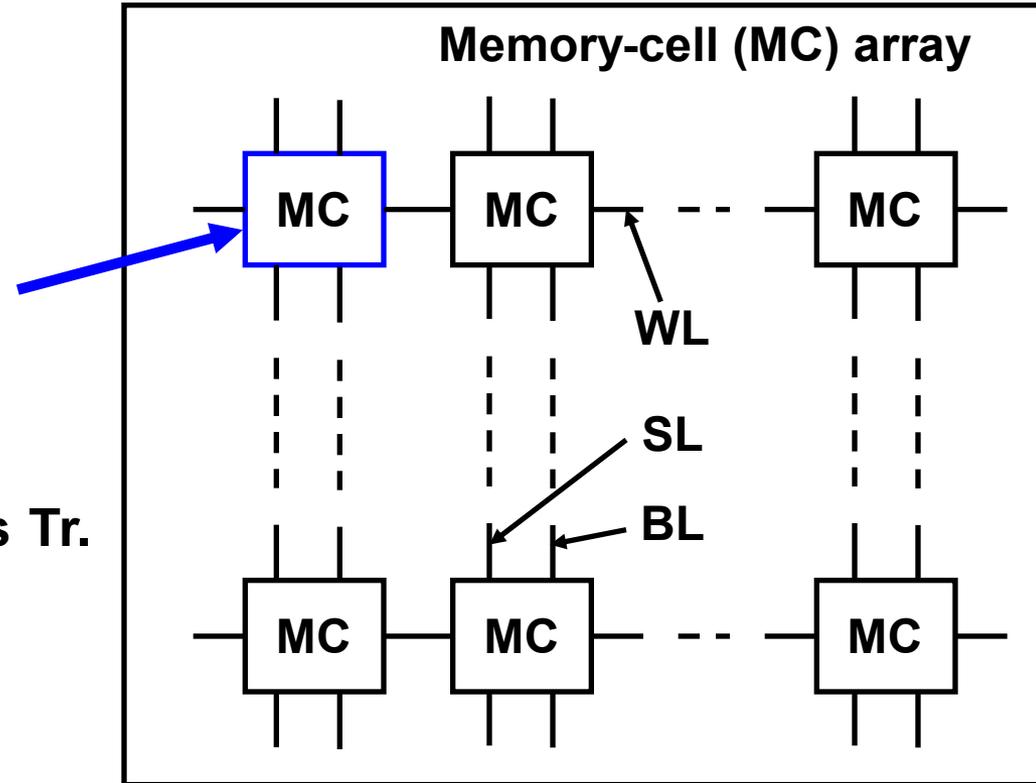
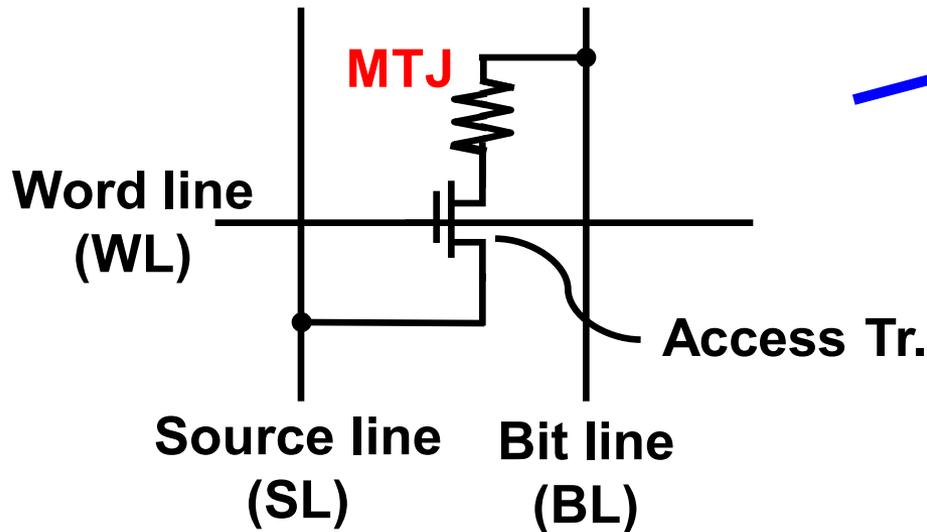


