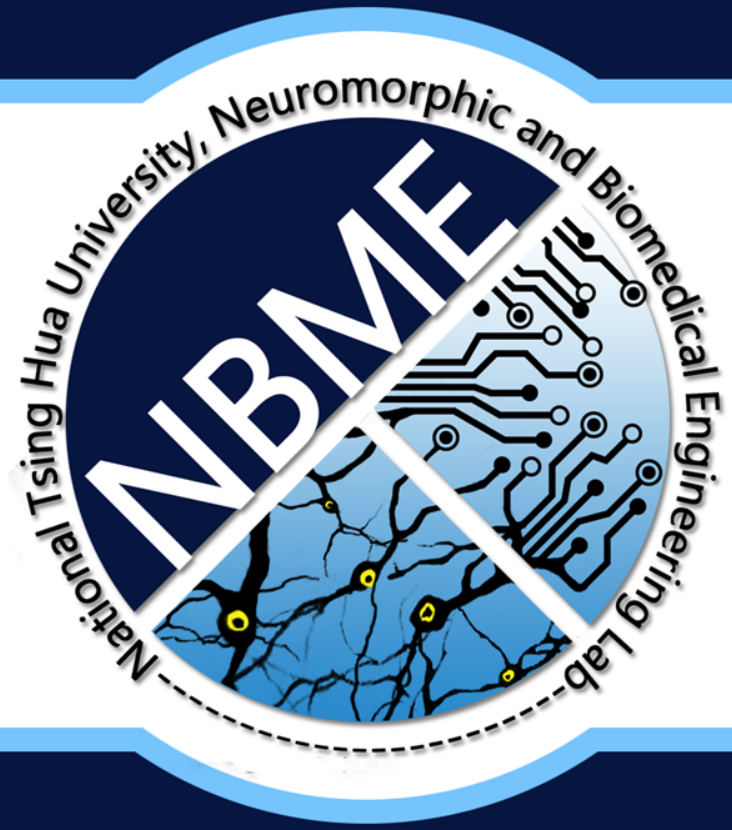


# Front Ended Interface Circuit for IOT Sensor

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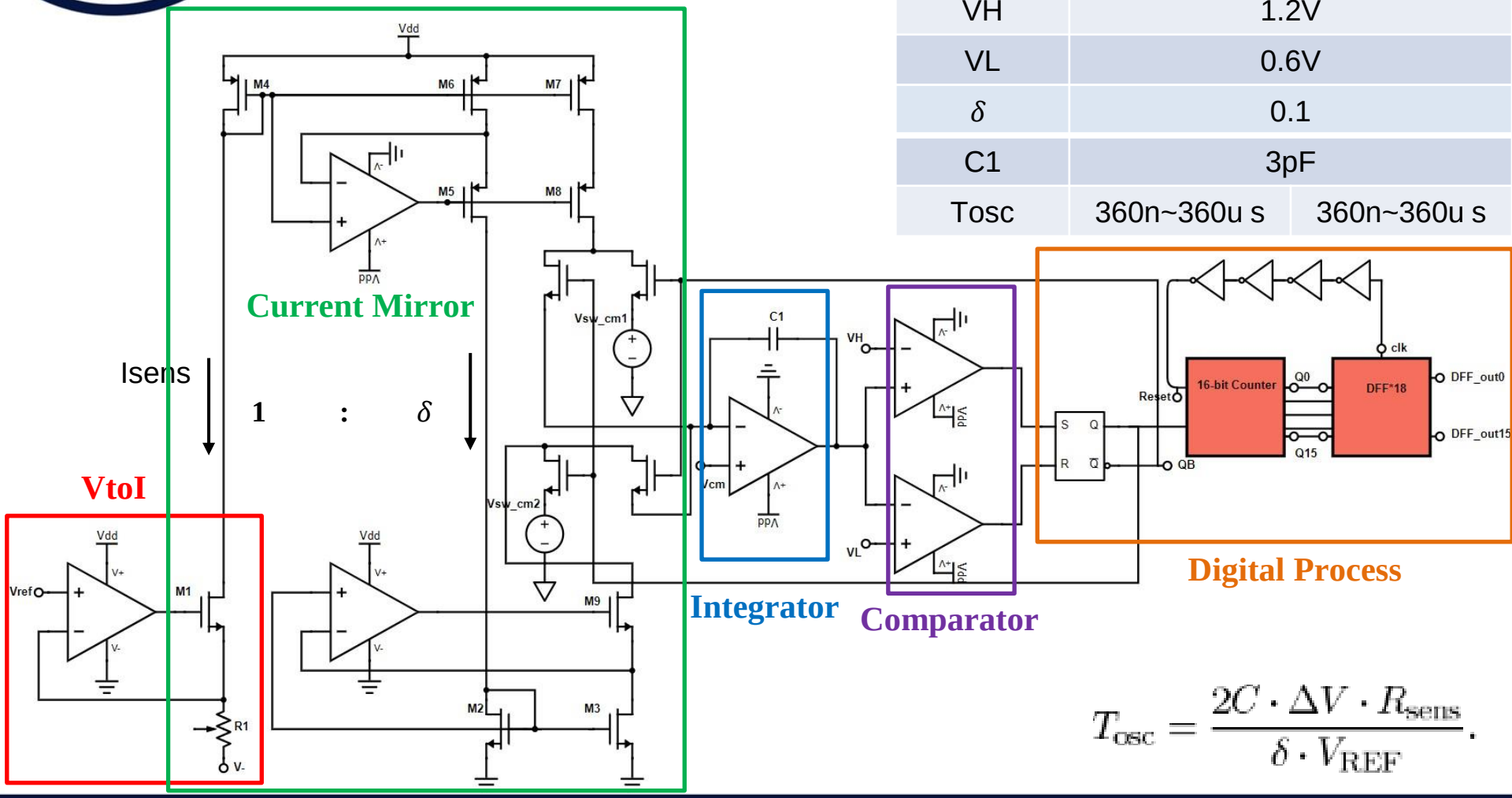
# System Diagram (.18 process)

