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Segmented DAC Linearity Improvement Algorithm Using Unit Cell Sorted Alternately with Digital Method

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Summary: Whether the numerical alternating sorting algorithm can improve the differential nonlinearity (DNL) and integral nonlinearity (INL) of the DAC under multiple mismatch conditions.
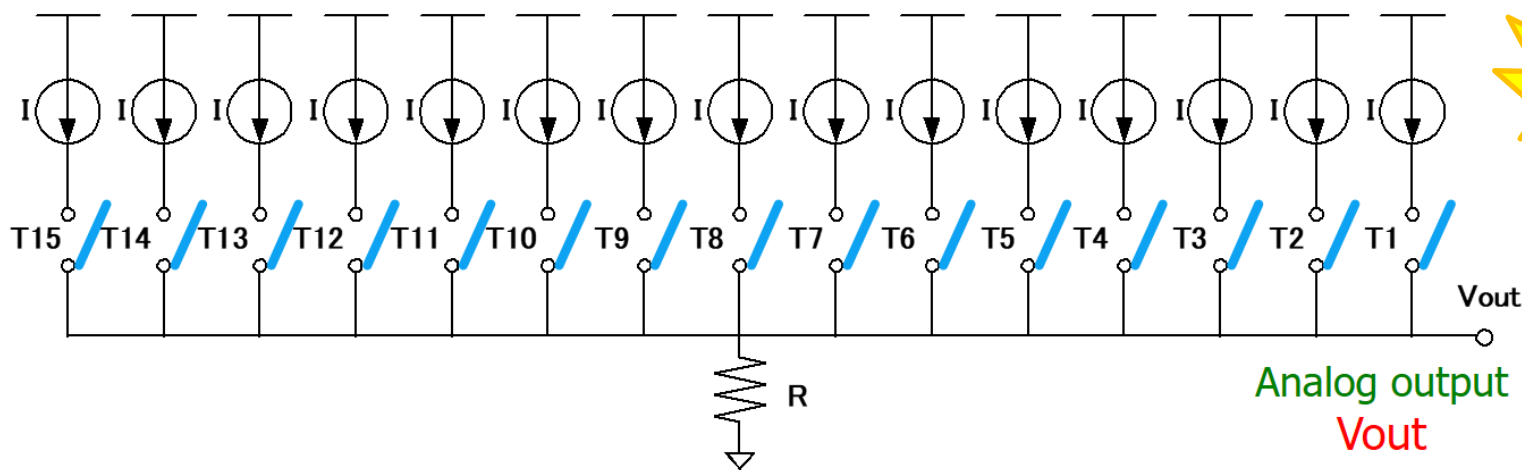
A-7 ● **Research Objective**

- Development of digital calibration method for DAC non-linearity.
- Digitally-assisted analog technology
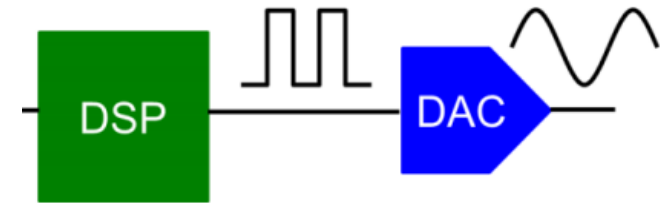
Digital-to-Analog Converter (DAC)

● **Segmented DAC Configuration**

Current sources mismatches causes non-linearity.

Problem

T15 T14 T13 T12 T11 T10 T9 T8 T7 T6 T5 T4 T3 T2 T1

Vout

R

Analog output
Vout

A-7 ● **Our Approach:**

Changing the order of switches "Alternate" calibration algorithm

① Original order of current source mismatch is random

② Larger, smaller, larger, smaller, … than ideal,

I_1 I_2 I_3 I_4 I_5 I_6 I_7 I_8 I_9 I_{10} I_{11} I_{12} I_{13} I_{14} I_{15}

I_{ideal}

I_1 I_3 I_2 I_4 I_7 I_5 I_9 I_6 I_{10} I_8 I_{12} I_{11} I_{13} I_{14} I_{15}

Large Large Large Large Large Large Large Surplus
Small Small Small Small Small Small Small

…

Mismatch Canceled