

Reservoir computing

Karol Bednarz

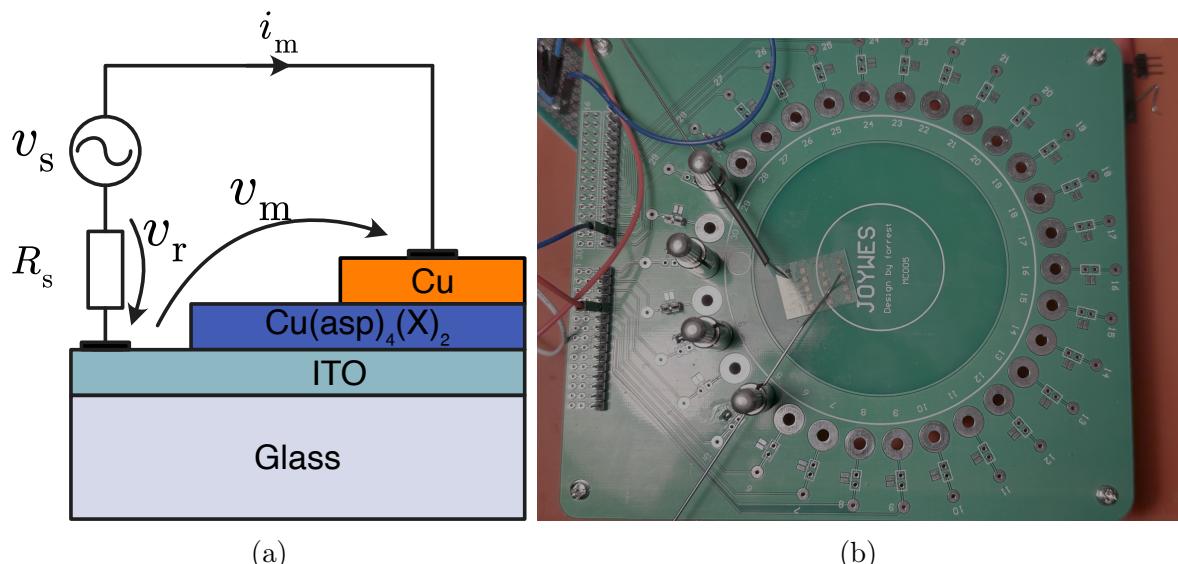
6 grudnia 2025

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1 Wstęp

Schemat pomiarowy oraz zdjęcie stanowiska pomiarowego zamieszczono na rysunkach 1(a) oraz 1(b).



Rysunek 1: (a) Schemat pomiarowy oraz (b) zdjęcie stanowiska pomiarowego.

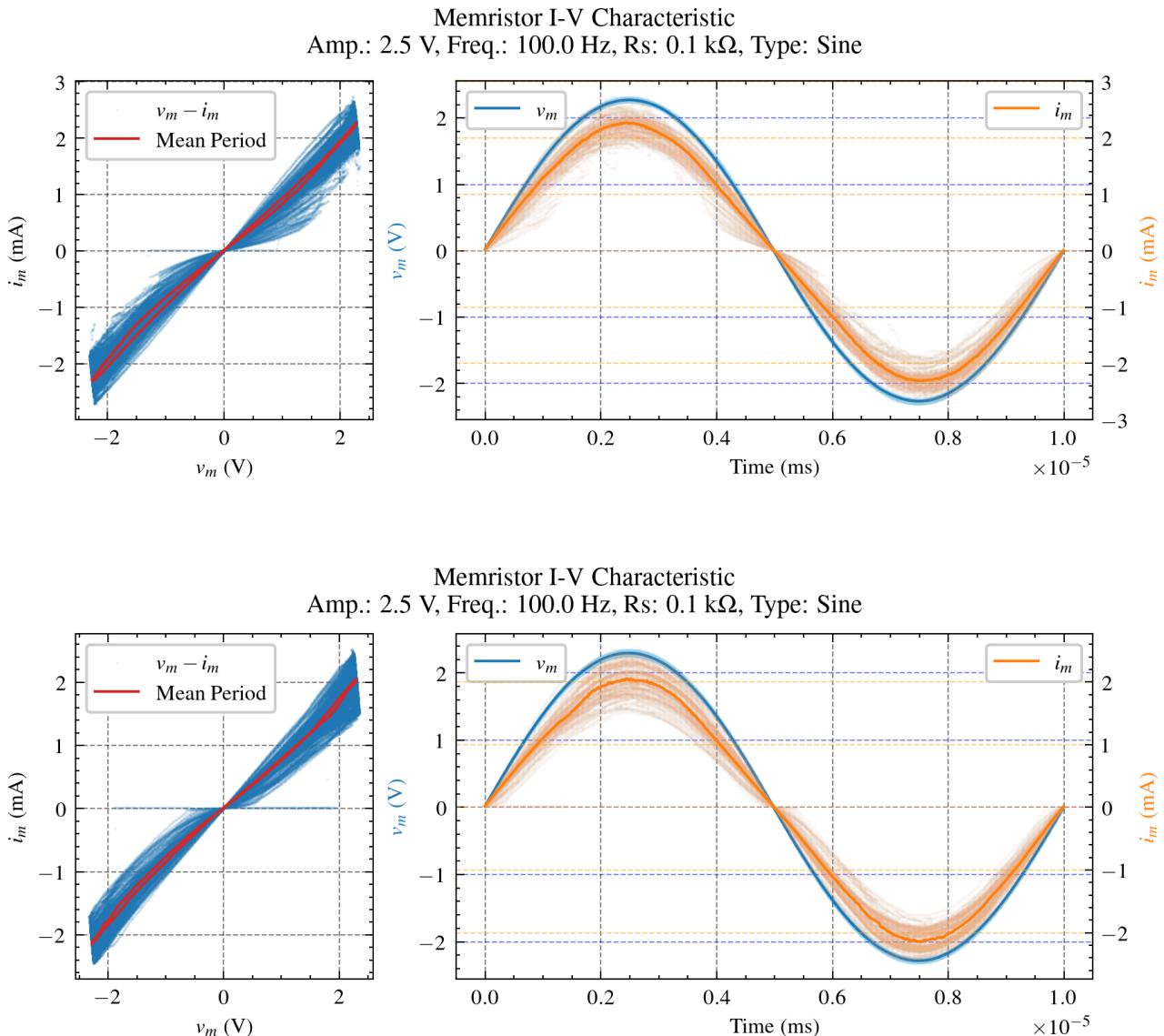
W badaniach zastosowano kartę pomiarową Analog Discovery 3 firmy Digilent, która umożliwia generowanie sygnałów oraz ich akwizycję. Generacja sygnałów realizowana była za pomocą dedykowanej aplikacji z interfejsem graficznym, opracowanej przy użyciu oficjalnego API WaveForms SDK. Proces akwizycji danych przeprowadzono w taki sposób, aby dla każdego okresu napięcia wejściowego zarejestrować 1000 próbek napięcia wyjściowego. W układzie pomiarowym zastosowano rezystor o wartości $R = 0.1 \text{ k}\Omega$. Dla kazdego zestawu parametrów sygnału wejściowego (częstotliwość, amplituda, wartość offsetu) przeprowadzono pomiary dla 120 okresów.

2 Pomiary

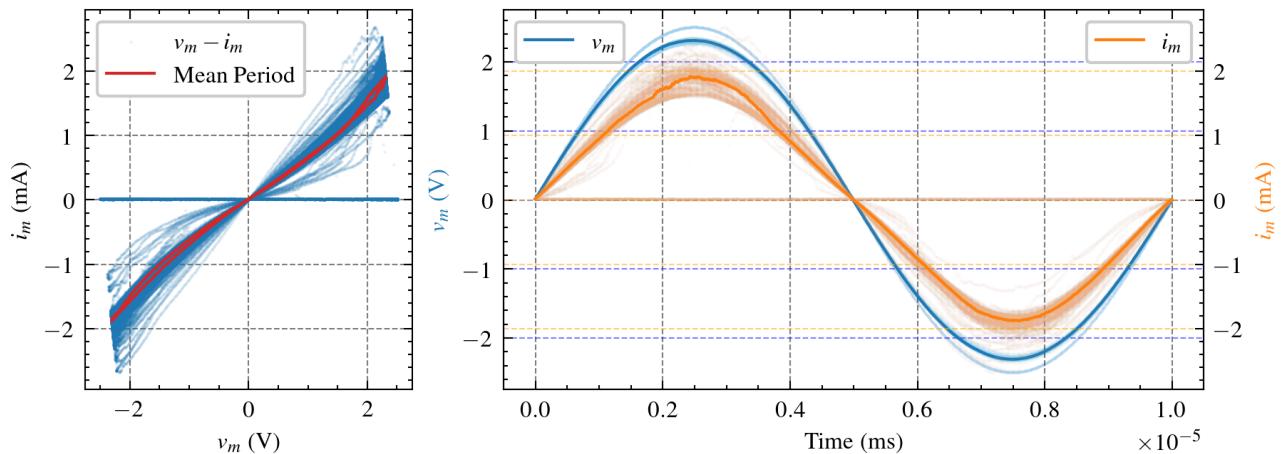
W niniejszej sekcji przedstawiono wyniki pomiarów przeprowadzonych dla różnych parametrów sygnału wejściowego. Wyniki zostały zaprezentowane w formie graficznej, gdzie wykresy umieszczone po lewej stronie ilustrują pętle histerezy w przestrzeni $v_m - i_m$ wraz z uśrednioną charakterystyką statyczną. Wykresy znajdujące się po prawej stronie przedstawiają przebiegi czasowe napięcia wejściowego v_s oraz napięcia na memristorze v_m . Na wykresach czasowych poszczególne okresy sygnału zostały oznaczone punktami, natomiast linia ciągła przedstawia przebieg uśredniony wszystkich zarejestrowanych okresów.

Jako, że otrzymano dużą liczbę wykresów, w niniejszym dokumencie zamieszczono jedynie wybrane przykłady ilustrujące wpływ poszczególnych parametrów sygnału wejściowego na charakterystyki memristora. Pełny zestaw wyników pomiarów wraz z plikami *.csv dostępny jest w repozytorium pod linkiem: [\[1\]](#). Rozbito również wyniki pomiarów na dwa oddzielne katalogi, ze względu na otrzymane dwa różne typy memristorów.

