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Title:Detection of nanosecond-scale, high power THz pulses with a field effect transistor
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Abstract:We demonstrate detection and resolution of high power, 34 ns free electron laser pulses using a rectifying field effect transistor. The detector remains linear up to an input power of 11 ± 0.5 W at a pulse energy of 20 ± 1 μJ at 240 GHz. We compare its performance to a protected Schottky diode, finding a shorter intrinsic time constant. The damage threshold is estimated to be a few 100 W. The detector is, therefore, well-suited for characterizing high power THz pulses. We further demonstrate that the same detector can be used to detect low power continuous-wave THz signals with a post detection limited noise floor of 3.1 μW/Hz. Such ultrafast, high power detectors are important tools for high power and high energy THz facilities such as free electron lasers.
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