Matrix-POL Power Supply System

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Ⅰ. Background

Power management has been required in order to more and more improve the performance of the Micro Processing Unit (MPU).

Furthermore, the increase in power consumption is questioned.

So energy saving requirement has been increasing.

Energy saving technique for CPU

· DVFS(Dynamic Voltage and Frequency Scaling)

DVFS is the technique that the low power consumption by the optimal value of the supply voltage and clock frequency of LSI.
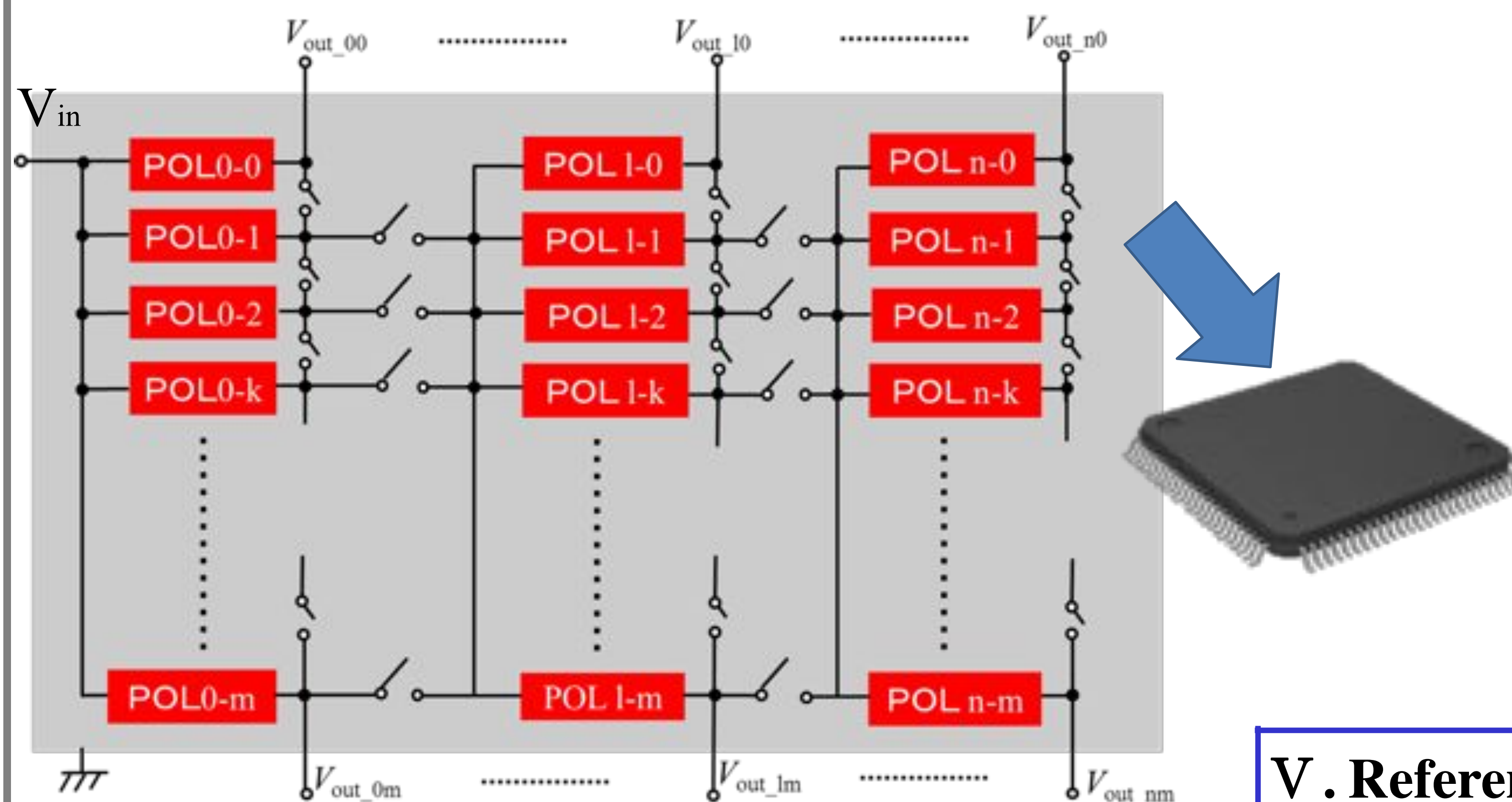
· Power Gating