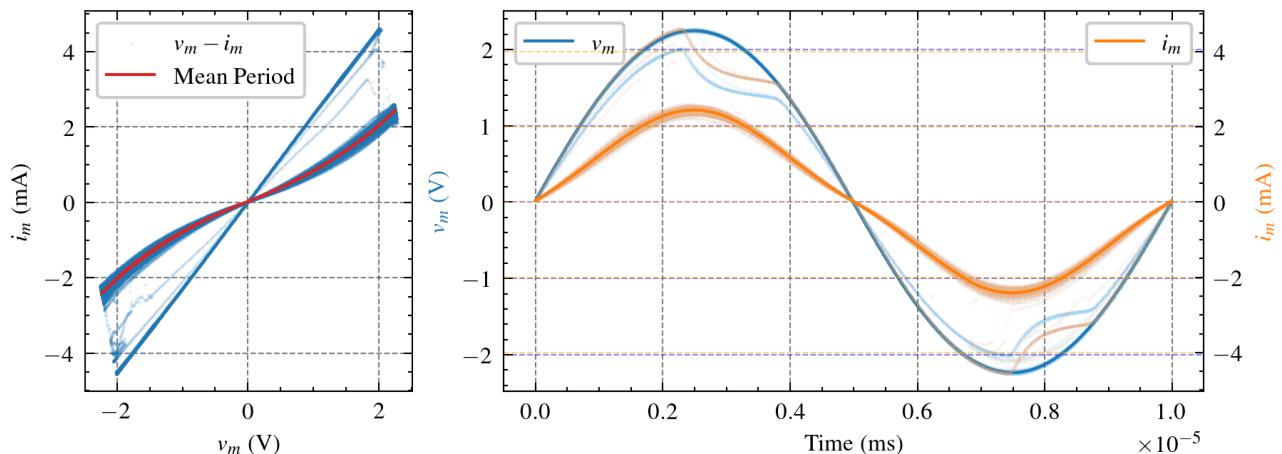
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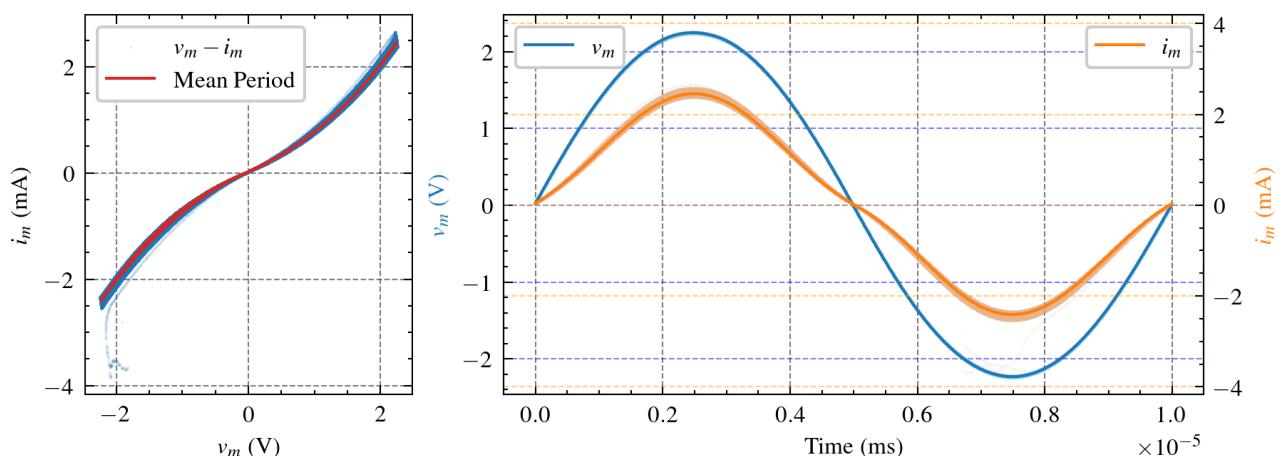
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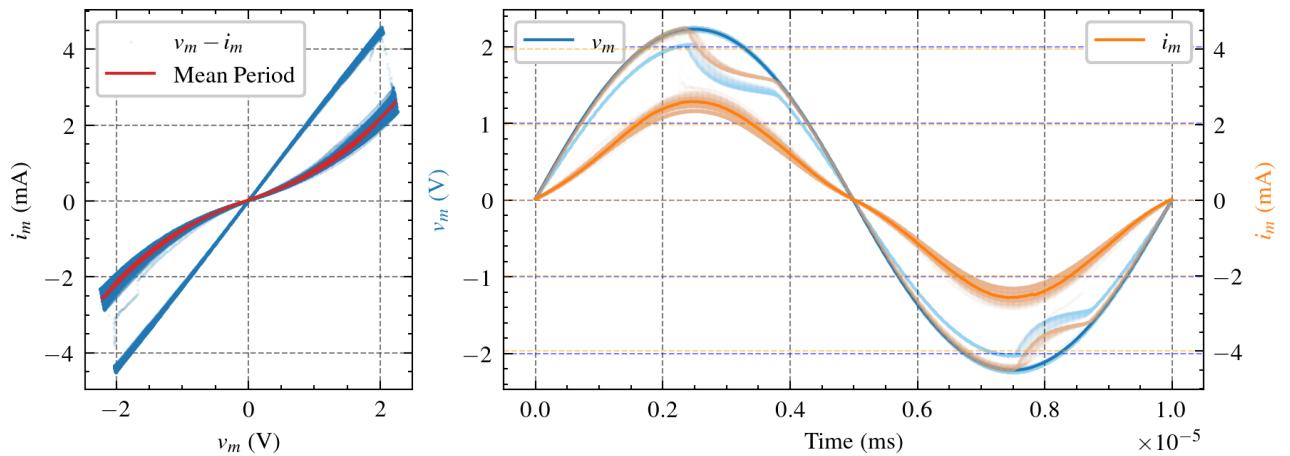
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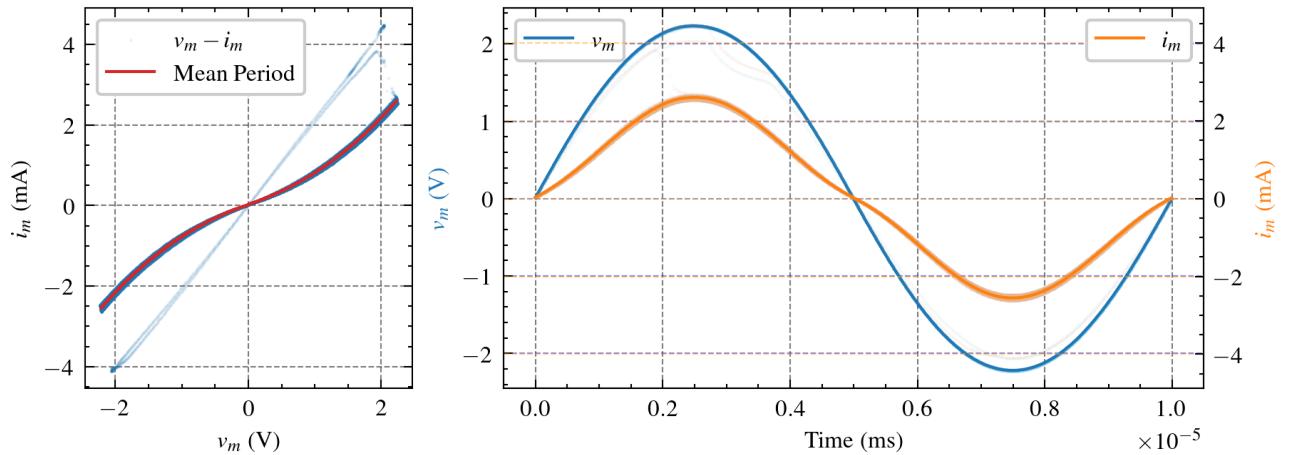
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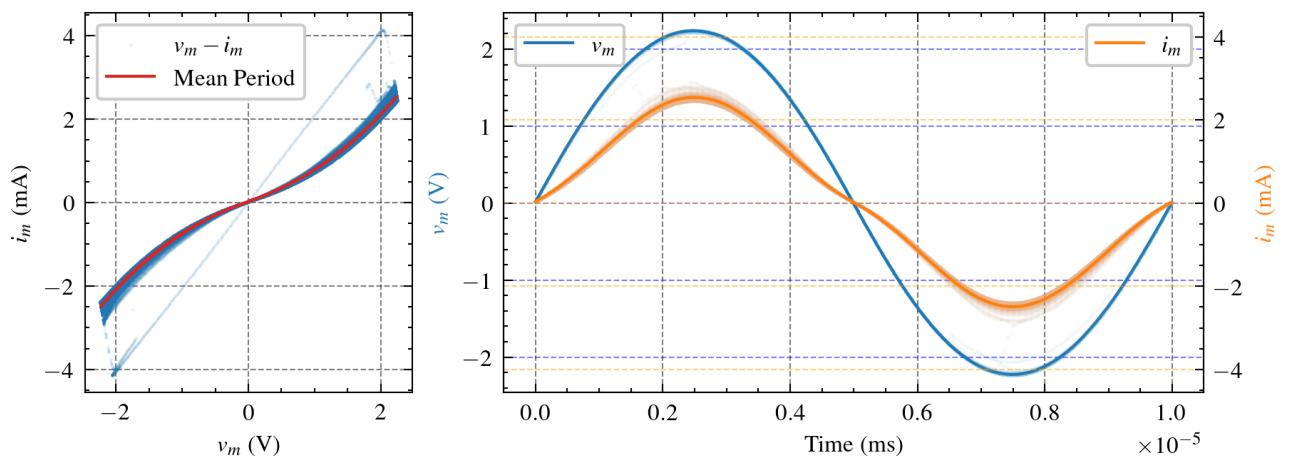
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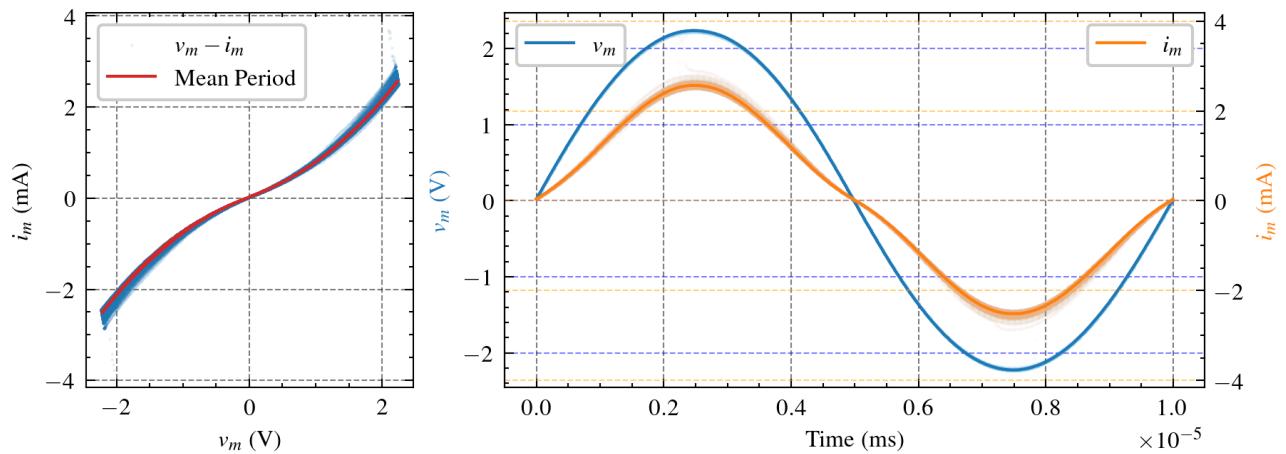
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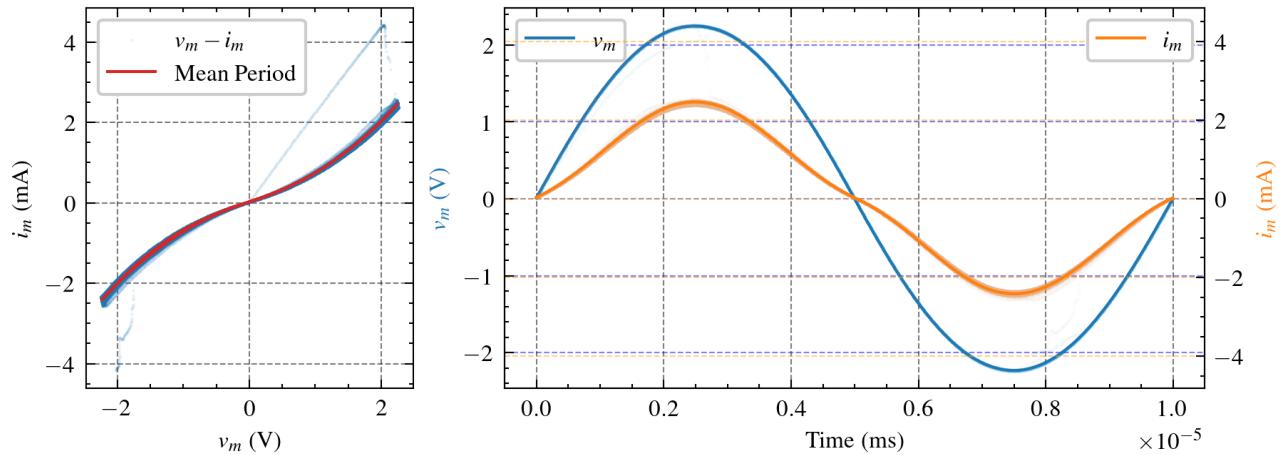