# A Negative-Resistance Sense Amplifier for Low-Voltage Operating STT-MRAM

**Yohei Umeki**  
**Kobe University**

MTJ: Magnetic tunnel junction

## 1T-1MTJ Memory Cell



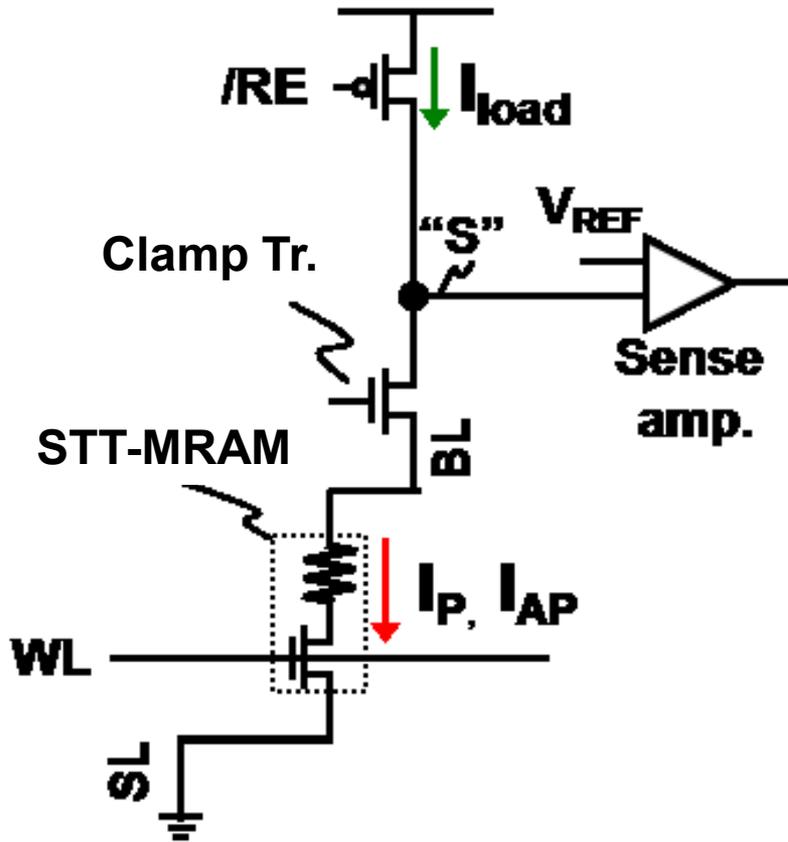
**MTJ** is the resistive device.

As the device, the STT-MRAM can operate at 0.4V.

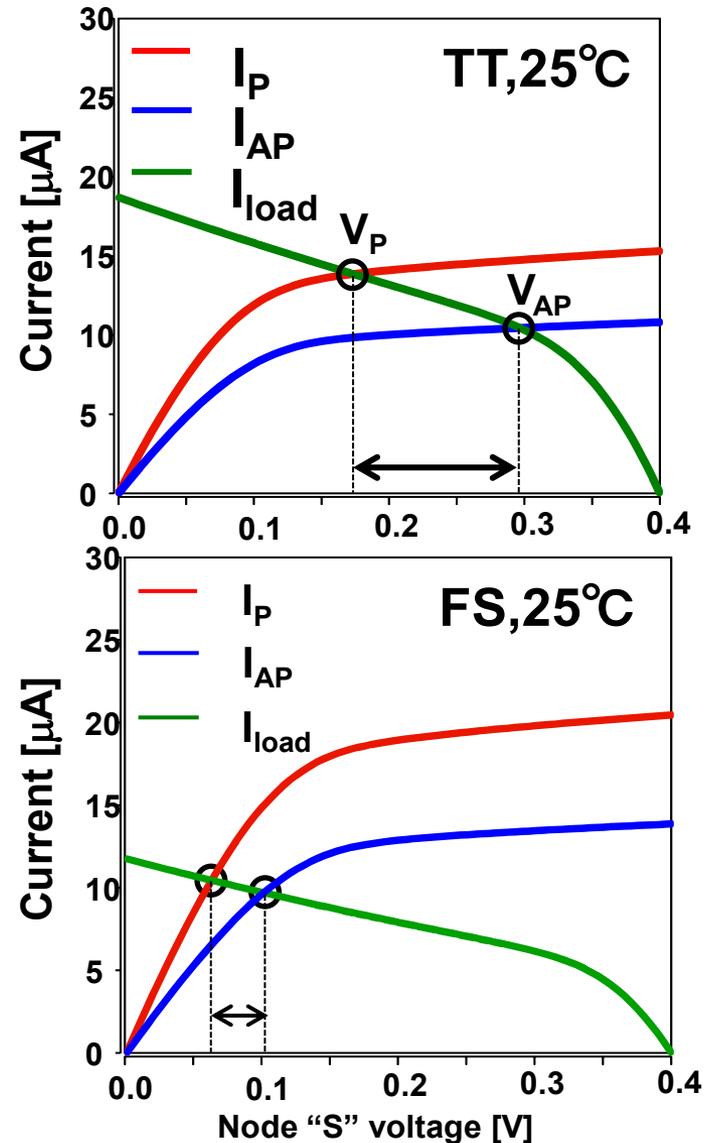
- Peripheral circuit is not operating at low voltage of **0.4V or less**.
- It is **difficult to read** the difference of the resistance with the conventional circuit.

