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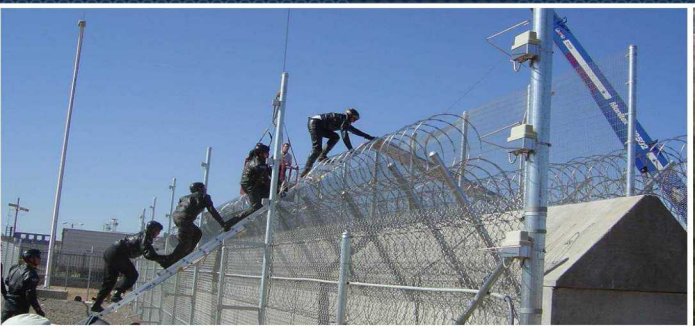
Physical Security Center of Excellence (PSCOE)



Maximum Power as a parameter for Ignitor Tester “safety” criteria

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Introduction

Long title:

Evidence that Maximum Power as a parameter may be useful or essential when reviewing Ignitor Tester "safety" criteria

- This presentation was originally assembled in ~ 2013.
- The data was obtained using the best vetted data available at that time.
- Some data source documentation is available separately.
- In an effort to share the data in a timely fashion, the original technical content has NOT been updated.
- Some updates to the presentation were done for internal SNL Review & Approval.
- Requests to further refine or develop this information should be directed to the author.

Study of the maximum power transfer of the SE3065 - Fluke 8012A/AD Type I Explosive Meter

Abstract:
The following slides summarize the SE3065 Meter behavior in the resistance mode, across a wide span of resistive loads. There is also preliminary discussion to propose the use of Minimum Firing Power, rather than No-Fire Current be used as the preferred parameter of evaluating the safety of explosives instruments.

This work was conceived in ~ 2006 by L. Shapnek, SNL 5433 Arming & Firing Systems. It was motivated by the need for 5433 to stay involved as one of the sole, remaining SNL organizations which supported DOE in Underground Nuclear Testing (UGT). In ~2008, SNL abandoned support of UGT Readiness.

As part of development of a Safety Training package for these types of meters in 2013, funding was obtained to start this work. The raw data is available from the author if needed.

A future, similar effort should be undertaken with the other SNL approved explosives meters (e.g. Alinco, AMPTEC, Valhalla's – see ESM Chpt. V).

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Method

Fixed resistors (loads) from 25 mohms to 20 Mohms (nominal) and an “Open Circuit” were placed one at a time, across the input terminals of a calibrated SE3065.

A calibrated Fluke 8025A (~10 Mohm input resistance) was placed across the loads.

For each load, the SE3065 was switched to each of the eight resistance scales (2 ohm – 20 Mohm).

On each scale, the resistance (R*) reading on the SE3065 and the voltage (V) reading on the 8025A were recorded, resulting in 640 measured data values (R & V).

**note that the measured R values include the parallel combination of the load and the 8025A internal resistance.*

The I, V and P parameters for each of these conditions was then calculated and then the data sets that showed the maximum power for that load and scale was plotted.

The plots were annotated with the maximums and other parameters of interest.

