SunSILICON and SunSILICON P
Silicon Diode Detectors

Characterization of two new unshielded and shielded silicon diode detectors for external beam radiation therapy: SunSILICON and SunSILICON P

T. Anders, et al., Zeitschrift für Medizinische Physik, 2025

10.1016/j.zemedi.2025.12.005

How to Use
Deep dive into silicon diode behavior or look-up data for diode specific response dependencies if you need more information than provided in the reference manual.

Key Message
The diode built into SunSILICON detectors shows great linearity with dose and dose rate, both in terms of dose per pulse and pulse repetition frequency, measurement reproducibility, leakage, signal-to-noise ratio, accumulated dose dependence values.

Intended Audience
Medical physicists who want to fully understand silicon behavior in clinical beams, Research physicists

Keywords
SunSILICON & SunSILICON P, General Silicon Diode Characteristics, Accumulated Dose Dependence, Dose Rate Dependence, Temperature Dependence, Speed of Response, Leakage Characteristics, Linearity

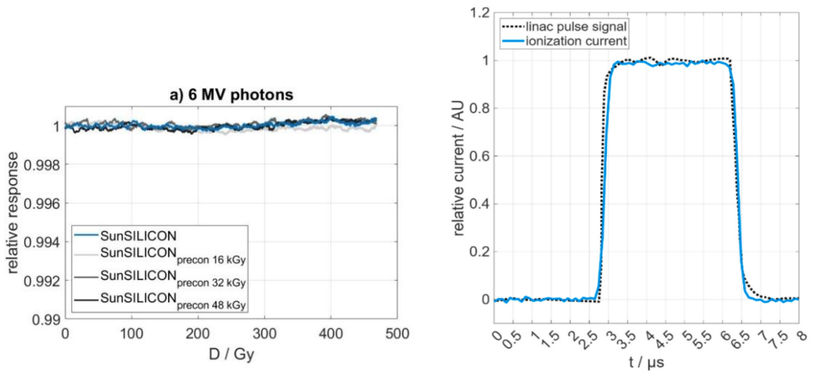

Figure 1. *Left: Accumulated dose dependence of the SunSILICON detector in 6 MV photon beams. Right: Linac pulse signal directly measured with an oscilloscope vs. the ionization current of the detector shows similar speed of response.*

SunSILICON and SunSILICON P
Photon Dosimetry

Clinical evaluation of two new unshielded and shielded silicon diode detectors in external photon beam radiation therapy: SunSILICON and SunSILICON P

T. Anders, et al., Journal of Applied Clinical Medical Physics, 2026

10.1002/acm2.70576

How to Use
Assures high performance and agreement with measurement previously performed with other detectors. Explains limitations of silicon diode technology and shielded vs unshielded behavior and recommended usage range.

Key Message
The SunSILICON (P) detectors are validated in their respective range of field sizes and radiation qualities. Results show excellent agreement with recent silicon-based detectors as well as great agreement to ion chamber measurements while offering a superior response.

Intended Audience
Medical physicists who are looking for detector performance validation in photon beams and want to fully understand the underlying physics.

Keywords
SunSILICON & SunSILICON P, Shielded vs. Unshielded design, , Photon PDDs & Profiles, Comparison to other detectors, Field Size dependencies, Energy dependencies

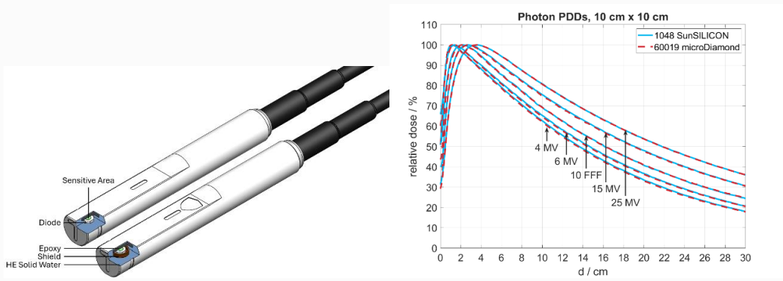

Figure 2 *Left: SunSILICON & SunSILICON P detectors. Right: SunSILICON PDD comparison to a reference detector for photon multiple energies.*

SunSILICON and SunSILICON P
Photon Dosimetry

Field output correction factors and perturbation factor analysis for novel SunSILICON and SunSILICON P silicon diode detectors

A.A. Schönfeld, et al., Journal of Applied Clinical Medical Physics, 2026

10.1002/acm2.70632

How to Use
Lookup and explanation of field output correction factors for SunSILICON and SunSILICON P.

Key Message
Provides field output correction factors for the SunSILICON and the SunSILICON P. Monte Carlo derived perturbation factor analysis showcases and explains the underlying physics.

