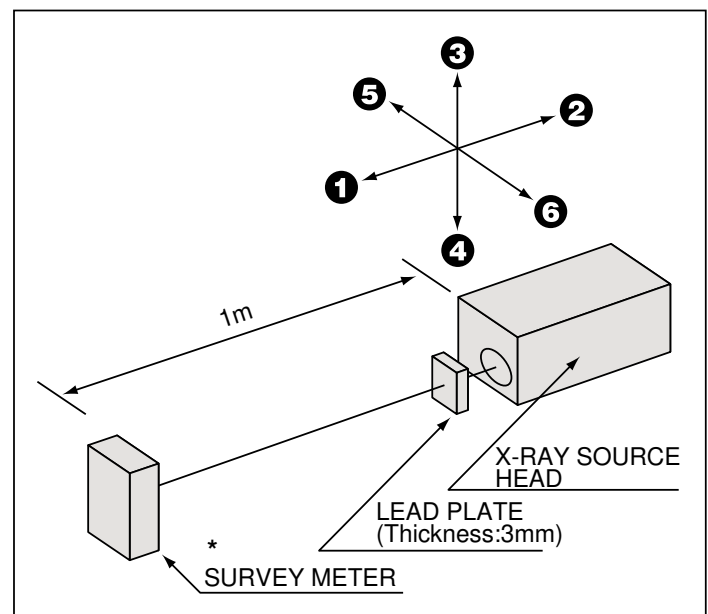
LOW X-RAY DOSE LEAKAGE

The X-ray dose leaking out from the X-ray source head is extremely low, requiring only small amounts of shielding materials. This permits you to design and construct a lightweight X-ray cabinet which is still sufficiently safe.

DERECTION	80kV L6731-01 mSV/h(R/h)	130kV L6622-01 mSV/h(R/h)
①	0.5×10^{-3} (0.1×10^{-3})	0.2 (0.1)
②	0.2×10^{-3} (0.05×10^{-3})	0.05 (0.025)
③	1.0×10^{-3} (0.5×10^{-3})	0.2 (0.1)
④	0.5×10^{-3} (0.1×10^{-3})	1.2 (0.6)
⑤	0.5×10^{-3} (0.1×10^{-3})	0.2 (0.1)
⑥	0.5×10^{-3} (0.1×10^{-3})	1.0 (0.5)