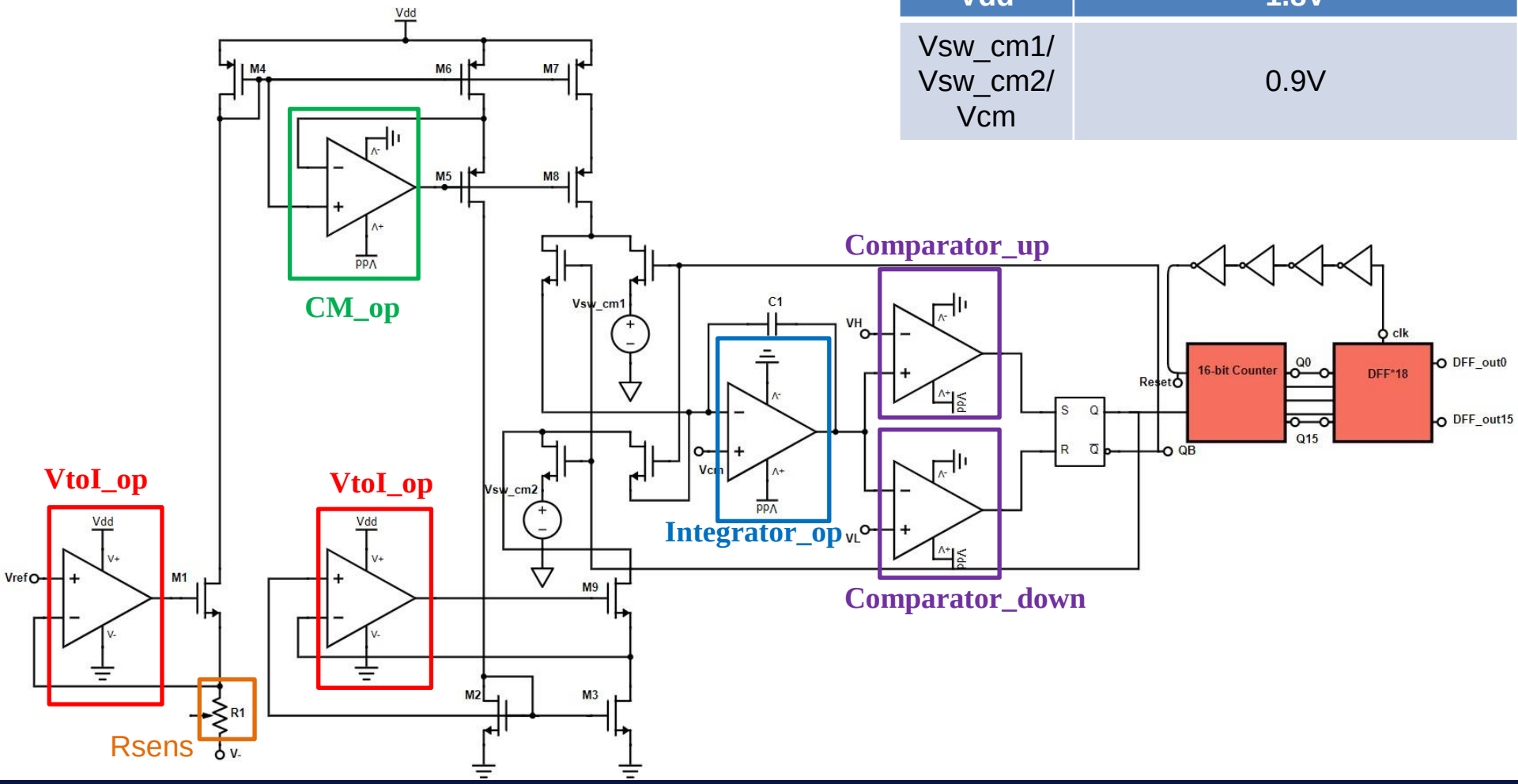
| input | parameter | |
|---|---|---|
| Vref | 50mV | 500mV |
| Rsens | 500~500k ohm | 5k~5M ohm |
| Isens | 100u~100nA | 100u~100nA |
| VH | 1.2V | |
| VL | 0.6V | |
| $\delta$ | 0.1 | |
| C1 | 3pF | |
| Tosc | 360n~360u s | 360n~360u s |