Intended Audience
Medical physicists who want to perform output correction factor measurements or want to understand more about field output correction factors

Keywords
SunSILICON & SunSILICON P, Field Output Factors, Field Size Dependencies, Field Output Correction Factors, Perturbation Effects

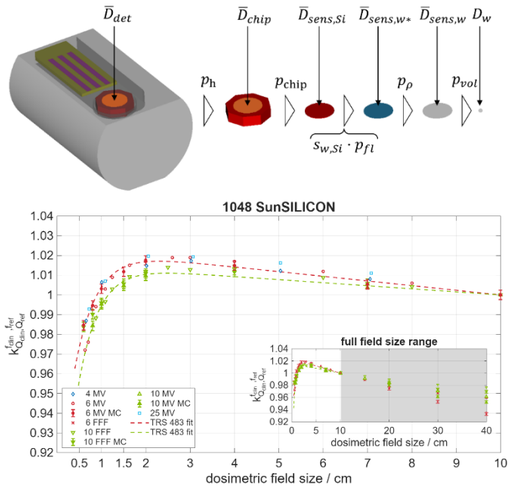

Figure 3 Top: *Schematic of the different detector components which where analyzed in terms of their beam perturbation effects.* ***Bottom:*** *SunSILICON field output correction factors and the respective energy depended TRS 483 fit.*

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Dosimetry
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SunSILICON and SunSILICON P
Electron Dosimetry

Clinical application of the unshielded silicon diode detector SunSILICON in external electron beam radiation therapy

T. Anders, et al., Journal of Applied Clinical Medical Physics, 2026

10.1002/acm2.70682

How to Use
Assures high performance and agreement with measurement previously performed with other detectors.

Key Message
Performance validation of SunSILICON in comparison to the SNC350p and SNC600c with a focus on electron beam profiles and PDDs over a broad range of energies and field sizes. Explains advantages when using a silicon diode in electron beam dosimetry and QA.

Intended Audience
Medical physicists who want to have the performance in electron beams validated

Keywords
SunSILICON, Electron PDDs & Profiles, Comparison to Other Detectors, Energy Dependencies

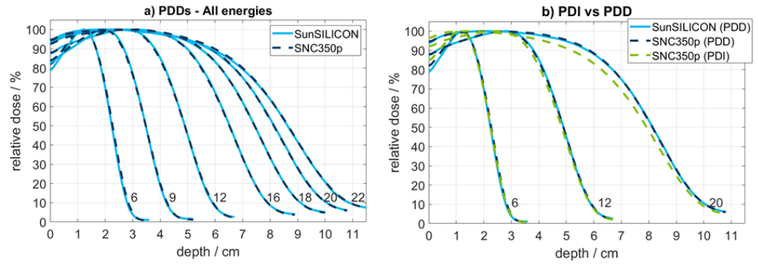

Figure 4 Left: *SunSILICON electron PDDs in the range of 6 to 22 Mev compared to the 350p ionization chamber.* ***Right:*** *Effect of conversion from PDI to PDD necessary for ionization chamber but not for silicon diodes.*

SNC600c and SNC125c
Photon Dosimetry

Monte Carlo calculated beam quality correction factors for two cylindrical ionization chambers in photon beams

M. Alissa, et al., Physica Medica, 2022

10.1016/j.ejmp.2021.12.012

How to Use
For reference dosimetry with SNC600c or SNC125c, the user measures the beam quality index D_{10} or $TPR_{20,10}$ to calculate k_Q according to their applicable dosimetry protocol using fit parameters presented in this study. The publication may be used as input for updating local dosimetry protocols.

Key Message
Collaboration between the National Research Council Canada and the Institute of Medical Physics and Radiation Protection in Gießen, Germany, provides updated k_Q values for SNC600C and SNC125C in accordance with TG-51, TRS 398 and DIN 6800-2

Intended Audience
Clinical medical physicists interested in measuring absolute dose

Keywords
SNC600c, SNC125c, Beam quality correction factor k_Q, Reference dosimetry, Annual QA

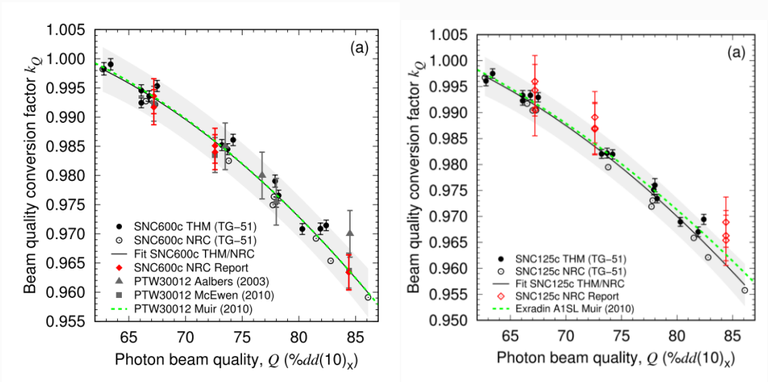

Figure 5 *Left: k_Q values for SNC600C (TG-51). Right: k_Q values for SNC125C (TG-51). k_Q values for other dosimetry protocols can be extracted from the publication.*

SNC 125c, SNC 350p and SNC 600c
Ionization Chambers

Experimental determination of the recombination correction factor k_S for SNC 125c, SNC 350p and SNC 600c ionization chambers in pulsed photon beams

A.-B. Schönfeld et al., Zeitschrift für Medizinische Physik, Germany

10.1016/j.zemedi.2020.03.001

How to Use
This work is the basis for k_S determination in updated dosimetry protocols like TRS, DIN and Ion Chamber Registry. Refer to this publication if you need more information than given in the dosimetry standards.