* VICTOREEN : Ion Chamber Survey Meter Model:450B-SI
* BICRON : Surveyor 2000

MEASUREMENT DIAGRAM



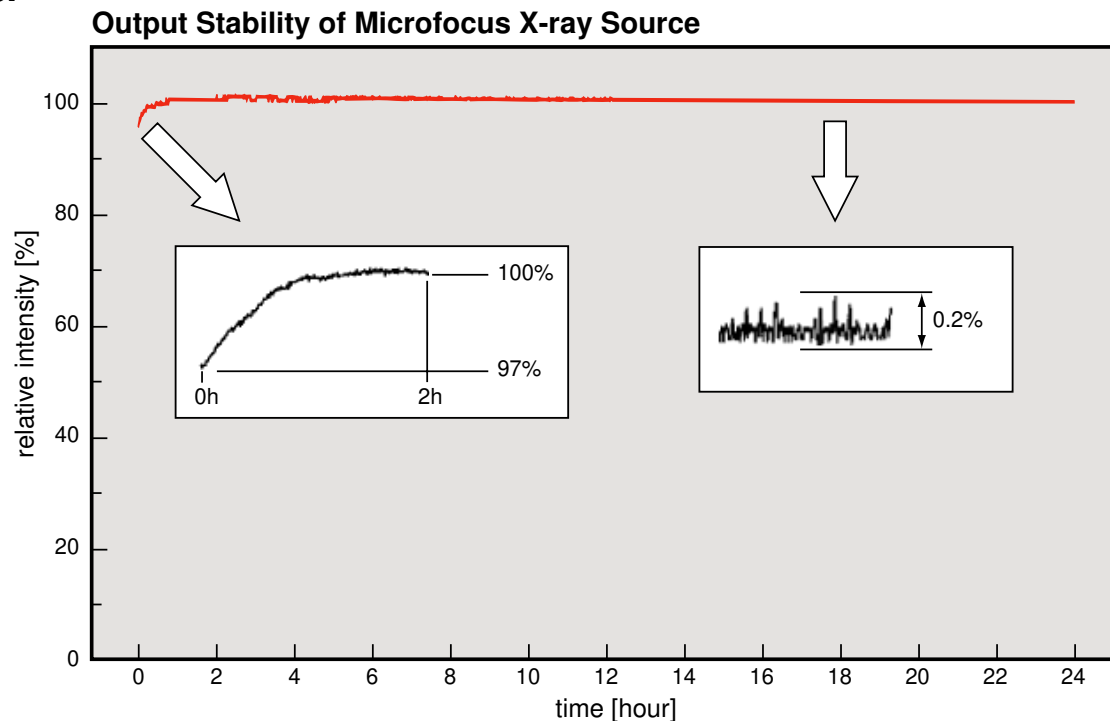
TARGET VOLTAGE / TARGET CURRENT

- L6731-01(80kV type) 80kV/100 μ A
 - L6622-01(130kV type) 130kV/300 μ A
- Distance:1m (From surface of X-ray tube unit cabinet)

HIGH STABILITY

STABLE X-RAY IRRADIATION

X-ray output is very stable, making it great for use in factory automation systems.



MICROFOCUS X-RAY SOURCE

80kV TYPE : L6731-01 / 130kV TYPE : L6622-01

REASON

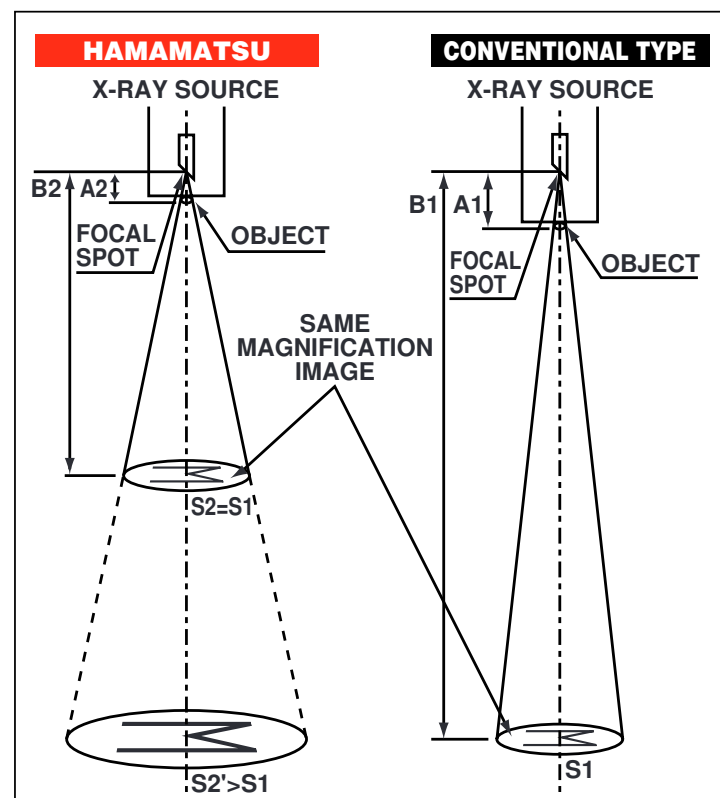
COMPACT-NESS

A microfocus X-ray source is ideal for compact cabinets or higher magnification of X-ray images.

The Hamamatsu microfocus X-ray source has a shorter focal length (A2) than the conventional type (A1) as shown below, and provides the same magnification at a shorter distance allowing the sample to be placed closer to the X-ray source.

This means the instrument package can be made more compact.

Another advantage is that since the X-ray dose increases as the distance from the X-ray source shortens (in proportion to "1/(Distance)²"), the Hamamatsu microfocus X-ray source will provide a higher X-ray dose with the same magnification producing sharp and clear X-ray images.