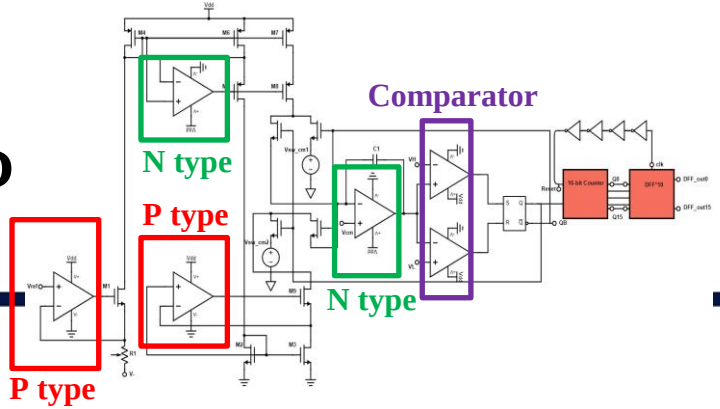

$$T_{osc} = \frac{2C \cdot \Delta V \cdot R_{sens}}{\delta \cdot V_{REF}}.$$

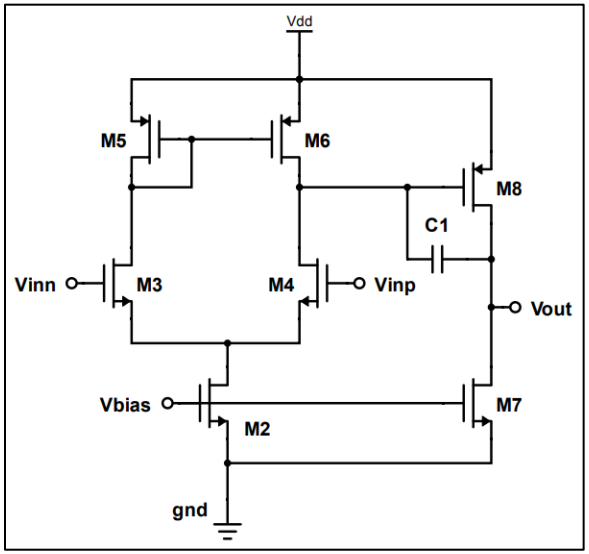
# System Diagram (.18 process)