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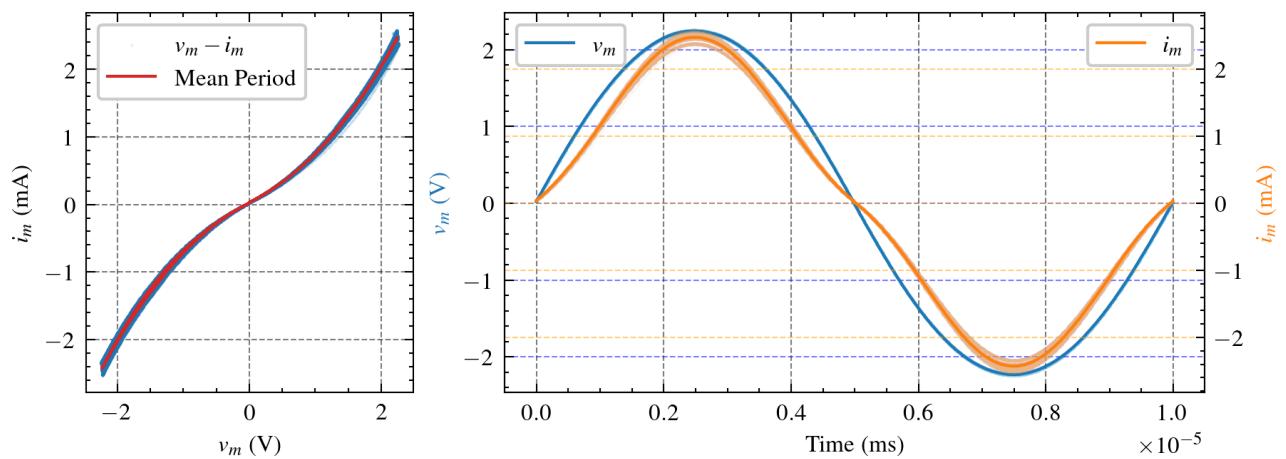
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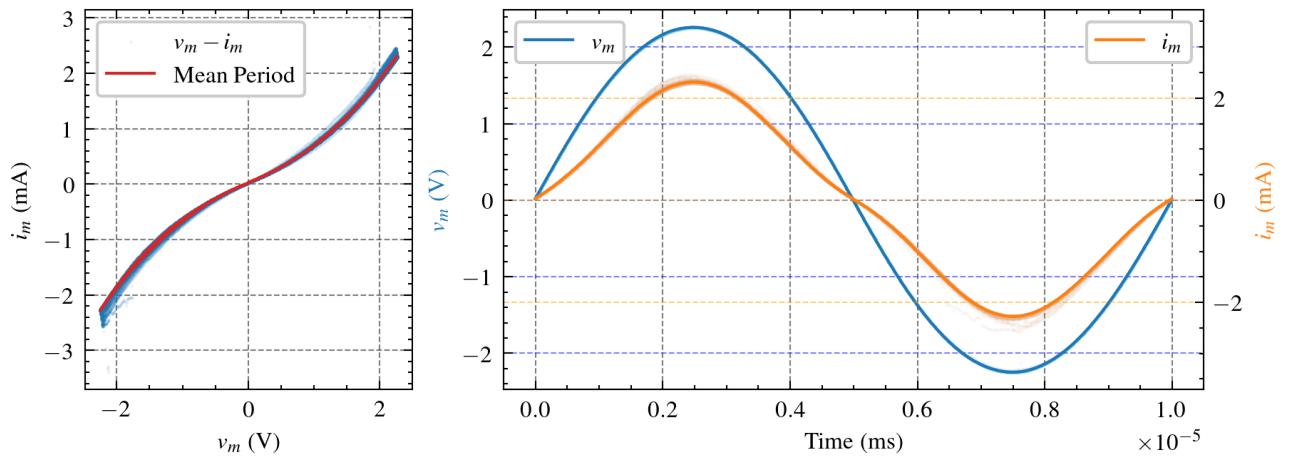
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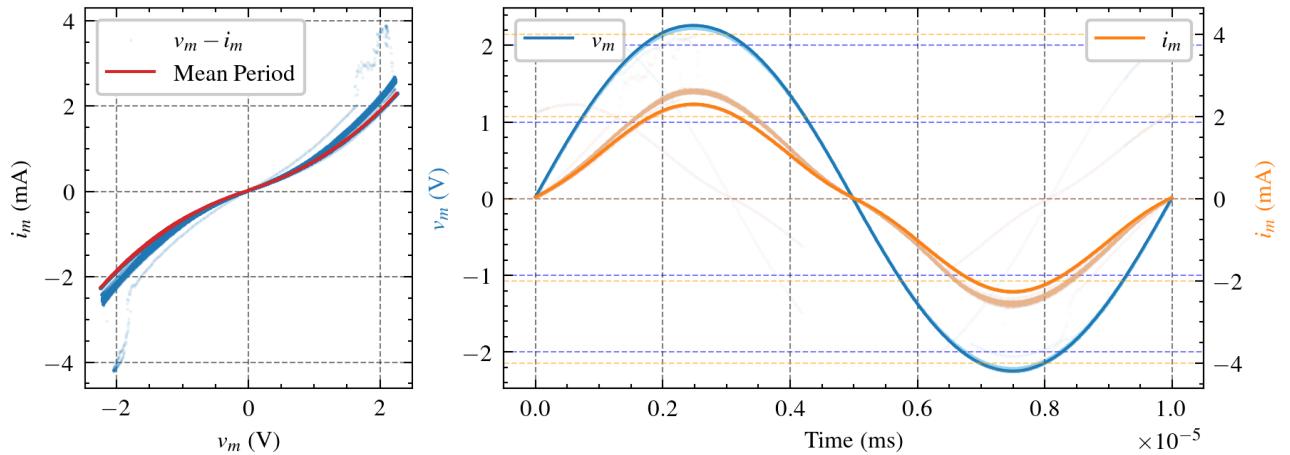
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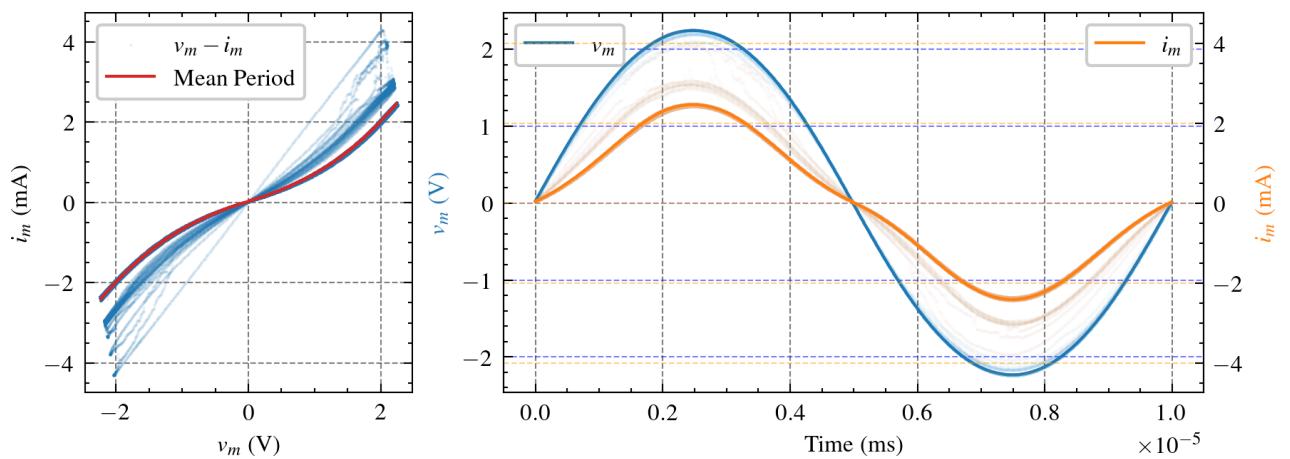
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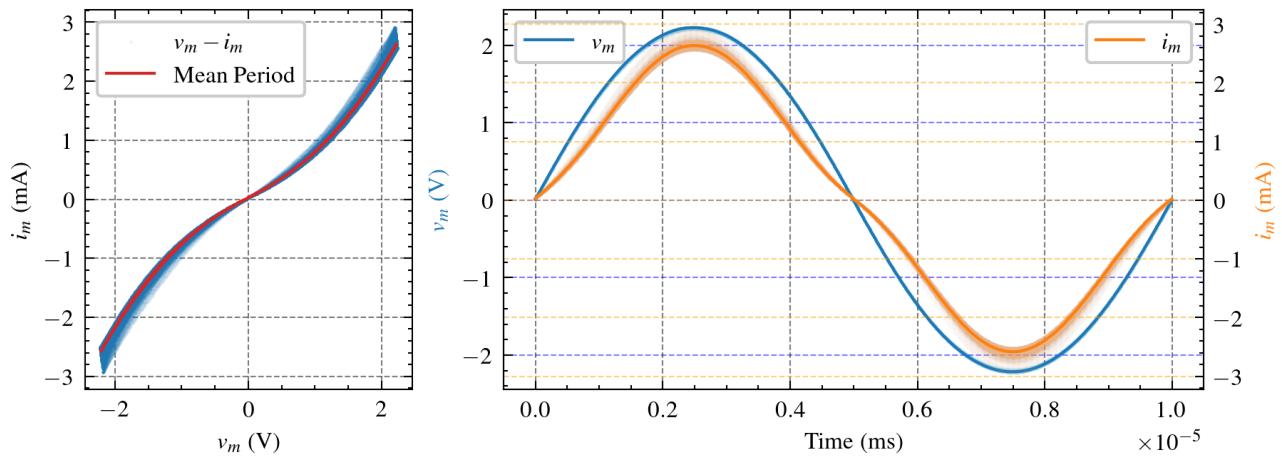
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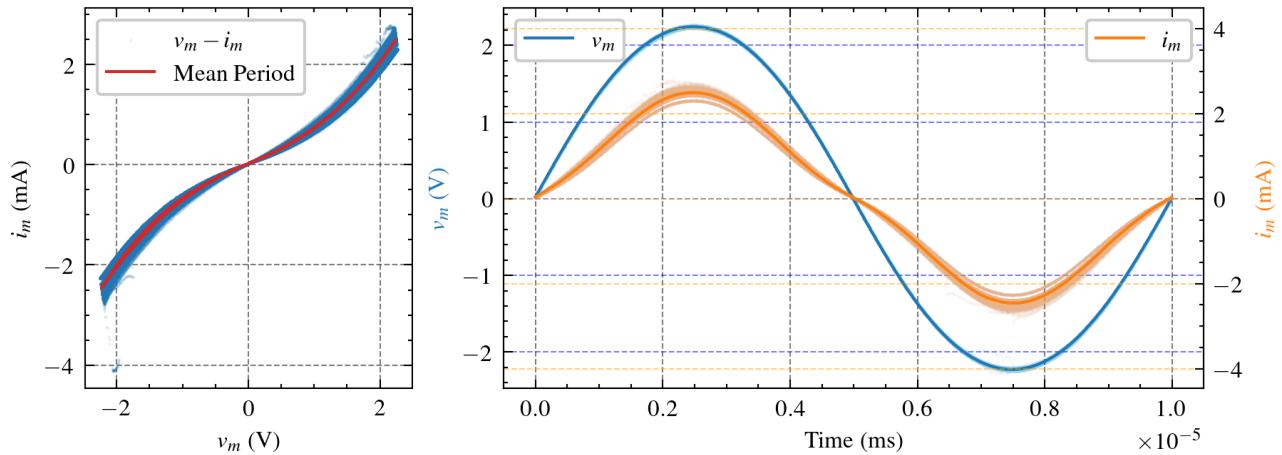
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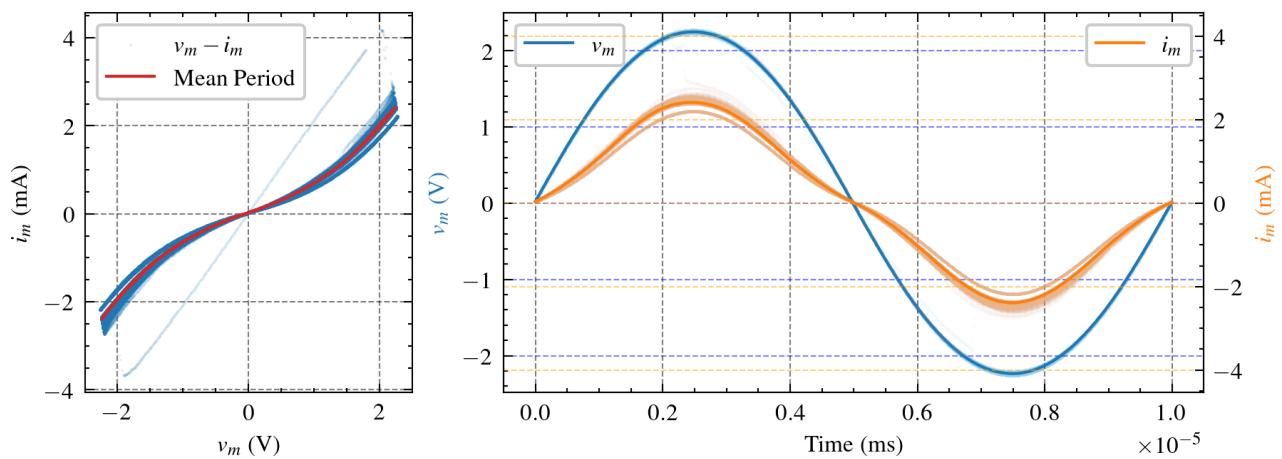