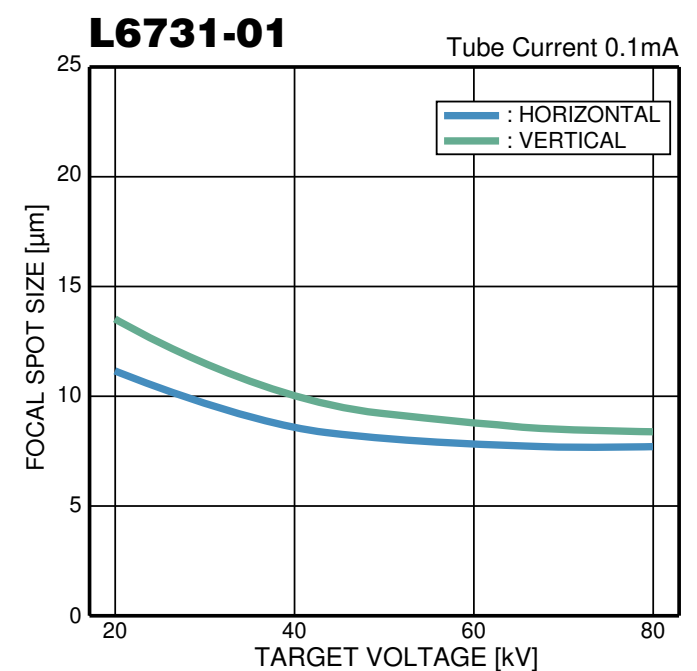
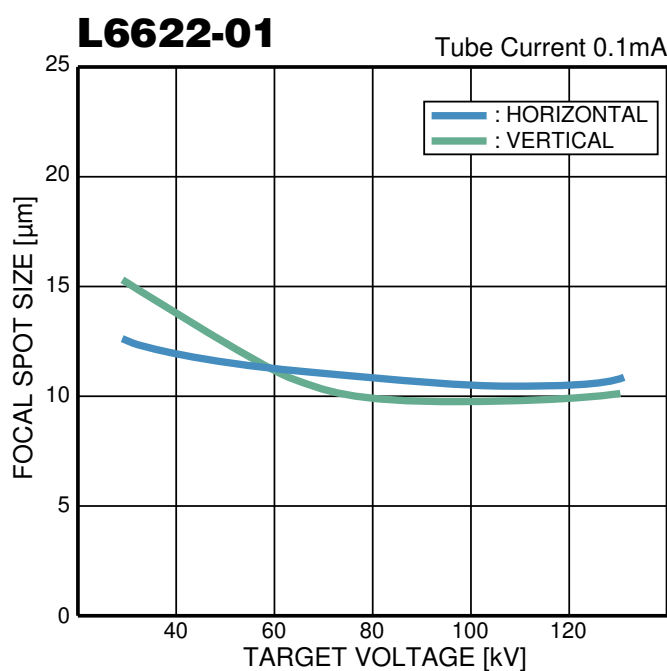
ex.) Imaging distance required to obtain an image magnified 40 times.

HAMAMATSU	CONVENTIONAL TYPE
$40 = \frac{B2}{12mm}$	$40 = \frac{B1}{15mm}$
$B2 = 480mm$	$B1 = 600mm$