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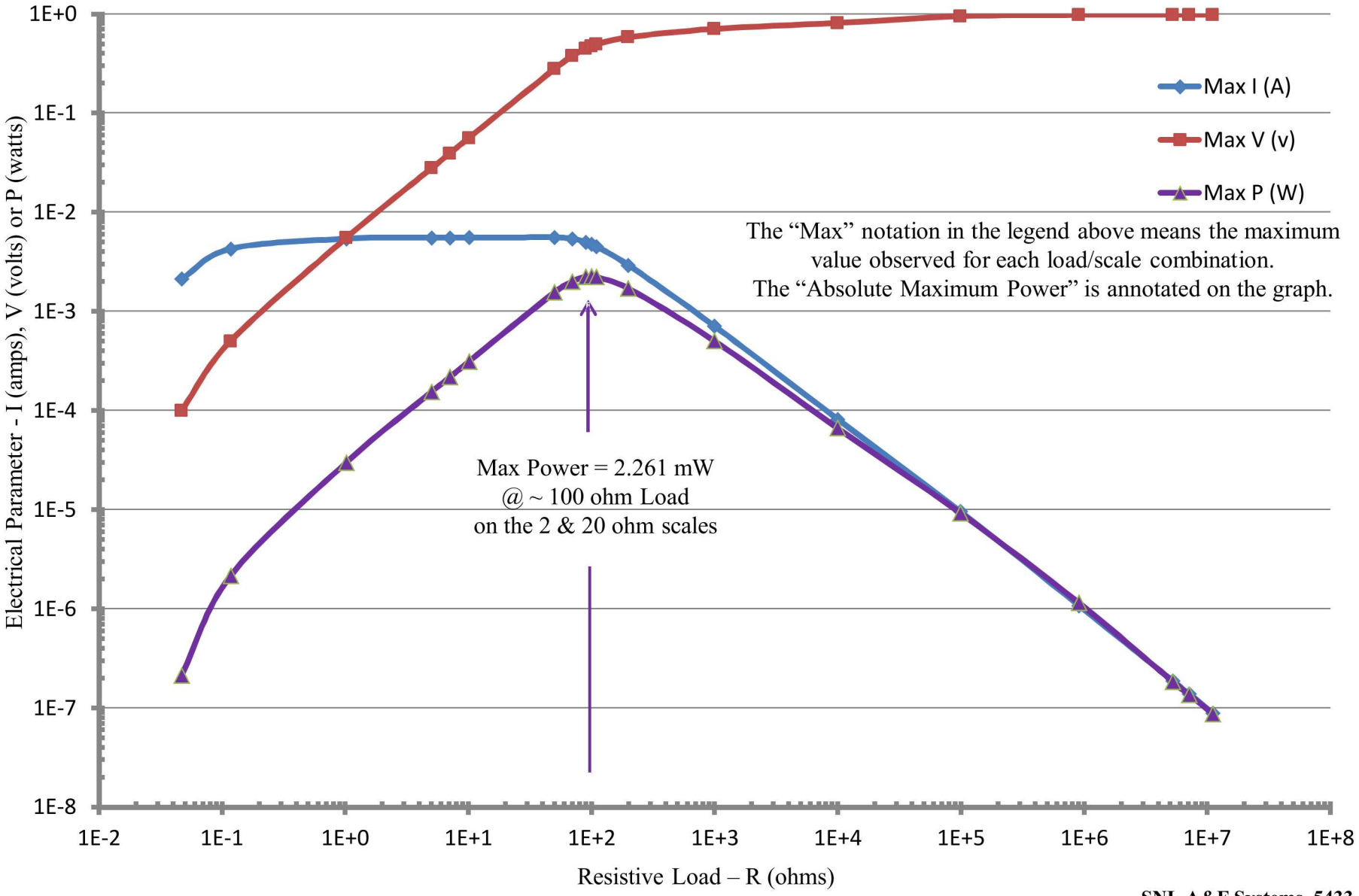
SE3065 - Fluke 8012A/AD
maximum electrical parameter vs. load



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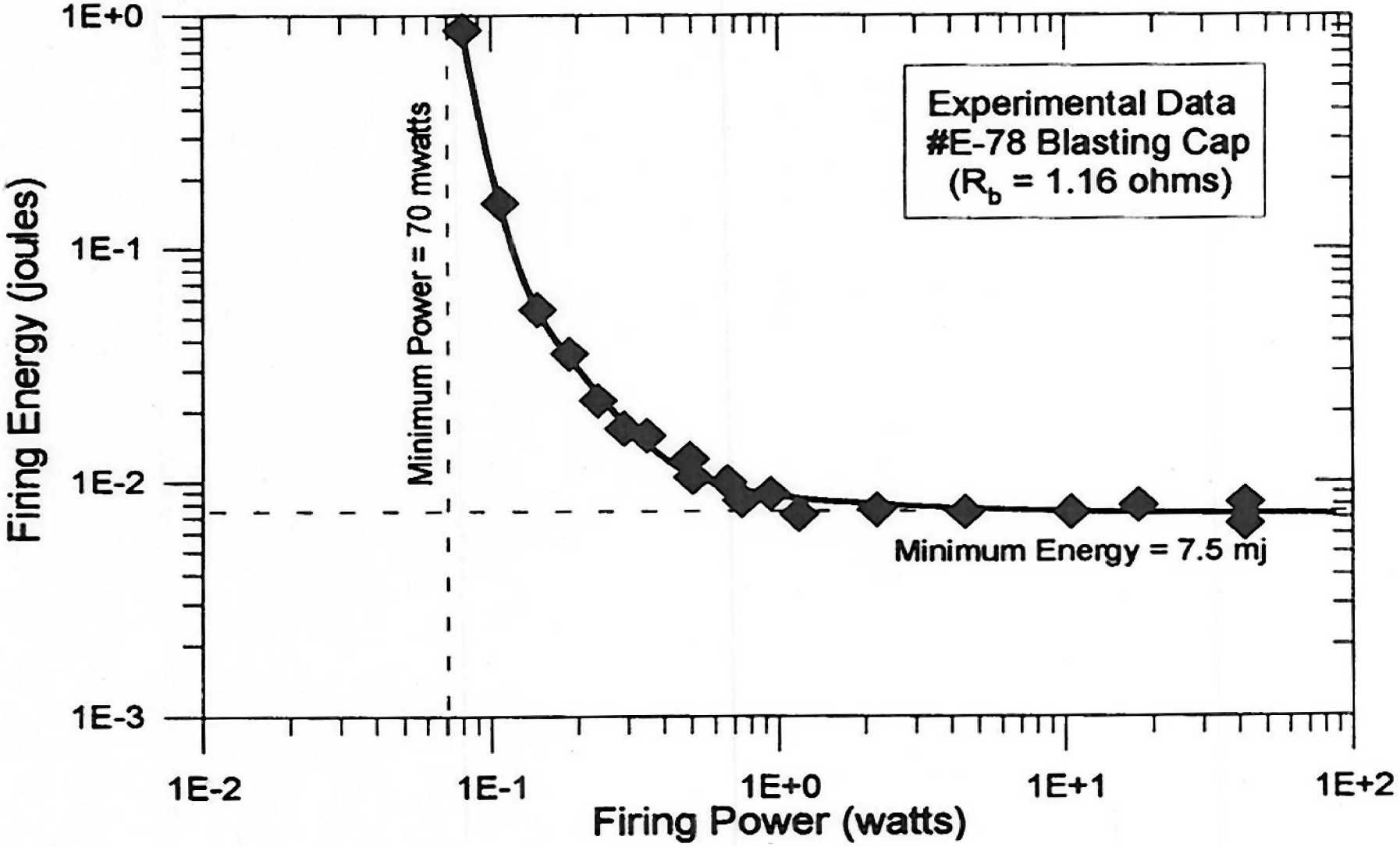
Thermal EED Energy vs. Power
from P. Cooper, "Explosives Engineering"