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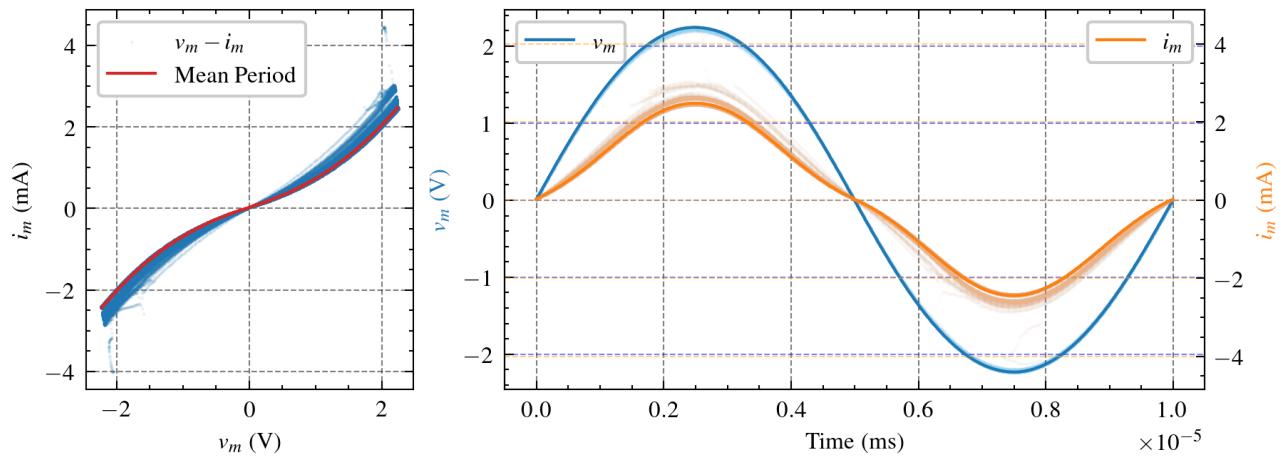
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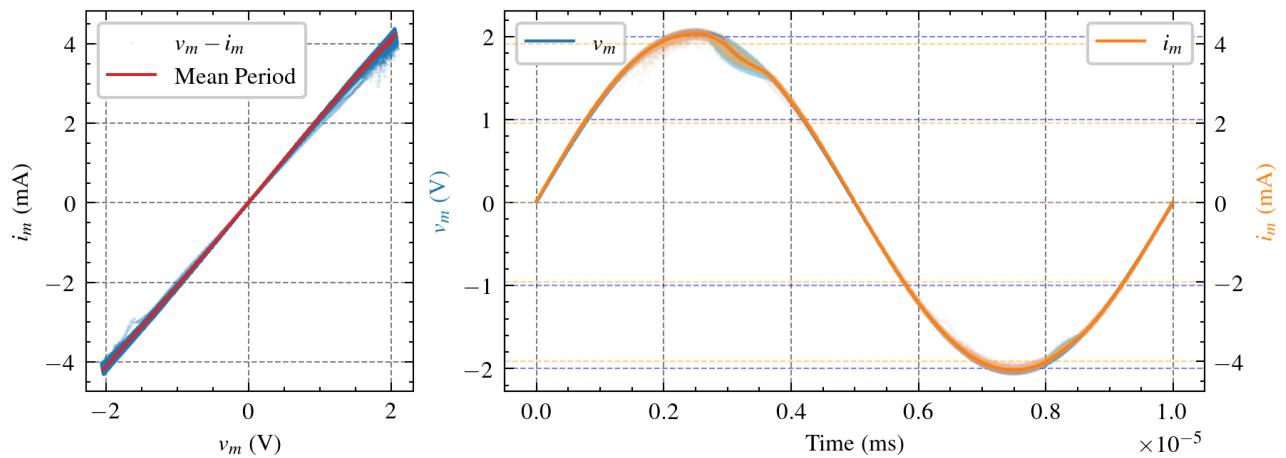
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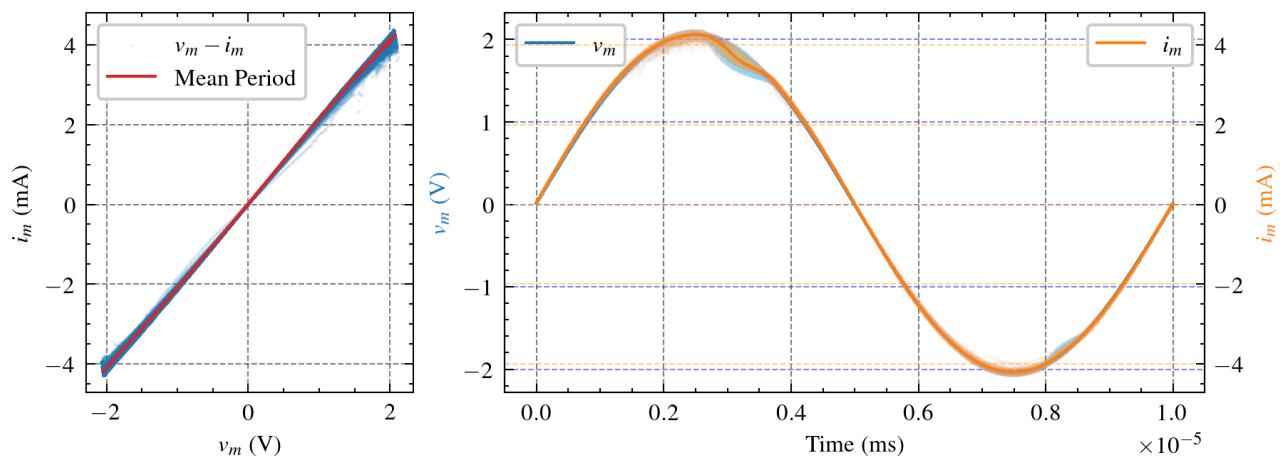
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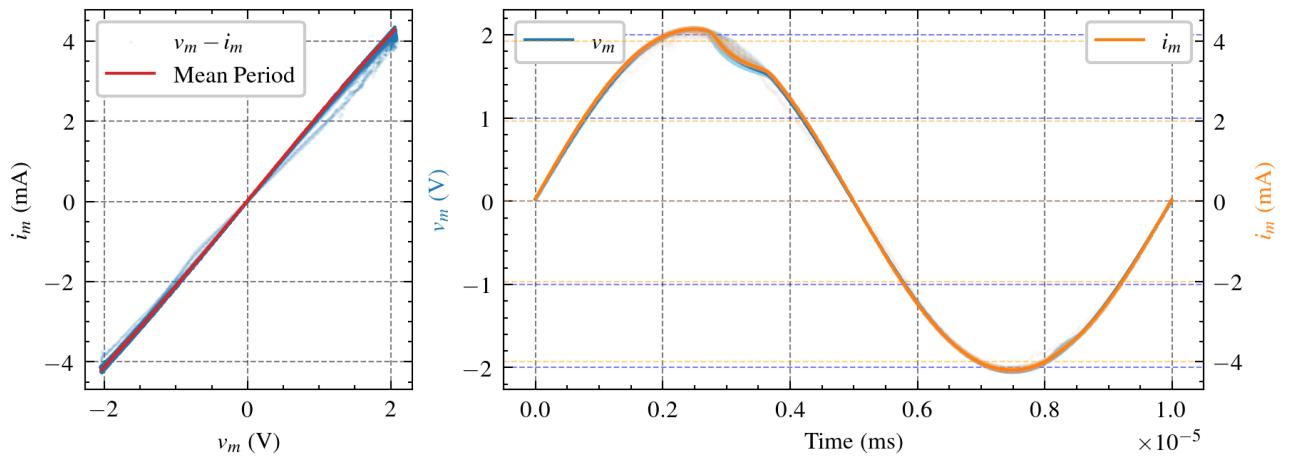
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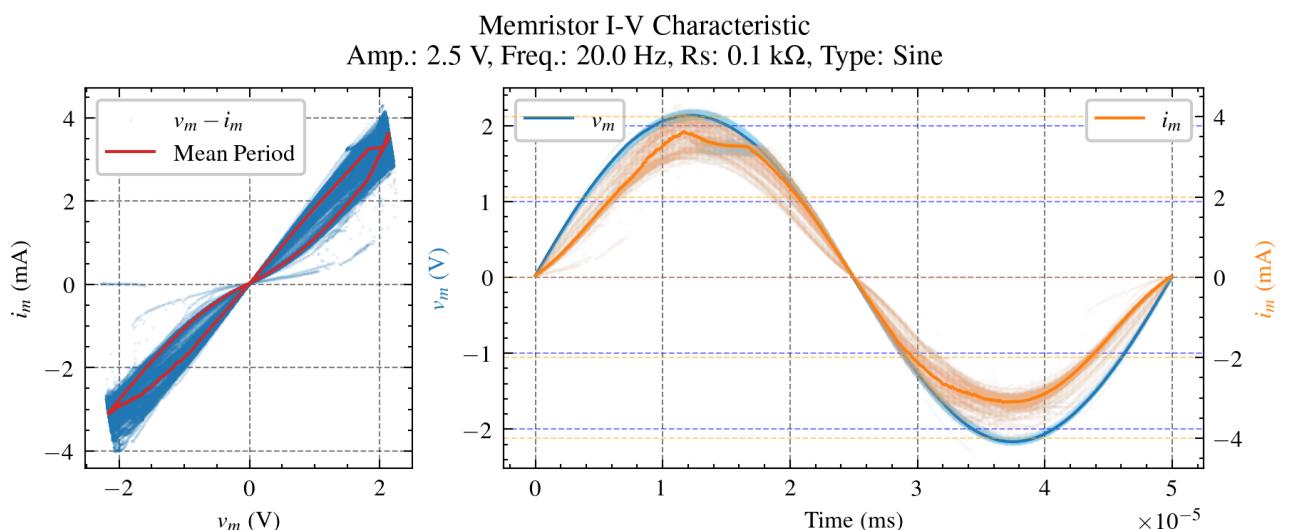
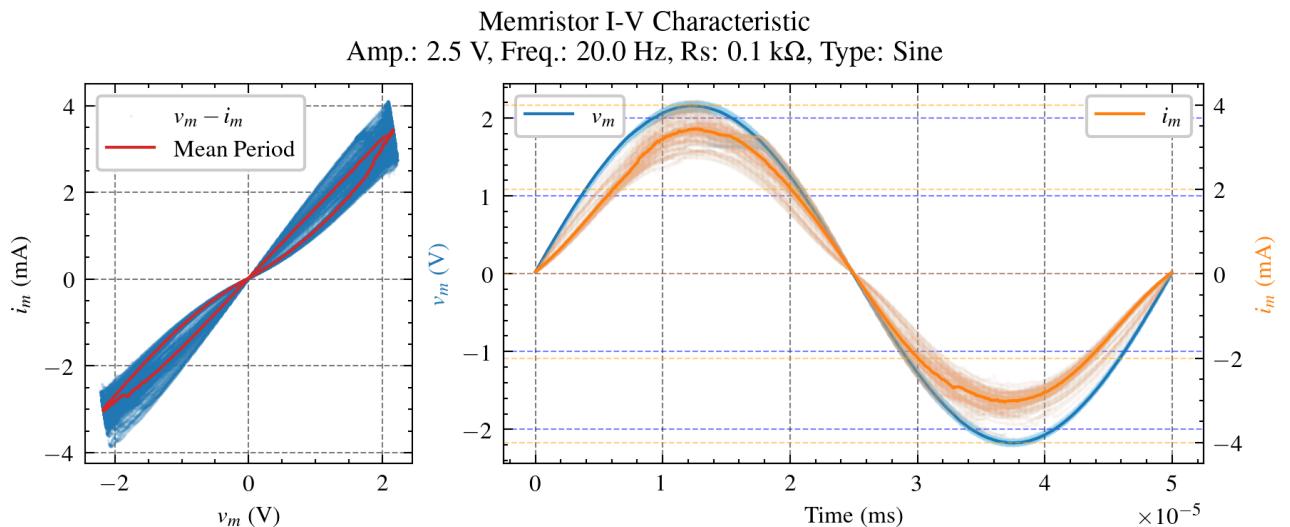
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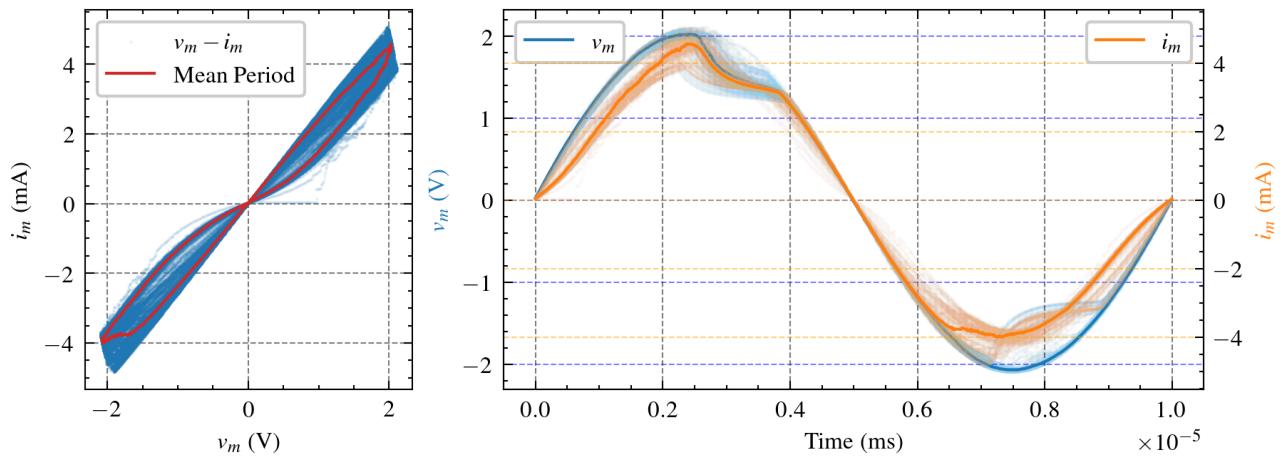
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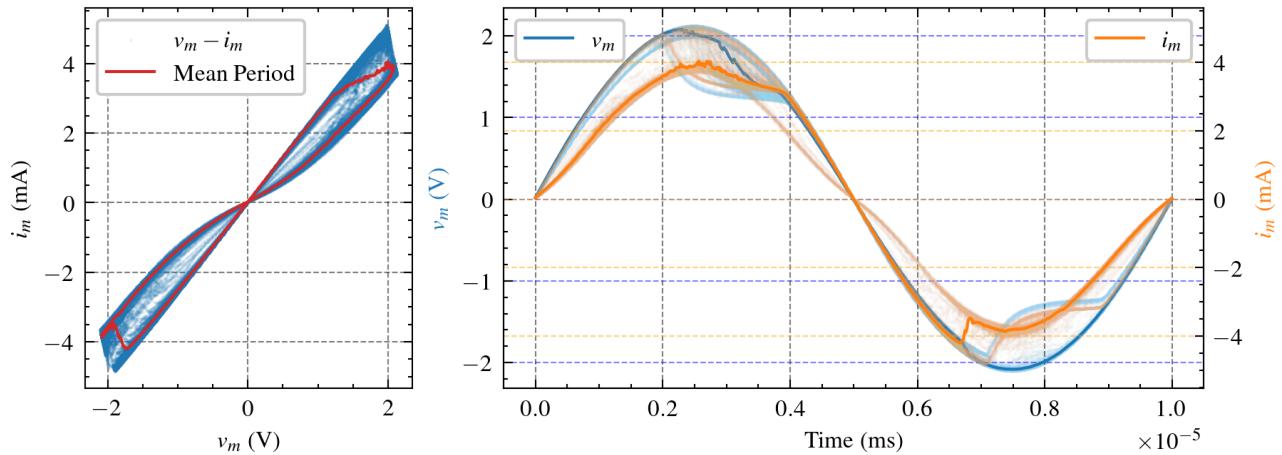
