



# microSilicon Type 60023

*Waterproof silicon diode detector  
for dosimetry in high-energy electron  
and photon beams*

## Highlights

- ▶ Useful for measurements in all electron fields and for photon fields  $\leq (10 \times 10) \text{ cm}^2$
- ▶ Excellent spatial resolution
- ▶ Thin entrance window for measurements in the vicinity of surfaces and interfaces
- ▶ Very small detector to detector variation
- ▶ Excellent dose stability

The microSilicon is ideal for dose measurements in electron and small photon fields. The excellent spatial resolution makes it possible to measure beam profiles very precisely, even in the penumbra region of small fields. The microSilicon is recommended for dose measurements in all electron fields and for photon fields up to  $(10 \times 10) \text{ cm}^2$ . The waterproof detector can be used in air and in water.

The microSilicon shows a very small detector to detector variation which provides a sound basis for reliable small field correction factors.

## Specification

Type of product	p-type silicon diode
Application	relative dosimetry in radiotherapy beams
Measuring quantities	absorbed dose to water
Reference radiation quality	$^{60}\text{Co}$
Nominal sensitive volume	$0.03 \text{ mm}^3$
Design	waterproof, disk-shaped sensitive volume perpendicular to detector axis
Reference point <sup>1</sup>	on detector axis, 0.9 mm from detector tip
Direction of incidence	axial
Nominal response	19 nC/Gy
Dose stability	
Electrons	$\leq 0.5 \text{ %/kGy}$ at 10 MeV $\leq 1 \text{ %/kGy}$ at 21 MeV
Photons	$\leq 0.1 \text{ %/kGy}$ at 6 MV $\leq 0.5 \text{ %/kGy}$ at 18 MV
Temperature response	$\leq 0.1 \text{ %/K}$ typical
Bias voltage	0 V
Signal polarity	negative

Directional response	$\leq \pm 1 \text{ %}$ for rotation around the chamber axis $\leq \pm 1 \text{ %}$ for tilting of the axis up to $\pm 20^\circ$
Leakage current	$\leq \pm 100 \text{ fA}$ typical
Cable leakage	$\leq 1 \text{ pC/(Gy}\cdot\text{cm)}$

## Materials and measures

Entrance window	0.3 mm RW3 0.01 mm Al 0.48 mm epoxy
Total window area density	$92 \text{ mg/cm}^2$
Water-equivalent window thickness	0.9 mm
Sensitive volume	radius 0.75 mm thickness 18 $\mu\text{m}$
Outer dimensions	diameter 7 mm length 45.5 mm

## Useful ranges

Radiation quality	(6 ... 25) MeV electrons $^{60}\text{Co}$ ... 25 MV photons
Field size	$(1 \times 1) \text{ cm}^2$ ... $(40 \times 40) \text{ cm}^2$ for electrons $(1 \times 1) \text{ cm}^2$ ... $(10 \times 10) \text{ cm}^2$ for photons
Small fields <sup>2</sup>	down to 0.4 cm
Temperature	(10 ... 40) $^\circ\text{C}$ (50 ... 104) $^\circ\text{F}$
Humidity	(10 ... 80) %, max 20 $\text{g/m}^3$
Air pressure	(540 ... 1060) hPa

## Ordering Information

TN60023 microSilicon, connecting system BNT  
TW60023 microSilicon, connecting system TNC  
TM60023 microSilicon, connecting system M

<sup>1</sup>Photons: Reference point corresponds to the effective point of measurement.  
Electrons: Effective point of measurement is 0.3 mm from tip.

<sup>2</sup>This detector is well suited for measurements in small and very small fields. Please note that for high accuracy measurements any detector may need correction factors in small fields. The small field size limit is provided as equivalent square field size following the methodology of IAEA TRS483:2017. In accordance with TRS483, the smallest field size considered is 0.4 cm.