Power gating technique is the technique that is reducing the leak current by interrupting the power supply when it is not necessary to operate the circuit.

On-die or one-chip POL is required for n-sec order response to the load change or the reference voltage change.
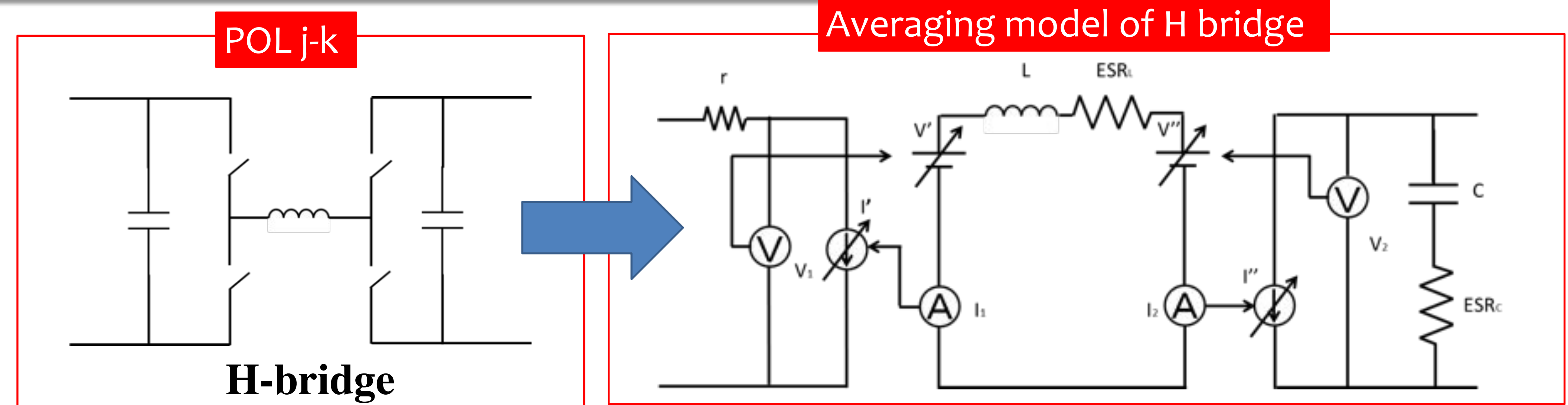
Characteristic of the many functions power supply system