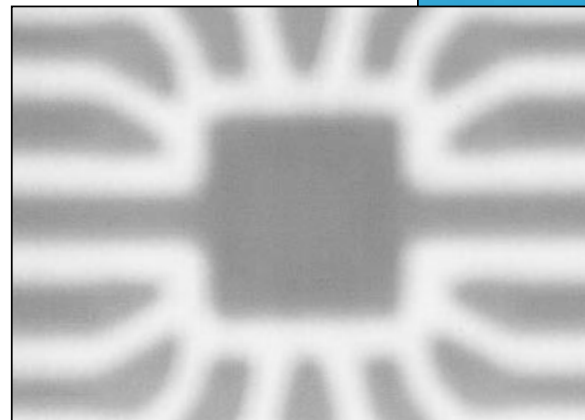
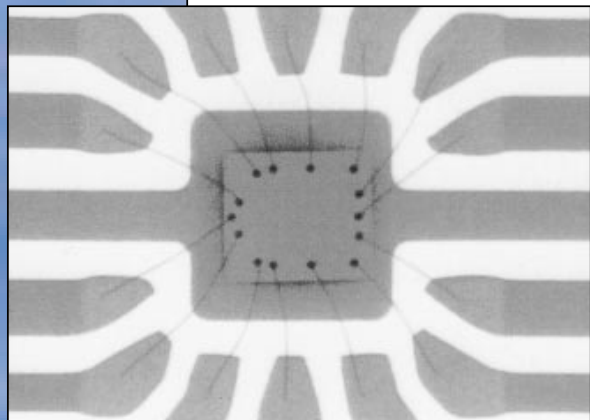
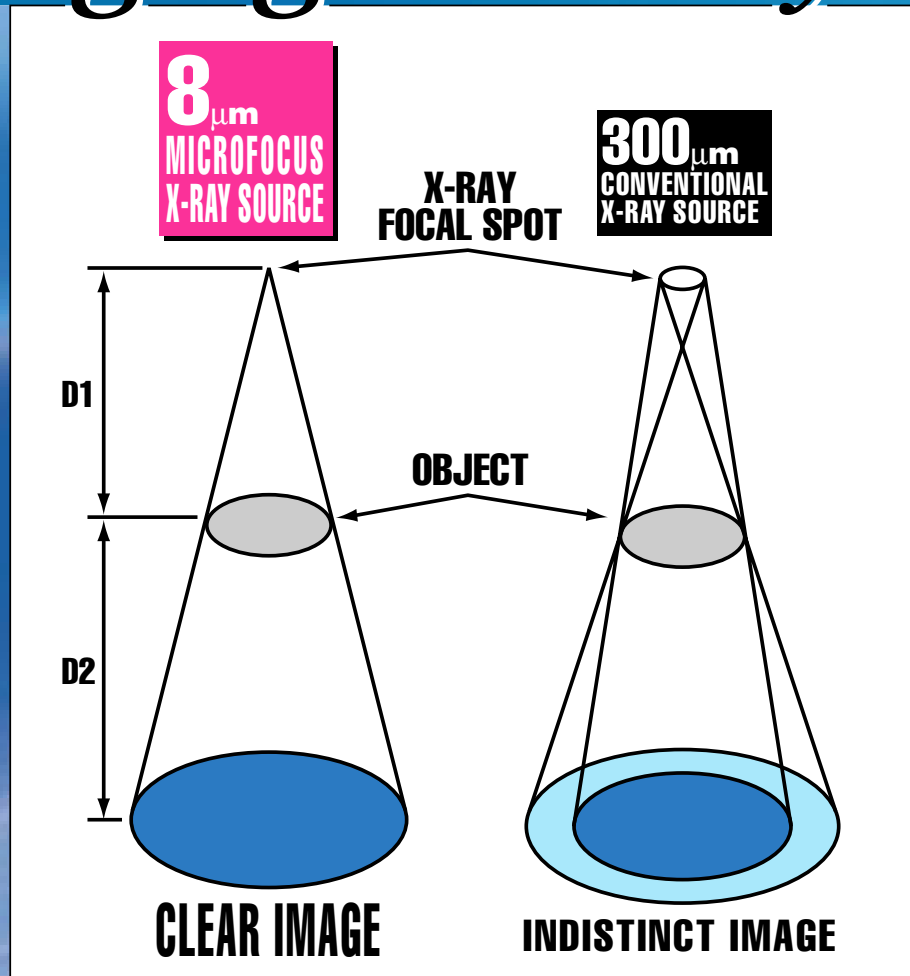
	HAMAMATSU	CONVENTIONAL TYPE
80kV	A2:12mm (L6731-01)	A1:15mm
130kV	A2:18mm (L6622-01)	A1:21mm

HIGH STABILITY

Focal point is highly stable versus in target voltage.



W *We did it to make high resolution and high magnification X-ray imaging a reality.*



MICROFOCUS X-RAY SOURCE

L6731-01 80kV Type • 8 μm

L6622-01 130kV Type • 10 μm

MICROFOCUS X-RAY SOURCE

Focal Spot Size: 8 μ m/10 μ m.

- High resolution image
- High magnification

The Shortest Distance Between Focal Spot and Head Face.

- Downsizing of equipment
- High density dose

RS-232C interface is employed as standard.