Energy-power relationship for a typical blasting cap (DuPont #E-78).

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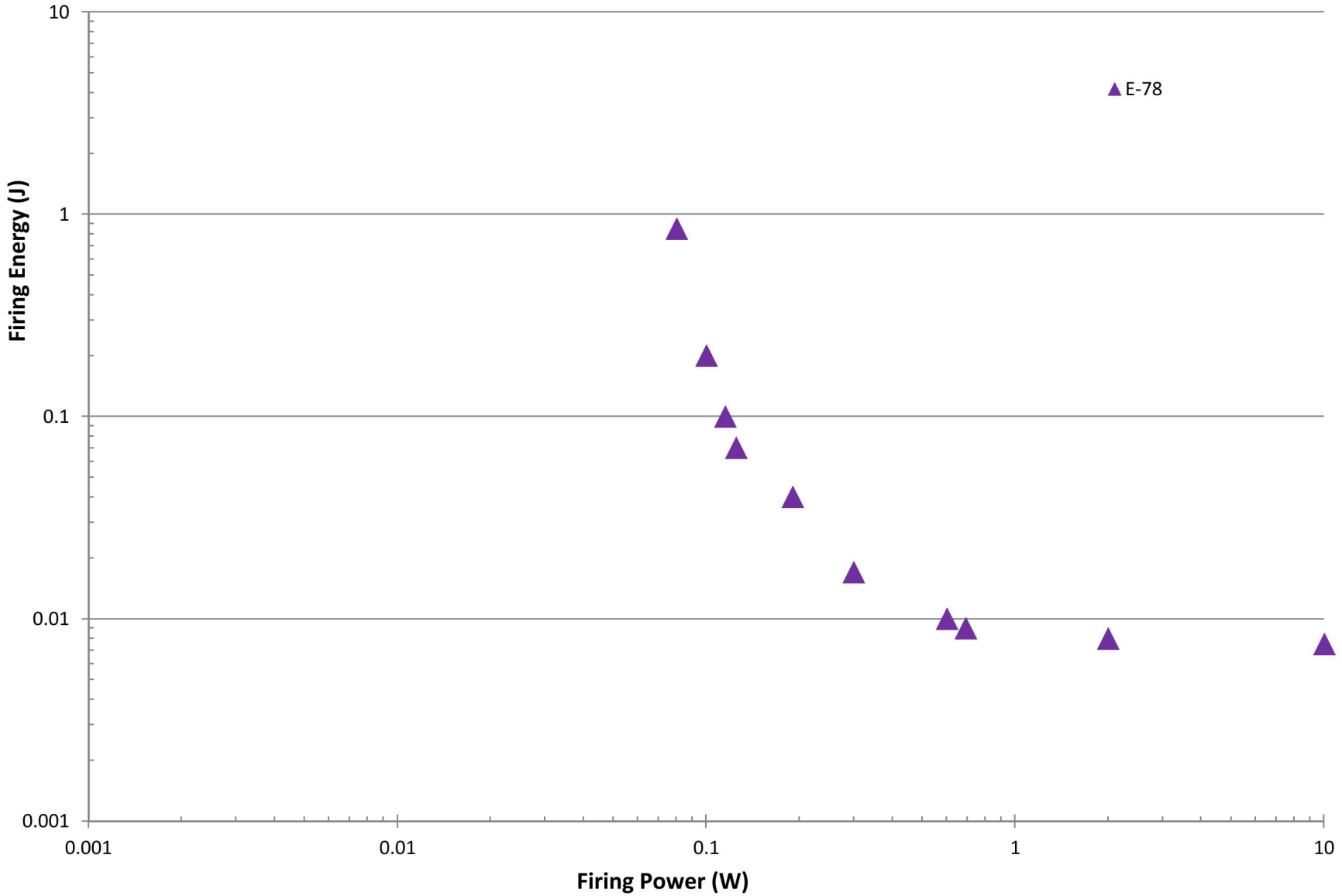
“Digitized” Thermal EED Energy vs. Power