· This power supply system can be reduce resistance value by parallel of POL

· POL burden of individual can be reduced the decentralization of the current

· POL capacity of individual can be reduced and overall capacity can be increase by parallel of capacitor
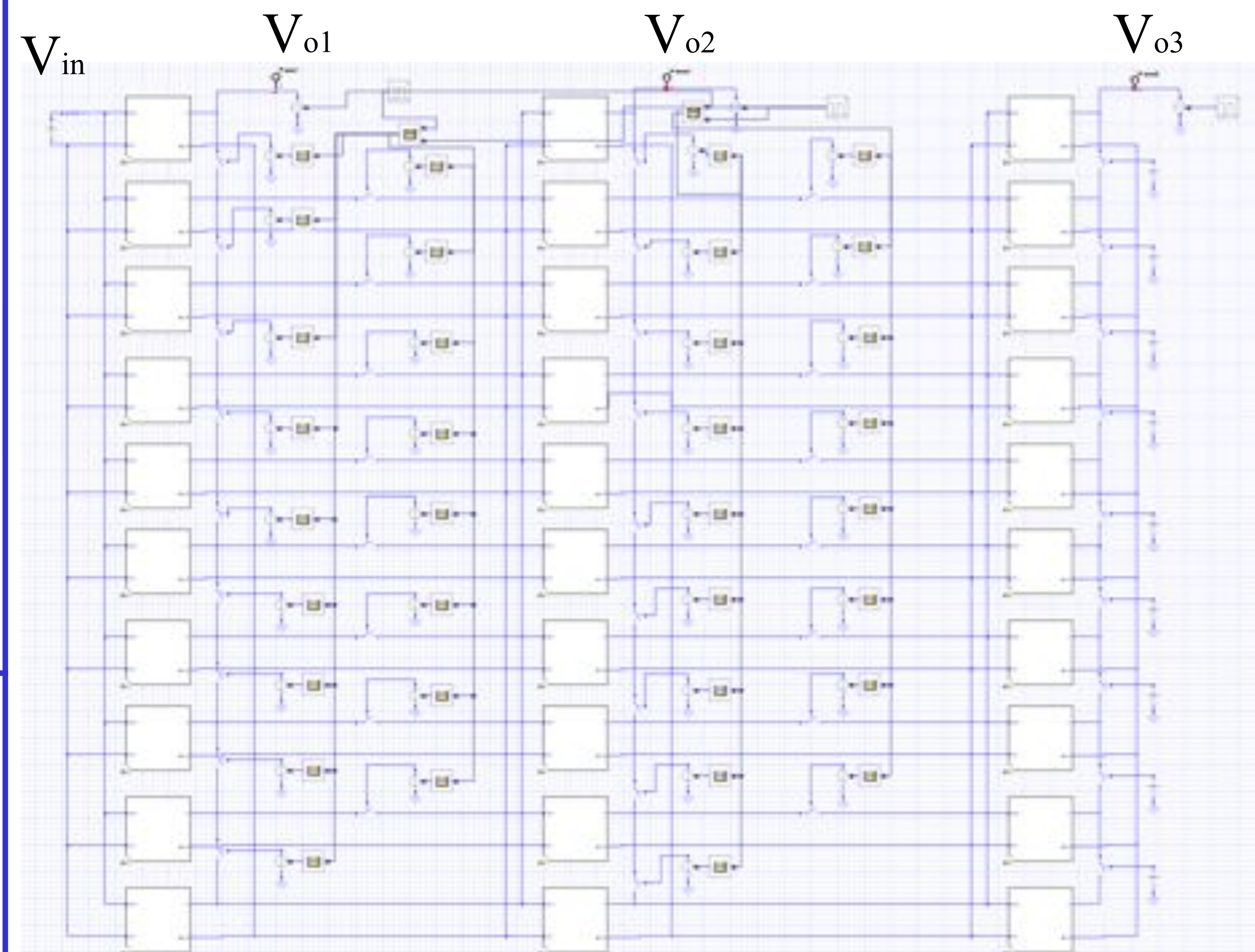
Ⅱ. Matrix-POL Power Supply System model

Ex. Single-input and multiple-output Matrix-POL

POL j-k

H-bridge

Averaging model of H bridge

Ⅲ. Simulation results

V_{in} V_{o1} V_{o2} V_{o3}

V_{o1}

V_{o2}

V_{o3}

		2nd stage load current[A]	
		0.3	0.6
1st stage load current[A]	0.3	5	3
	0.6	7	5

Output parallel of 1st stage

		2nd stage load current[A]	
		0.3	0.6
1st stage load current[A]	0.3	5	7
	0.6	3	5

Output parallel of 2nd stage

Ⅳ. Conclusion

· New architecture of on chip POL is proposed.

· H-bridge converter is the basic unit circuit.

· This system is the hybrid converter of series regulator and SMPS.

Ⅴ. Reference

· JOHNNY C.BENNETT, "Practical Computer Analysis of Switch Mode Power Supplies," CRC Press, 2006