APPLICATIONS

- X-ray Non Destructive Inspection
 - Printed Circuits
 - Plastics
 - Semiconductor Device
 - Rubbers
 - Ceramics
 - Combined Materials
- Multilayer Printed Circuit Board X-ray Inspection / Drilling Instrument
- Industrial On-line Process Control and Measurement
- Industrial X-ray CT System

SPECIFICATIONS

80kV TYPE L6731-01

GENERAL

Parameter	Value	Unit
Target Voltage	20 to 80	kV
Target Current	0 to 100	μ A
Maximum Output Power	8	W
Focal Spot Size	8	μ m
Beam Angle	39	degree
Minimum Distance Focus / Object	12	mm
Environmental X-ray Dose Leakage	5×10^{-3}	mSv/h Max.
Operation	Continuous	—

X-RAY TUBE UNIT

Parameter	Description
X-ray Tube	Sealed Type
Cooling Method	Forced Air Cooling
Window Material	Beryllium (150 μ mt)
Target Material	Tungsten
Cathode Material	Dispenser Cathode
Window Position	End-window
High Voltage Power Supply	Built-in Type
Operation / Storage Temperature	+10 to +50 °C / 0 to +50 °C
Operation / Storage Humidity	93 % RH Max. [Ⓐ]
Weight	Approx. 5.2 kg

NOTE: [Ⓐ] Without moisture condensation.

X-RAY CONTROL UNIT

Parameter	Description
Function	Target Voltage / Current Pre-set, Auto Warm-up
Protection	Safety Interlock
External Control	RS-232C
Operation / Storage Temperature	0 to +40 °C
Operation / Storage Humidity	93 % RH Max. [Ⓐ]
Power Consumption	30 W Max.
Input Voltage	24 Vdc
Installation Method	Designed for both bench-top and rack mounting
Weight	Approx. 6 kg

130kV TYPE L6622-01

GENERAL

Parameter	Value	Unit	
Target Voltage	20 to 130	kV	
Target Current	Small Focal Spot	40 to 100kV 0 to 250	μ A
	Large Focal Spot	100 to 130kV 0 to 100	μ A
Maximum Output Power	Small Focal Spot	0 to 300	W
	Large Focal Spot	13	W
Focal Spot Size	Small Focal Spot	39	W
	Large Focal Spot	10	μ m
Beam Angle	Small Focal Spot	40	μ m
	Large Focal Spot	43	degree
Minimum Distance Focus/Object	18	mm	
Environmental X-ray Dose Leakage	3	mSv/h Max.	
Operation	Continuous	—	

X-RAY TUBE UNIT

Parameter	Description
X-ray Tube	Sealed Type
Cooling Method	Forced Air Cooling
Window Material	Beryllium (200 μ mt)
Target Material	Tungsten
Cathode Material	Dispenser Cathode
Window Position	End-window
High Voltage Power Supply	Built-in Type
Operation / Storage Temperature	+10 to +40 °C / 0 to +50 °C
Operation / Storage Humidity	85 % RH Max. [Ⓐ]
Weight	Approx. 12.5 kg

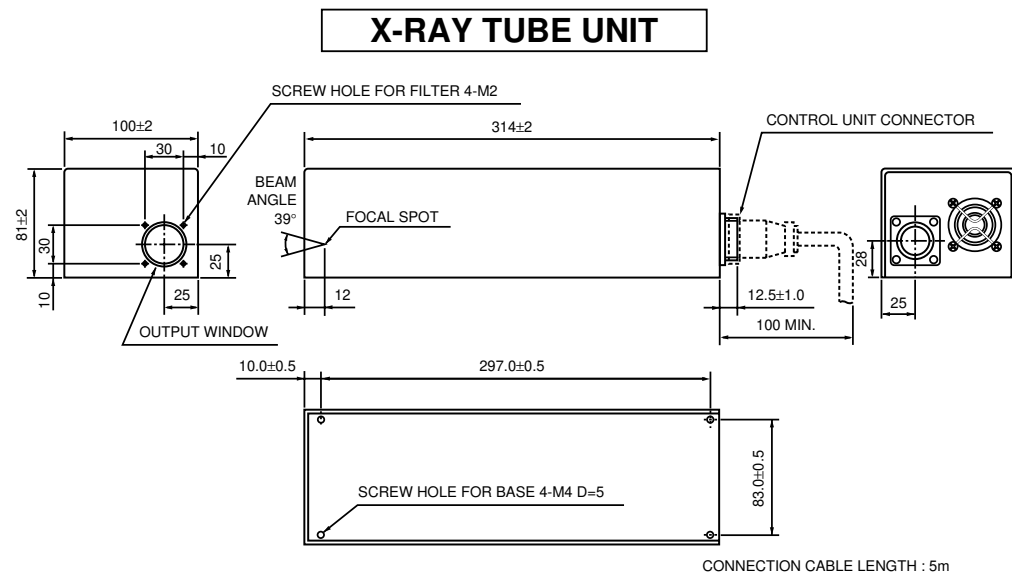
NOTE: [Ⓐ] Without moisture condensation.