Key Message
Measured dose needs to be corrected for incomplete charge collection in dependence of the applied bias voltage and the intra-pulse dose rate. All relevant parameters to calculate k_S extracted from Jaffé plots for all three ionization chambers are provided.

Intended Audience
Clinical medical physicists interested in measuring absolute dose

Keywords
SNC 125c, SNC 350p, SNC 600c, Ion recombination, Reference dosimetry

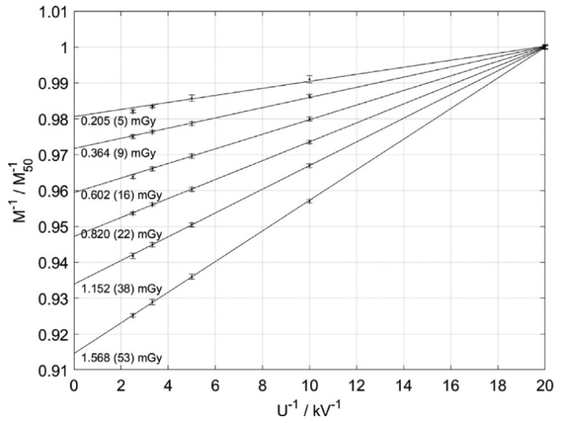

Figure 6 *Linear behavior between the reverse relative measurement signal and the reverse bias voltage for different dose per pulse configurations.*

SNC 125c, SNC 350p and SNC 600c
Electron Dosimetry

Monte Carlo calculated beam quality correction factors for high energy electron beams

M. Alissa, et al, Physica Medica, 2023

10.1016/j.ejmp.2023.103179

NRC Report
Report-IRS-2065 *Report-IRS-1860*

How to Use
For reference dosimetry with SNC600c, SNC125c, or SNC350p, the user measures the beam quality index R_{50} to calculate k_Q according to their applicable dosimetry protocol using fit parameters presented in this study. The publication may be used as input for updating local dosimetry protocols.

Key Message
Provides k_Q factors for electron beams according to TRS 398 and TG-51 protocols. Extending the NRC reports by independent Monte Carlo and measurement data.

Intended Audience
Clinical medical physicists interested in measuring absolute dose

Keywords
SNC350p, SNC125c, SNC600c, Beam quality correction factor, Reference dosimetry

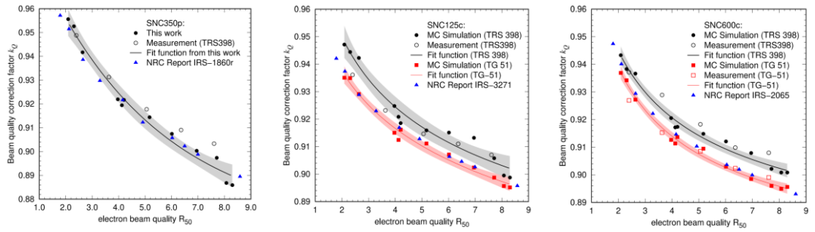

Figure 7 *Left: k_Q for the SNC350p. Center: k_Q for the SNC125c (with TRS 398 and TG-51 fit). Right: k_Q for the SNC600c (with TRS 398 and TG-51 fit).*

SNC600c and SNC125c
MRgRT QA

Experimental and Monte Carlo-based determination of magnetic field correction factors kB,Q in high-energy photon fields for two ionization chambers

M. Alissa, et al., Medical Physics, 2022

10.1002/mp.16345

How to Use
For reference dosimetry with SNC600c or SNC125c in MR-Linacs, the user obtains $k_{B,Q}$ according to their applicable dosimetry from this study. The publication may be used as input for updating local dosimetry protocols.

Key Message
Study applies Monte Carlo to determine the dosimetric impact of the Lorentz effect on the SNC600c and SNC125c. To accurately determine absolute dose in magnetic fields, $k_{B,Q}$ for different magnetic field strengths and orientations.

Intended Audience
MR-linac users, interested in measuring absolute dose

Keywords
SCN125c, SNC600c, MRgRT, Magnetic Fields, Reference Dosimetry in MR

Ionization chamber	*B* field	Source 6 MV $k_{B,Q}$	Source 7 MV $k_{B,Q}$
SNC 125c	B_x = ±0.35 T	0.999(0)	0.998(7)
	B_x = ±1.5 T	0.997(1)	0.996(5)
SNC600c	B_x = ±0.35 T	0.997(0)	0.997(0)
	B_x = ±1.5 T	0.993(1)	0.992(4)

Table 1: *Magnetic field correction factors for existing MRI-linear accelerators for ionization chambers SNC125c and SNC600c for orientation where the magnetic field and the chamber axis coincide, and they are perpendicular to the beam direction.*