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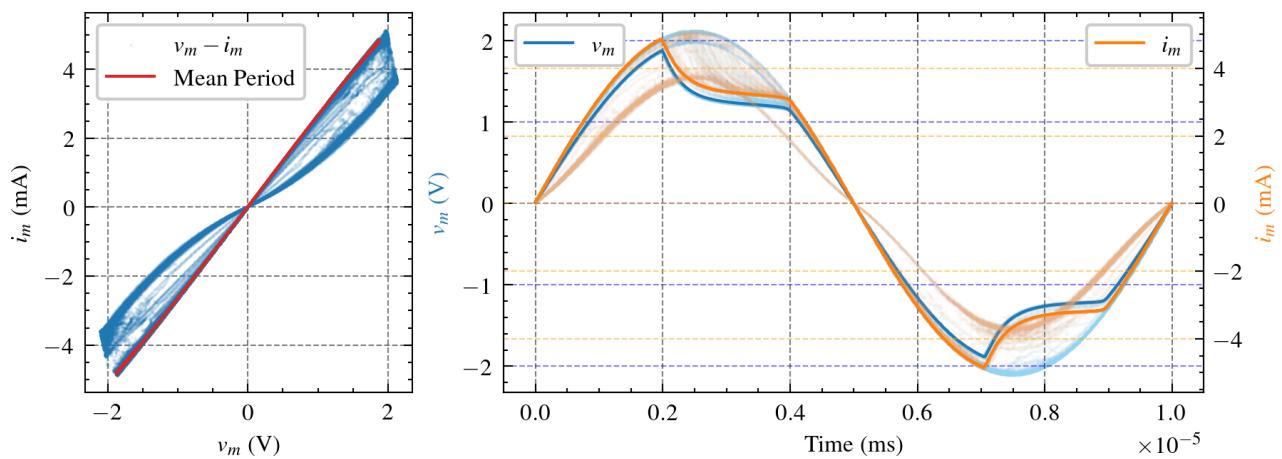
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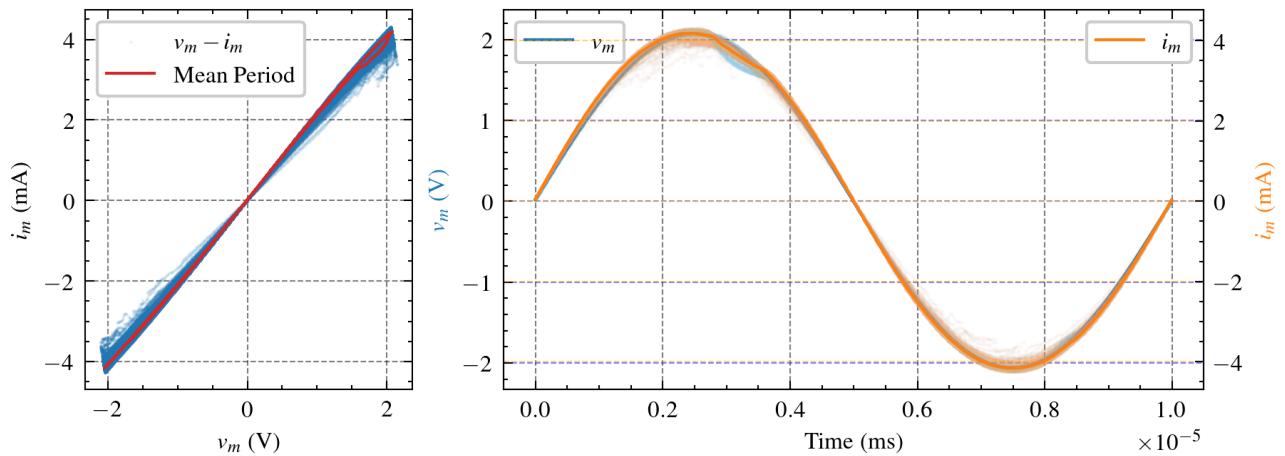
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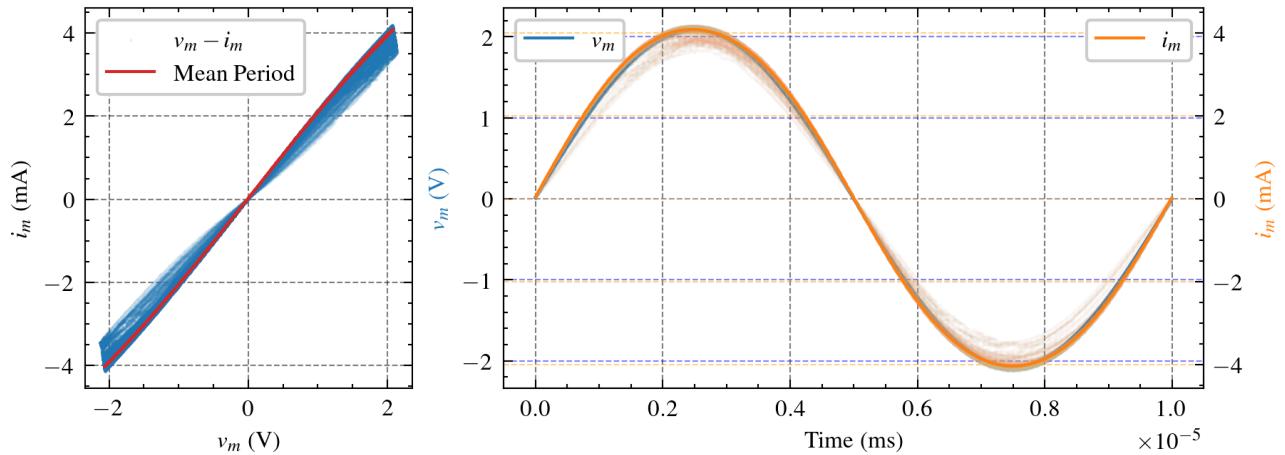
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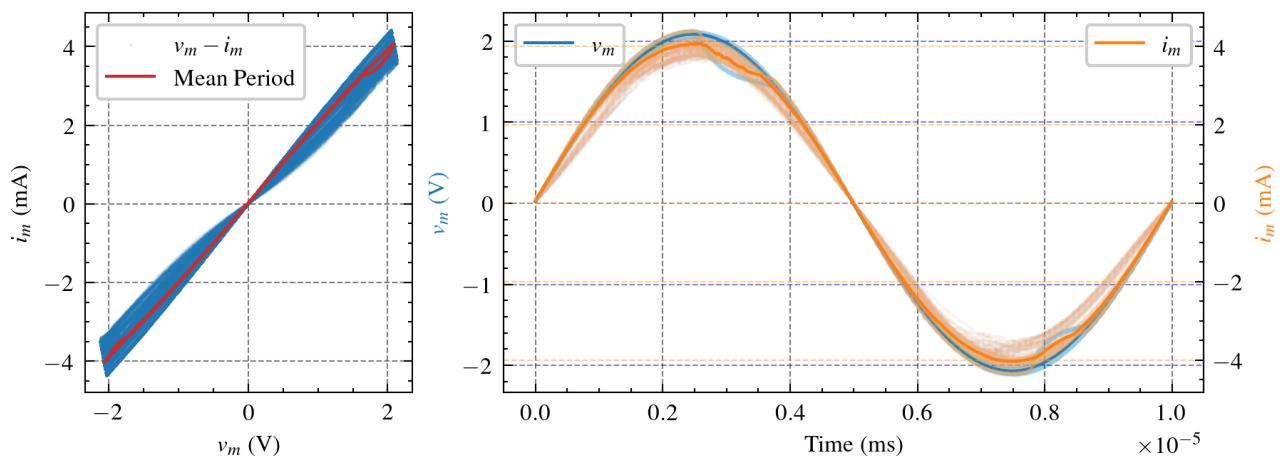
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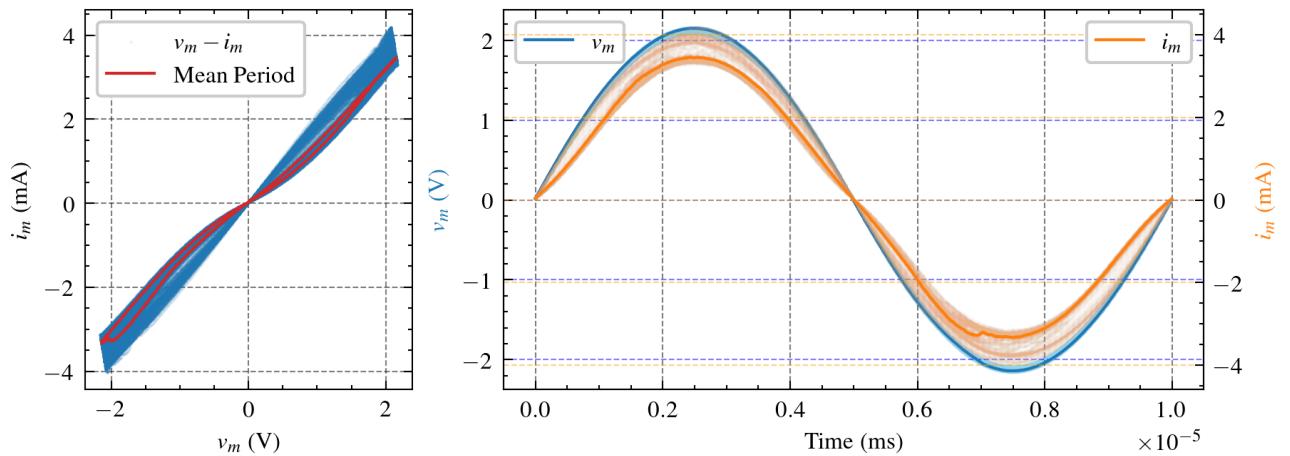
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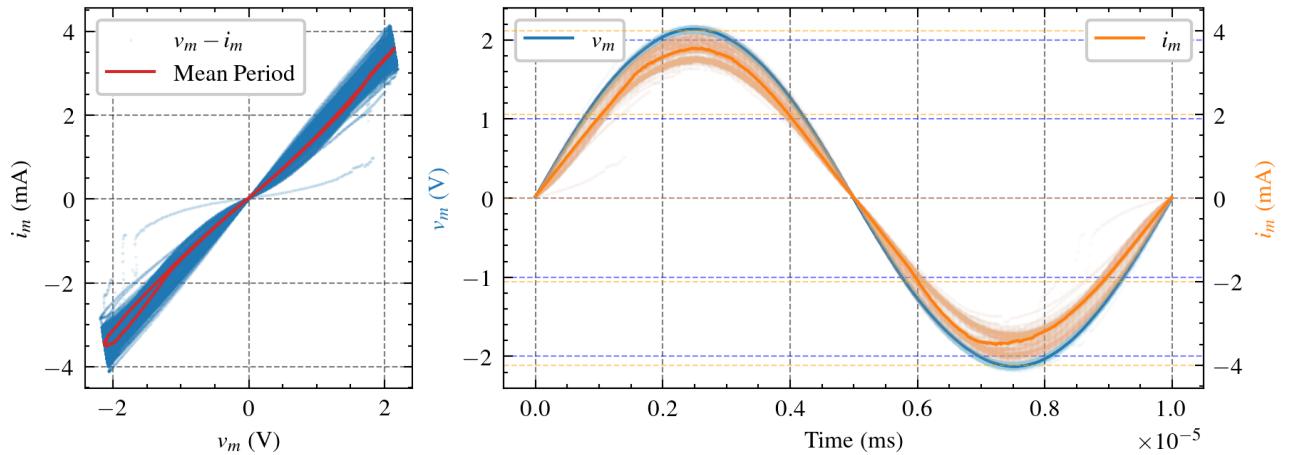