**We will propose a sense amplifier can operate normally in low voltage.**

# Conventional circuit

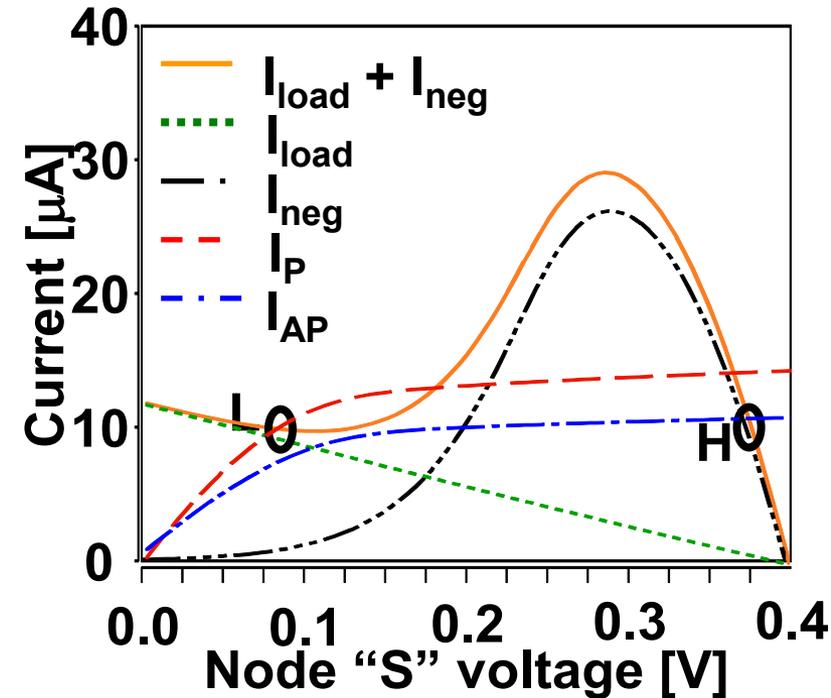
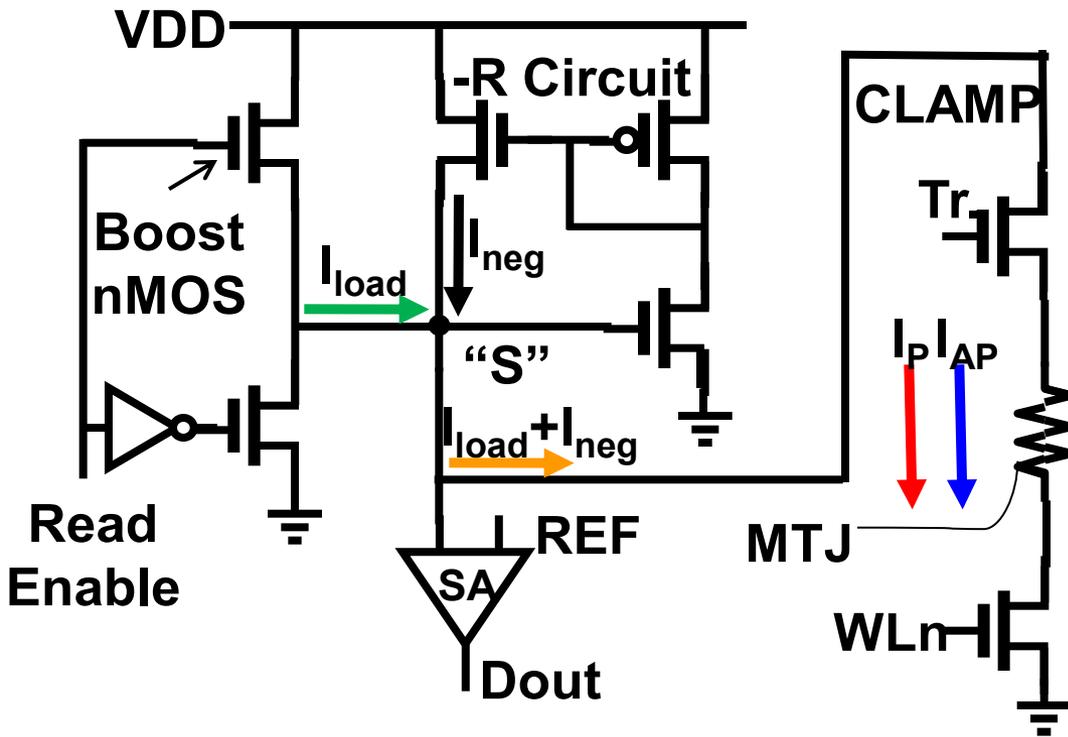


The conventional circuit has a **small read margin**.



# 1S-4

# Proposed Negative R circuit



- This circuit can operate in all process corners.
- This circuit can ensure a potential difference of **250mV** between two states. (0.4V, TT)

**Thank you very much for kind attention.  
Please come to the question to poster **1S-4**.**