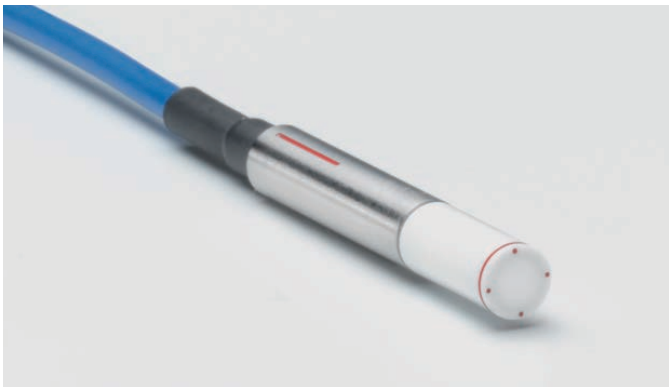
microSilicon Type 60023

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



- Useful for measurements in all electron fields and for photon fields ≤ (10 x 10) cm²
- Excellent spatial resolution
- Thin entrance window for measurements in the vicinity of surfaces and interfaces
- Very small detector to detector variation
- Excellent dose stability
- Very low dose per pulse dependence
- Point dose patient QA with RUBY

The microSilicon is ideal for dose measurements in electron and small photon fields. The excellent spatial resolution makes it possible to measure very precisely beam profiles 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 x 10) cm². 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.

General

Type of product	p-type silicon diode
Application	relative dosimetry in radiotherapy beams
Reference radiation quality	^{60}Co
Design	waterproof, disk-shaped sensitive volume perpendicular to detector axis
Direction of incidence	axial

Specification

Nominal sensitive volume	0.03 mm³
Nominal response	19 nC/Gy
Dose stability	
Electrons	≤ 0.5 %/kGy at 10 MeV
	≤ 1 %/kGy at 21 MeV
Photons	≤ 0.1 %/kGy at 6 MV
	≤ 0.5 %/kGy at 18 MV
Temperature response	≤ 0.1 %/K typical
Bias voltage	0 V
Signal polarity	negative
Reference point[1]	on detector axis, 0.9 mm from detector tip
Directional response in water	≤ ±1 % for rotation around the detector axis, ≤ ±1 % for tilting of the axis up to ±20°
Leakage current	≤ ±100 fA
Cable leakage	≤ 1 pC/(Gy·cm)

Materials and measures

Entrance window	0.3 mm RW3 0.01 mm Al 0.48 mm epoxy
Total window area density	92 mg/cm²
Water-equivalent window thickness	0.9 mm
Dimensions of sensitive volume	radius 0.75 mm thickness 18 µm
Outer dimensions	diameter 7 mm length 45.5 mm

Ranges of use

Radiation quality	(6 ... 25) MeV electrons ^{60}Co ... 25 MV photons
Field size	(1 x 1) cm² ... (40 x 40) cm² for electrons (1 x 1) cm² ... (10 x 10) cm² for photons
Small fields[2]	down to 0.4 cm
Temperature	(10 ... 40) °C (50 ... 104) °F
Humidity	(10 ... 80) %, max 20 g/m³
Air pressure	(700 ... 1060) hPa

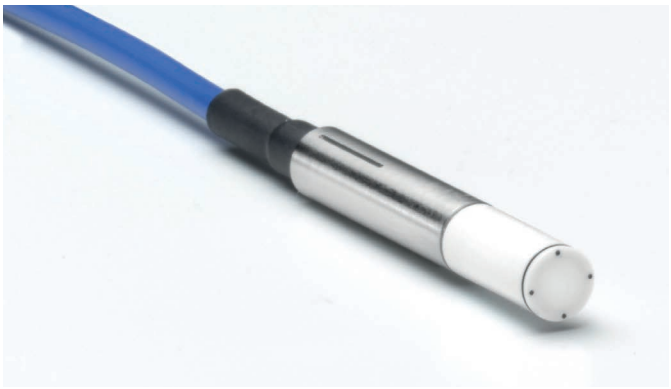
Ordering Information

TN60023 microSilicon, connecting system BNT
TW60023 microSilicon, connecting system TNC
TM60023 microSilicon, connecting system M
T40072.1.140 RUBY detector holder T60023

[1]Photons: Reference point corresponds to the effective point of measurement.
Electrons: Effective point of measurement is 0.3 mm from tip.

[2]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 TRS-483:2017. In accordance with TRS-483, the smallest field size considered is 0.4 cm.

microSilicon X
Type 60022



Shielded silicon diode detector for all photon fields

- Shielded diode detector for photon field sizes up to (40 x 40) cm^2
- The shielding reduces the low energy scattered radiation amount in the detector signal
- Ideal for percentage depth dose measurements, field size independent
- Excellent dose stability (≤ 0.1 %/kGy at 6 MV)
- Very low dose per pulse dependence

Due to its newly developed shielding, the microSilicon X is perfectly suited for measurements in photon fields up to large field sizes. With its excellent spatial resolution, it is possible to measure very precisely beam profiles, even in the penumbra region.
The improved energy response enables the user to perform accurate, field size independent percentage depth dose measurements. In addition the new design results in a small water equivalent window thickness, which has positive effects on the measurements of output factors.

General

Type of product	shielded p-type silicon diode
Application	relative dosimetry in high-energy photon beams
Reference radiation quality	^{60}Co
Design	waterproof, disk-shaped sensitive volume perpendicular to detector axis
Direction of incidence	axial

Specification

Nominal sensitive volume	0.03 mm^3
Nominal response	19 nC/Gy
Dose stability	≤ 0.1 %/kGy at 6 MV ≤ 0.5 %/kGy at 18 MV
Temperature response	≤ 0.1 %/K typical
Bias voltage	0 V
Signal polarity	negative
Reference point[1]	on detector axis, 0.9 mm from detector tip
Directional response in water	≤ ±1 % for rotation around the detector axis, ≤ ±1 % for tilting of the axis up to ±20°
Leakage current	≤ ±100 fA
Cable leakage	≤ 1 pC/(Gy·cm)

Materials and measures

Entrance window	0.3 mm RW3 0.01 mm Al 0.48 mm epoxy
Total window area density	92 mg/cm^2
Water-equivalent window thickness	0.9 mm
Dimensions of sensitive volume	radius 0.75 mm thickness 18 µm
Outer dimensions	diameter 7 mm length 45.5 mm

Ranges of use

Radiation quality	^{60}Co ... 25 MV photons
Field size	(2 x 2) cm^2 ... (40 x 40) cm^2
Temperature	(10 ... 40) °C (50 ... 104) °F
Humidity	(10 ... 80) %, max 20 g/m^3
Air pressure	(700 ... 1060) hPa

Ordering Information

TN60022 microSilicon X, connecting system BNT
TW60022 microSilicon X, connecting system TNC
TM60022 microSilicon X, connecting system M

[1]Reference point corresponds to the effective point of measurement.