X-RAY CONTROL UNIT

Parameter	Description
Function	Target Voltage / Current Pre-set, Auto Warm-up
Protection	Safety Interlock
External Control	RS-232C
Operation / Storage Temperature	0 to +40 °C
Operation / Storage Humidity	85 % RH Max. [Ⓐ]
Power Consumption	200 W Max.
Input Voltage	24 Vdc
Installation Method	Designed for both bench-top and rack mounting
Weight	Approx. 6 kg

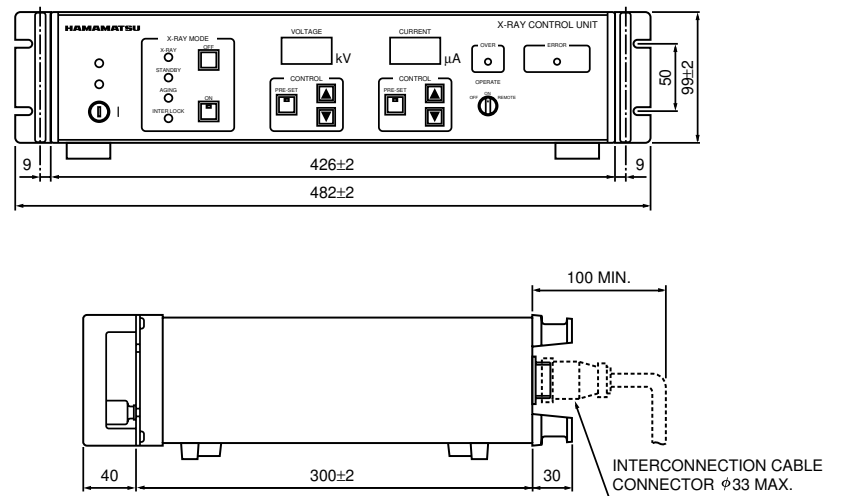
DIMENSIONAL OUTLINE (Unit:mm)