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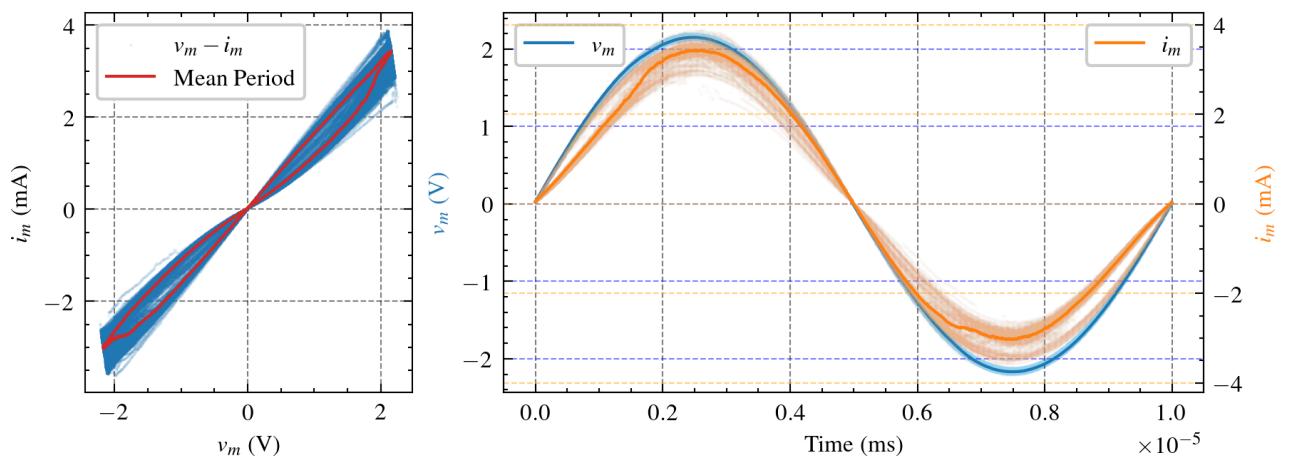
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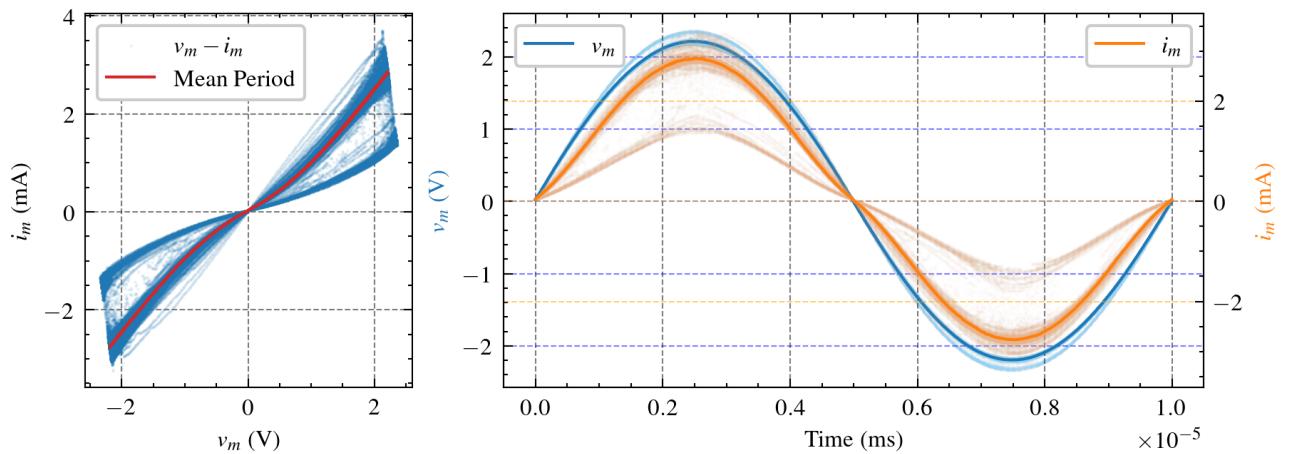
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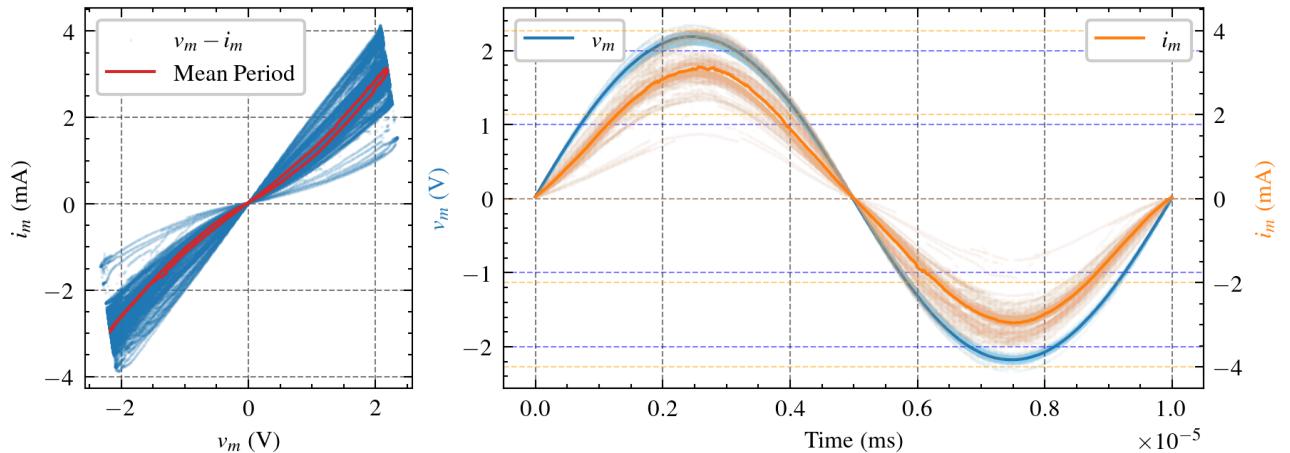
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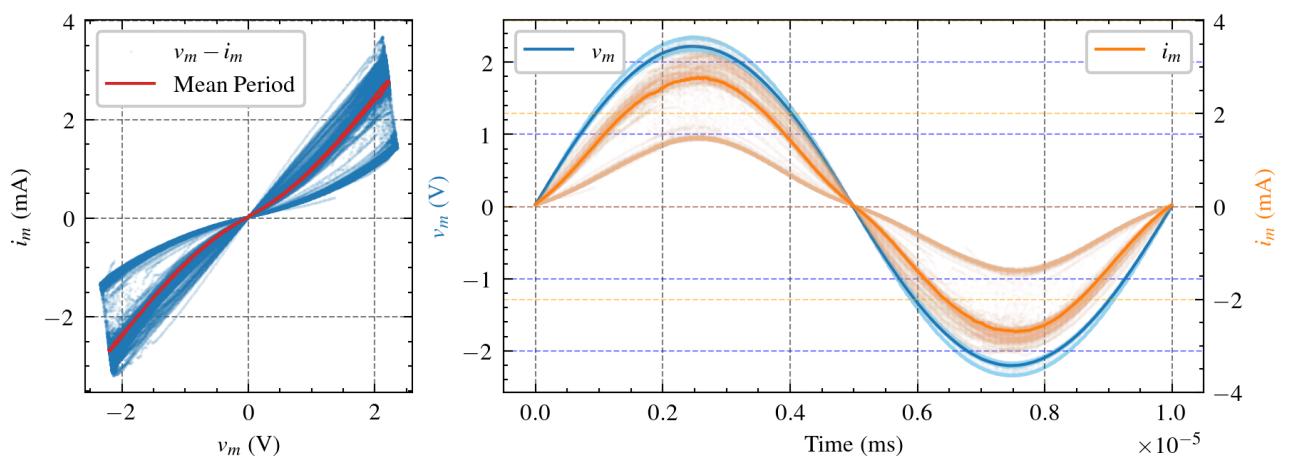
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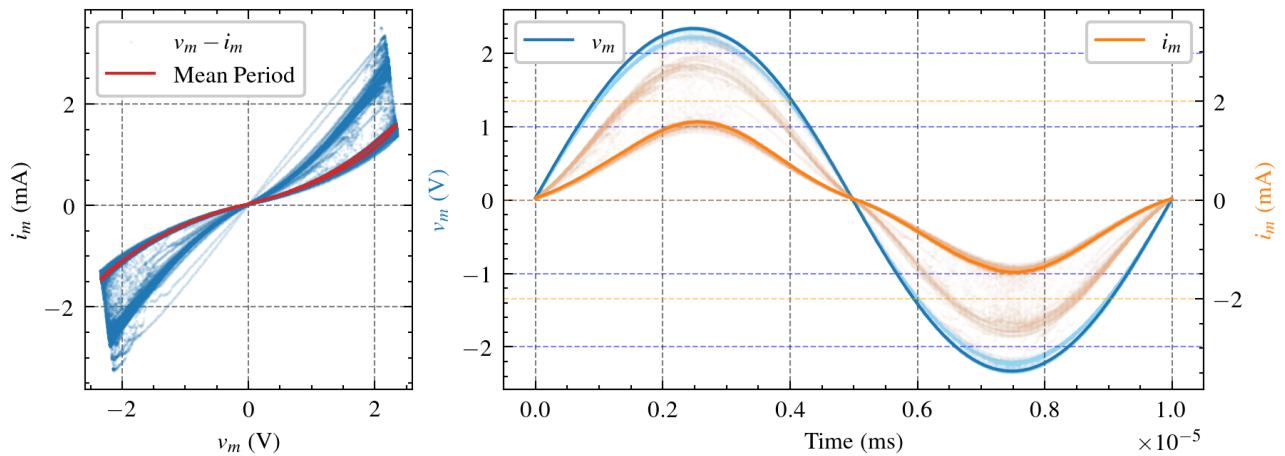
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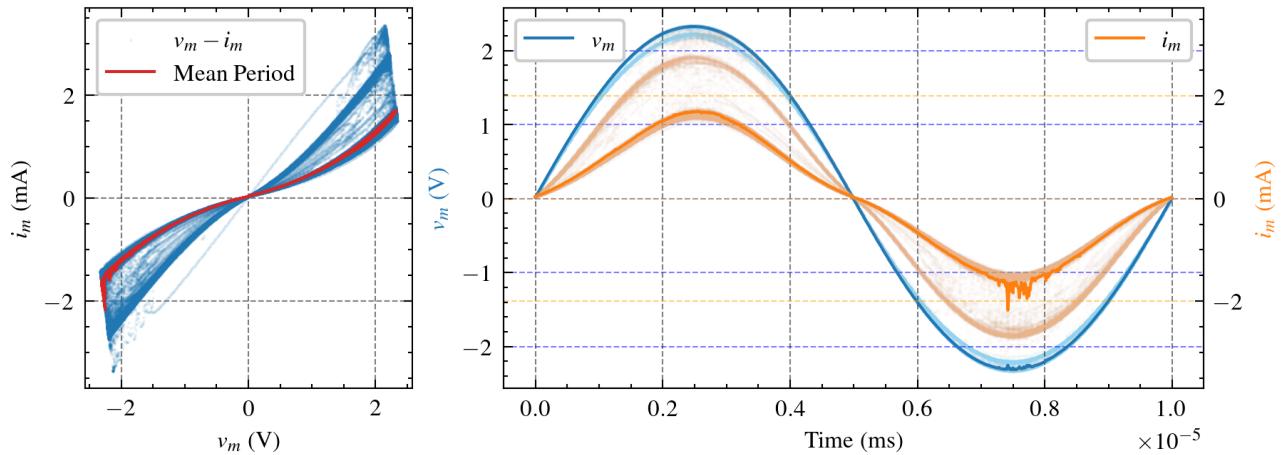
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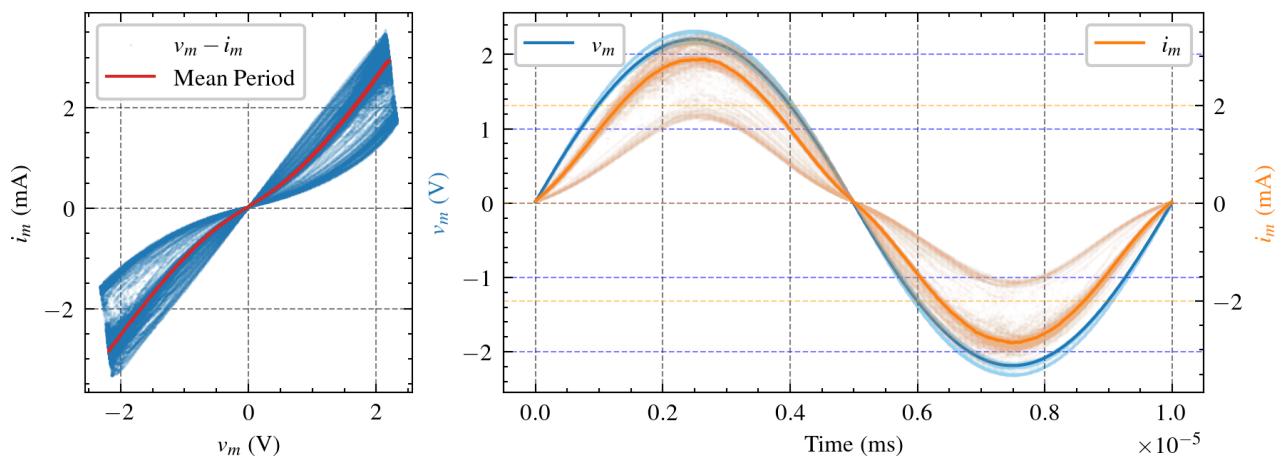
