

MRI compatible power supply for PET detectors of an integrated PET/MR scanner

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Power supply of PET detectors is a serious issue for integrated PET/MRI systems, due to mutual interaction between power supply electronics and MRI magnetic fields. In this work, we developed a prototype of a magnetic compatible power supply, that can be safely placed and used in a MRI magnetic field. The power supply is a highly compact (5.2x5.2 cm) switching DC-DC converter iron-core free. The power supply works in the Very High Frequency (VHF) range, between 24.5 and 26.5 MHz, so as to avoid RF coupling between power supply signal harmonics and RF magnetic field of a 1.5 T MRI scanner, that works at 64 MHz. Power supply output parameters (power and voltage) have been chosen to match those of the PET boards of the PET/MRI TRIMAGE scanner, in which the power supply could be placed. In particular, the main goal was to convert 12 V DC input to 3.3 V DC output with 10 W output power. At present, the power supply is able to convert 12 V input to 5 V and 10 W output with a measured efficiency of 70.5% without need of a dedicated cooling system. Magnetic compatibility has been verified in a 1.5 T and 7 T MRI scanners, where no artifacts induced by the circuit were observed in MRI images and MRI scanners performances were similar in presence and absence of power supply.

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