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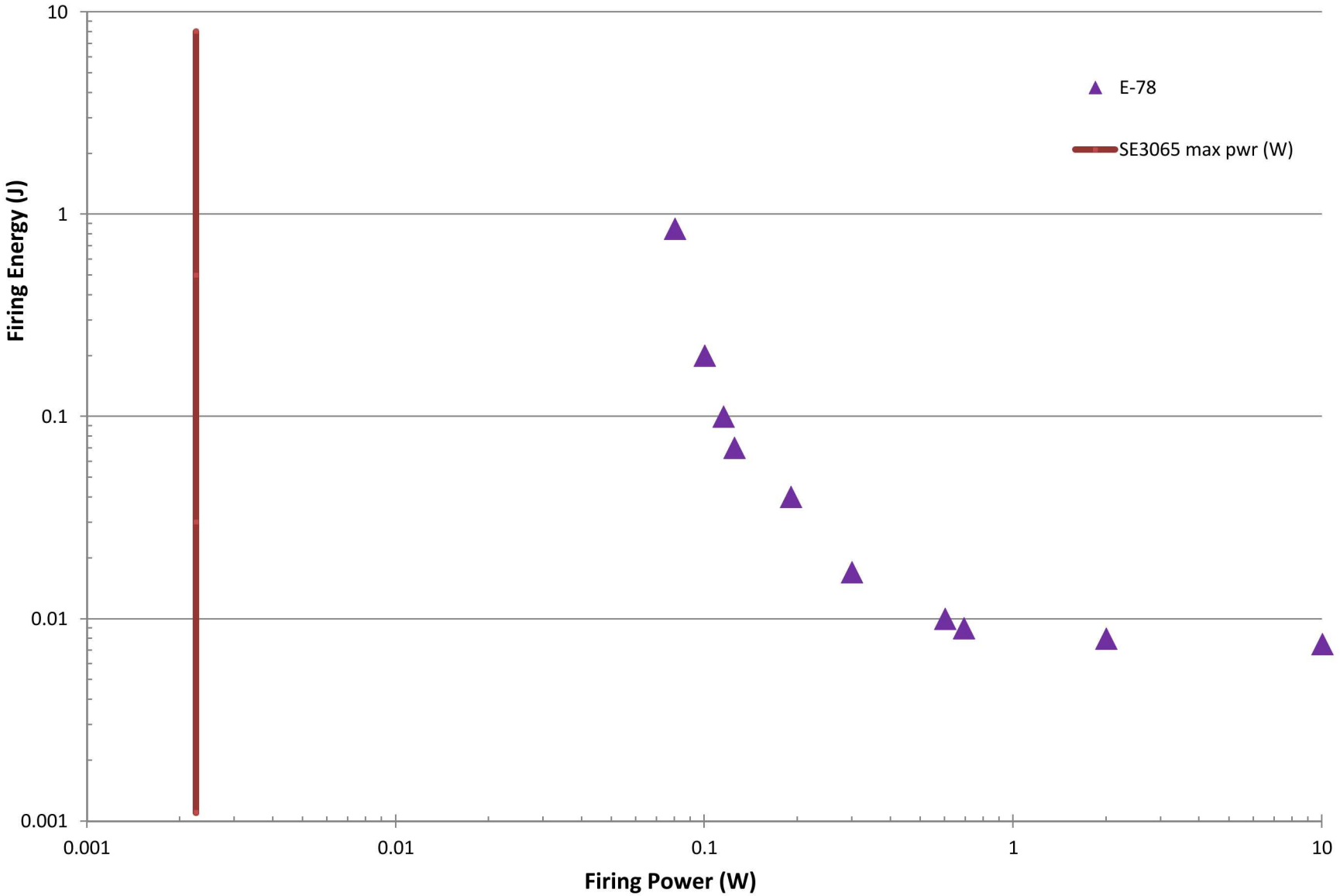
SE3065 Meter max Power relative to E78



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