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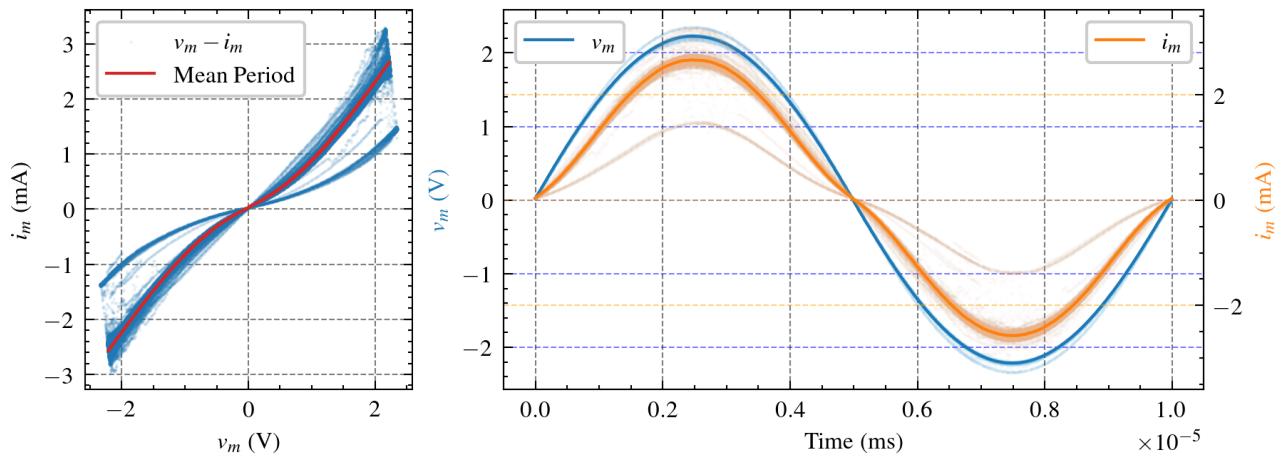
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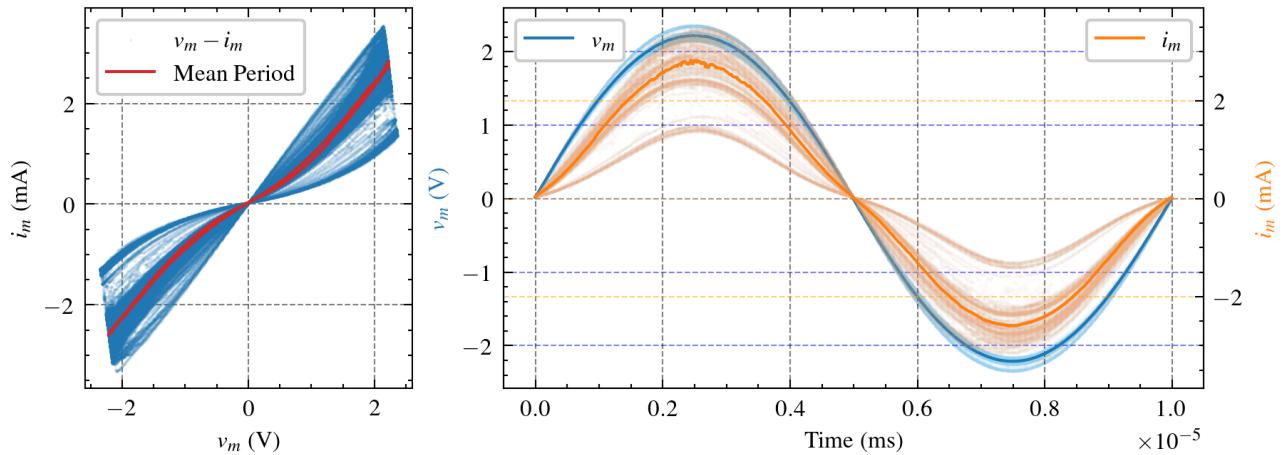
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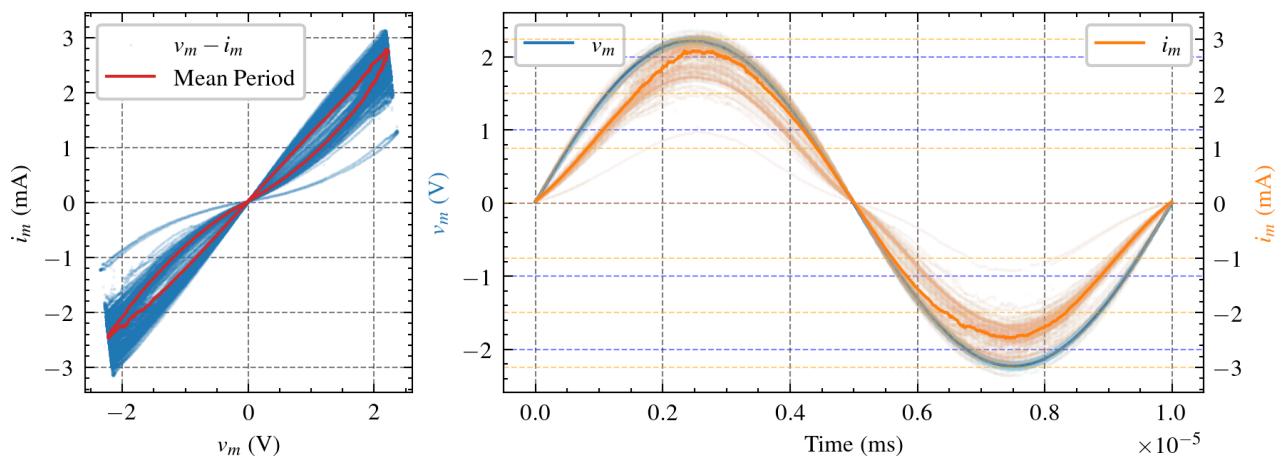
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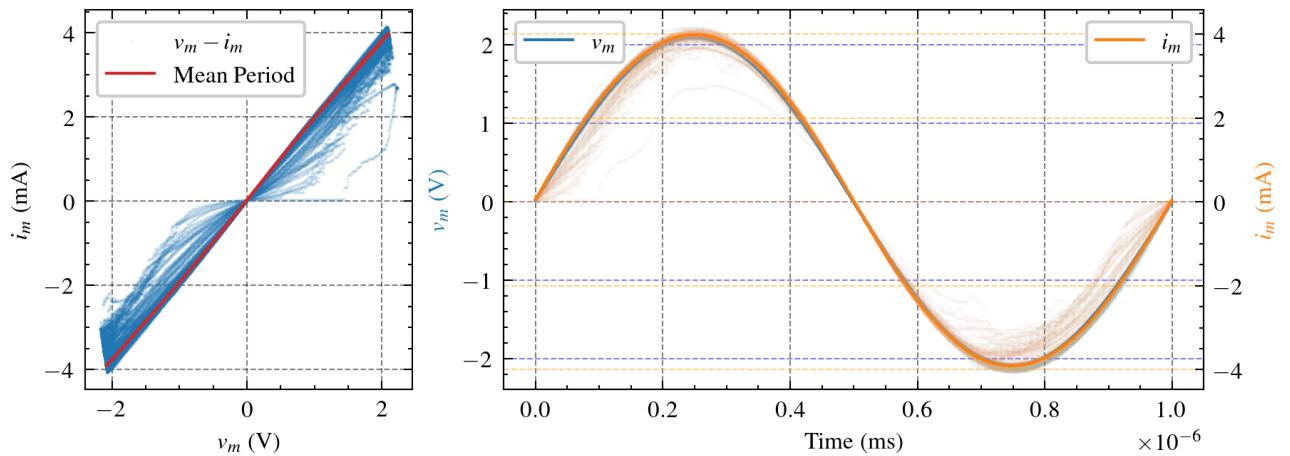
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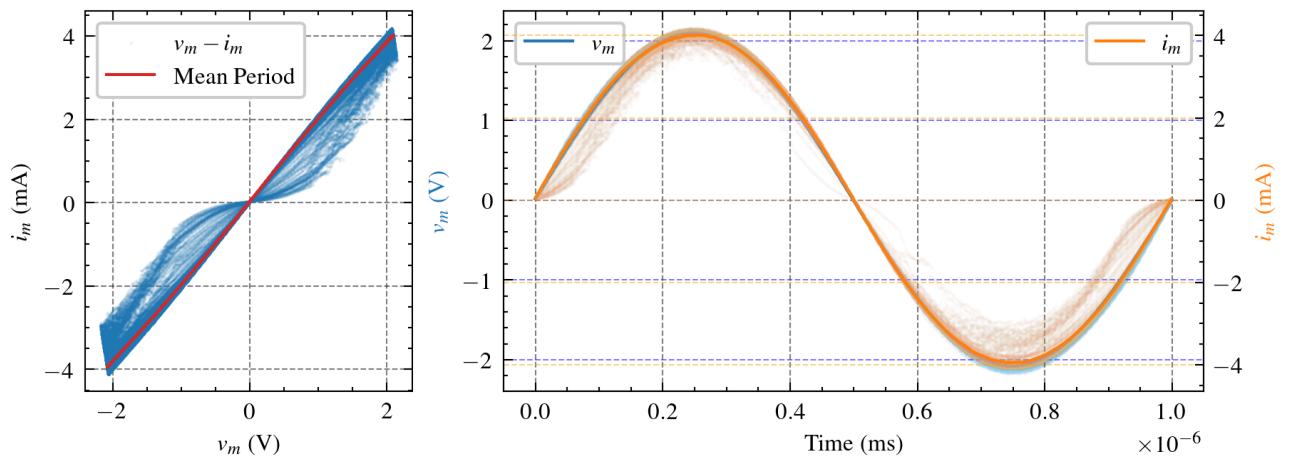
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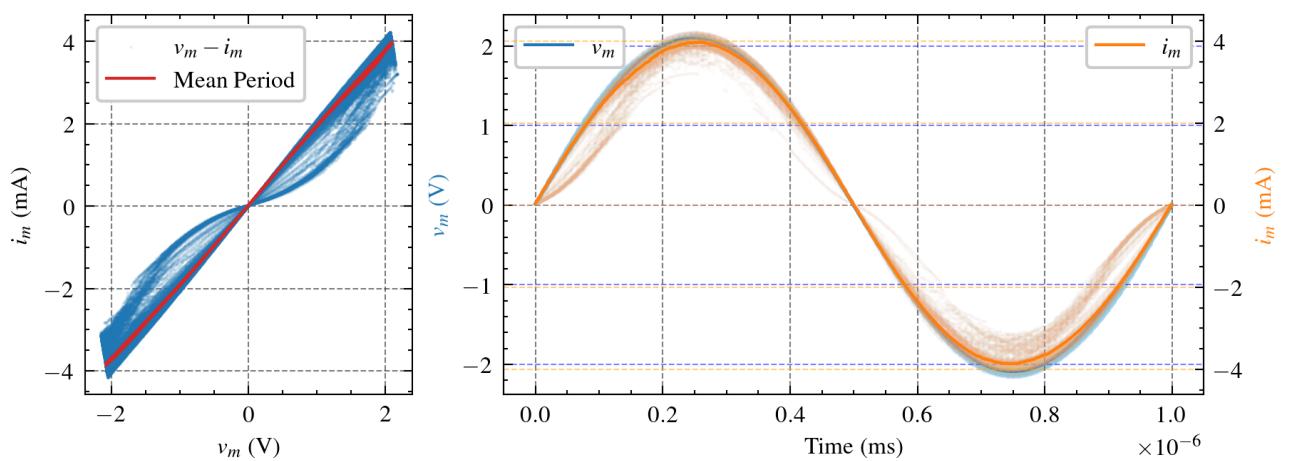
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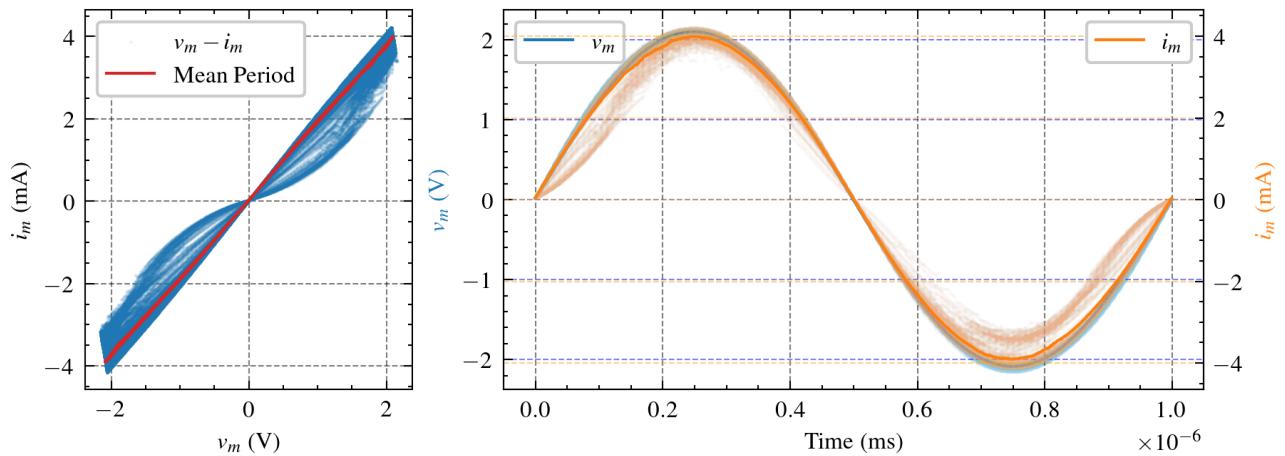