| Vdd | 1.8V |
|---|---|
| Vsw_cm1/ Vsw_cm2/ Vcm | 0.9V |

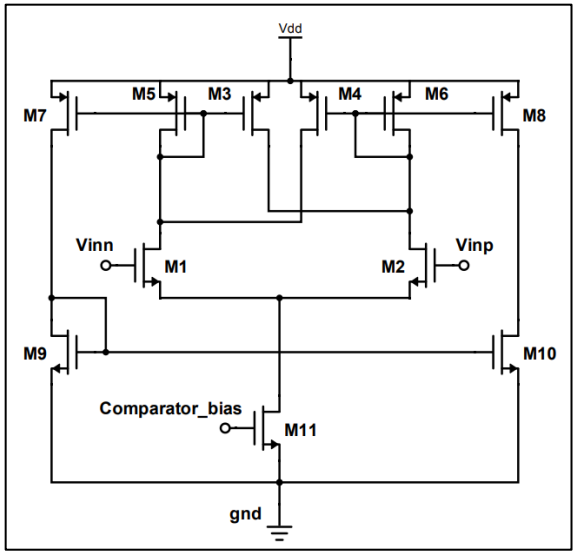


# n/p type two stage OP

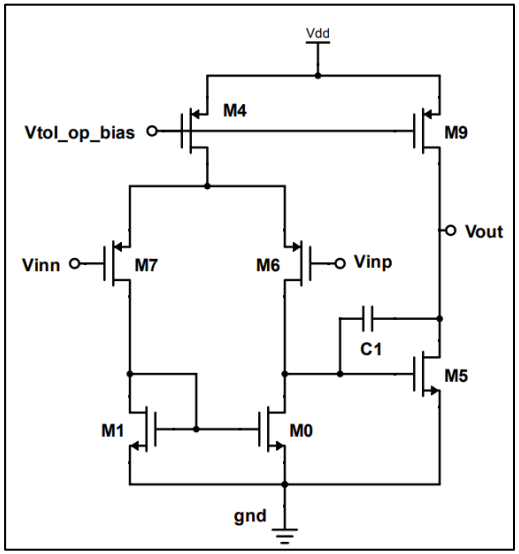



N type two stage op

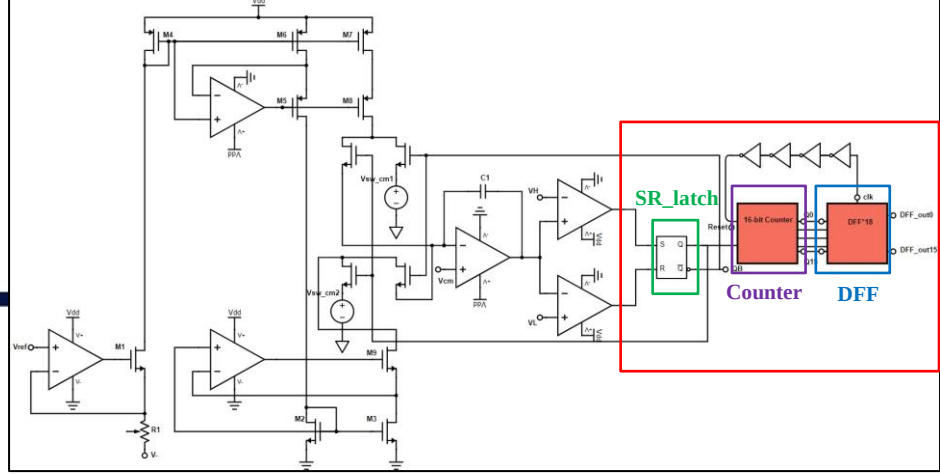