L6731-01 80kV TYPE



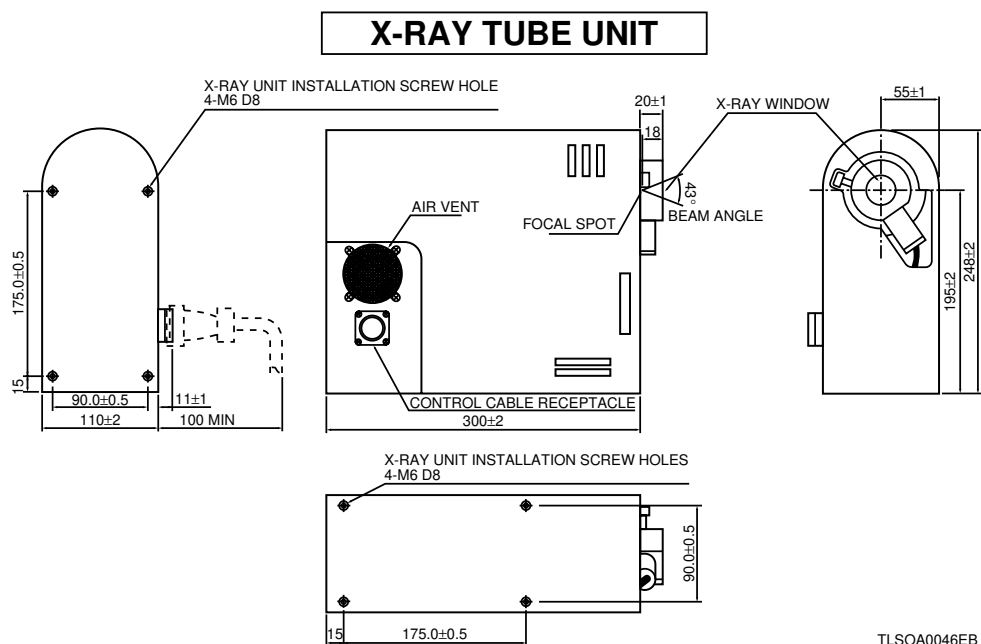
TLSOA0045EA

X-RAY CONTROL UNIT



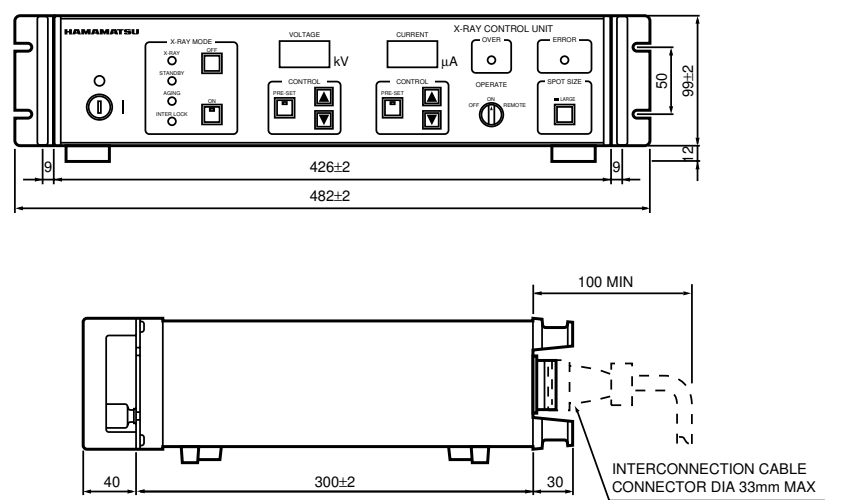
TLSOA0044EB

L6622-01 130kV TYPE



TLSOA0046EB

X-RAY CONTROL UNIT



TLSOA0047EC

Applicable standards

1. **CE Marking:** EMC/EN55011; 1991 (Group 1 Class A, EN 50082: 1995)
2. **SAFETY:** EN61010-1:1993+A2:1995

⚠ PRE-CAUTION TO USE

1. X-ray emissions from this device are harmful to the human body so the operator must take the necessary steps for protection.
2. The X-ray source should be installed in a shielded cabinet to avoid unwanted X-ray exposure during operation. Safety circuits must be utilized to prevent X-ray leakage resulting from misoperation.
3. Comply with local regulations regarding X-ray sources and radiation emission and take the necessary steps as required.

#WARRANTY

The warranty only covers replacement or repair of the product. This warranty does not cover damage or loss due to misuse or natural calamities, etc.

HAMAMATSU

Homepage <http://www.hamamatsu.com>

HAMAMATSU PHOTONICS K.K., Electron Tube Center

314-5, Shimokanzo, Toyooka-village, Iwata-gun, Shizuoka-ken, 438-0193, Japan, Telephone: (81)539/62-5248, Fax: (81)539/62-2205

U.S.A.: Hamamatsu Corporation: 360 Foothill Road, P. O. Box 6910, Bridgewater. N.J. 08807-0910, U.S.A., Telephone: (1)908-231-0960, Fax: (1)908-231-1218

Germany: Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-2658

France: Hamamatsu Photonics France S.A.R.L.: 8, Rue du Saule Trapu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: (33)1 69 53 71 00, Fax: (33)1 69 53 71 10

United Kingdom: Hamamatsu Photonics UK Limited: Lough Point, 2 Gladbeck Way, Windmill Hill, Enfield, Middlesex EN2 7JA, United Kingdom, Telephone: 44(20)8-367-3560, Fax: 44(20)8-367-6384

North Europe: Hamamatsu Photonics Norden AB: Smidesvägen 12, SE-171-41 SOLNA, Sweden, Telephone: (46)8-509-031-00, Fax: (46)8-509-031-01

Italy: Hamamatsu Photonics Italia: S.R.L.: Strada della Moia, 1/E, 20020 Arese, (Milano), Italy, Telephone: (39)02-935 81 733, Fax: (39)02-935 81 741

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