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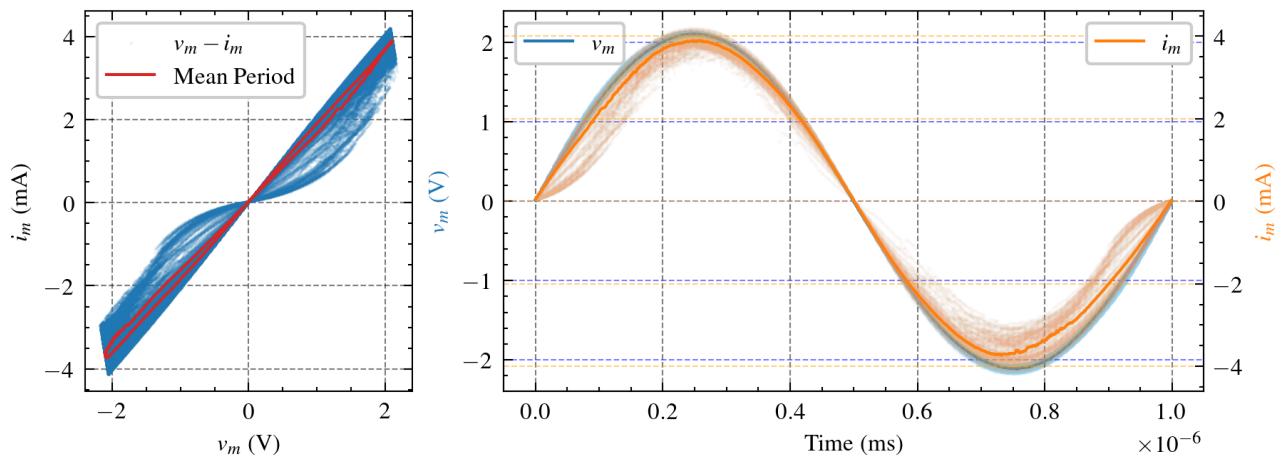
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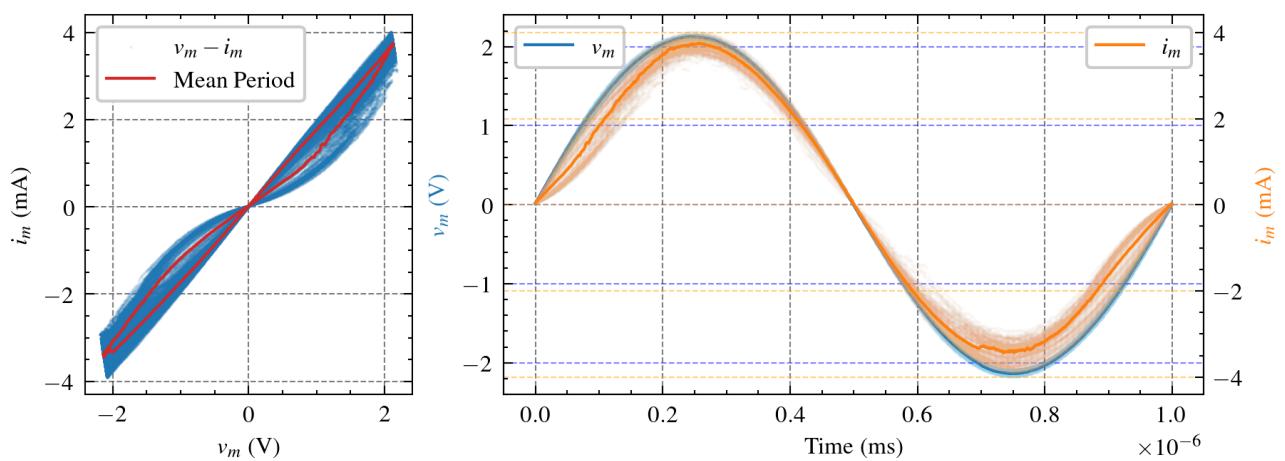
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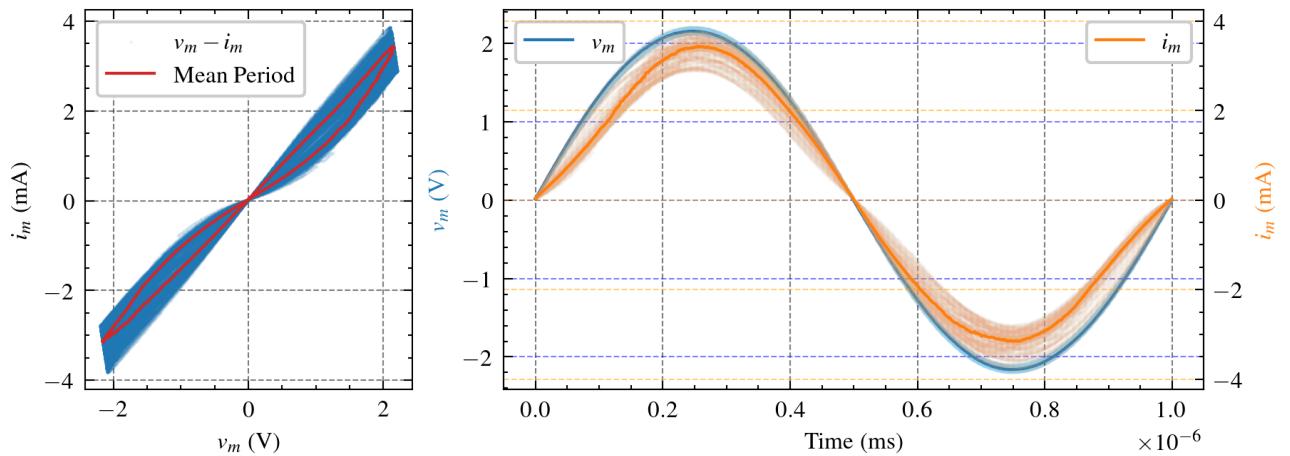
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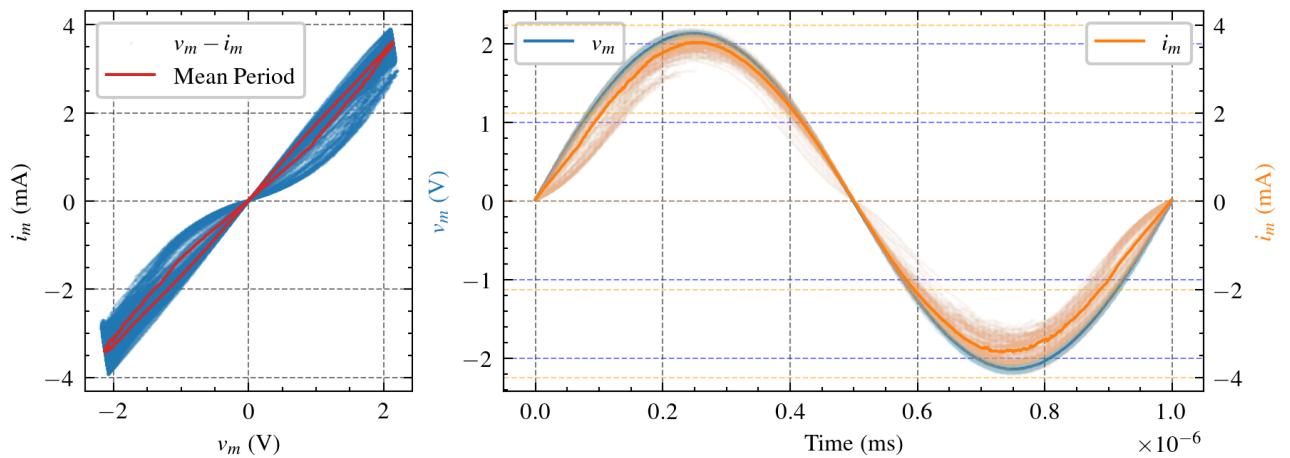
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Memristor I-V Characteristic
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Memristor I-V Characteristic
Amp.: 2.5 V, Freq.: 1000.0 Hz, Rs: 0.1 k Ω , Type: Sine



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