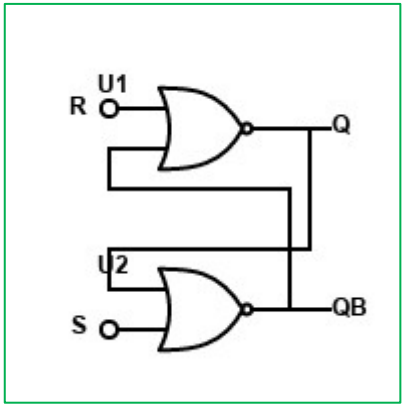

Comparator_op



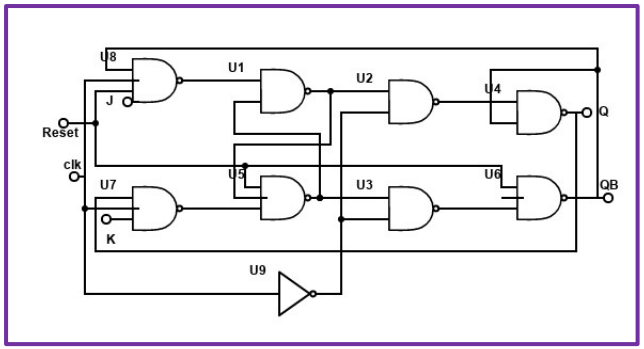

P type two stage op

# Digital Block

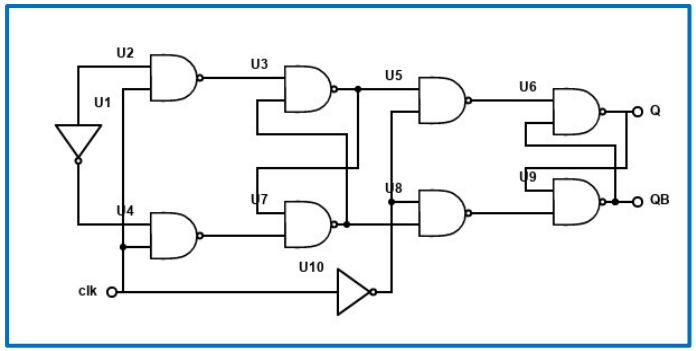


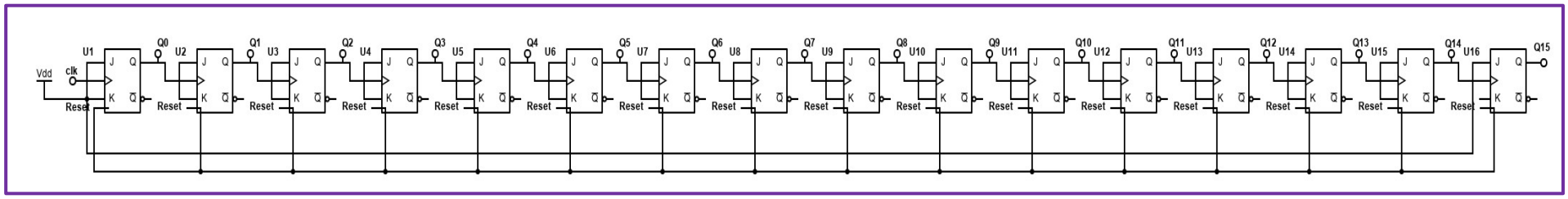

SR latch




Counter JKFF Structure

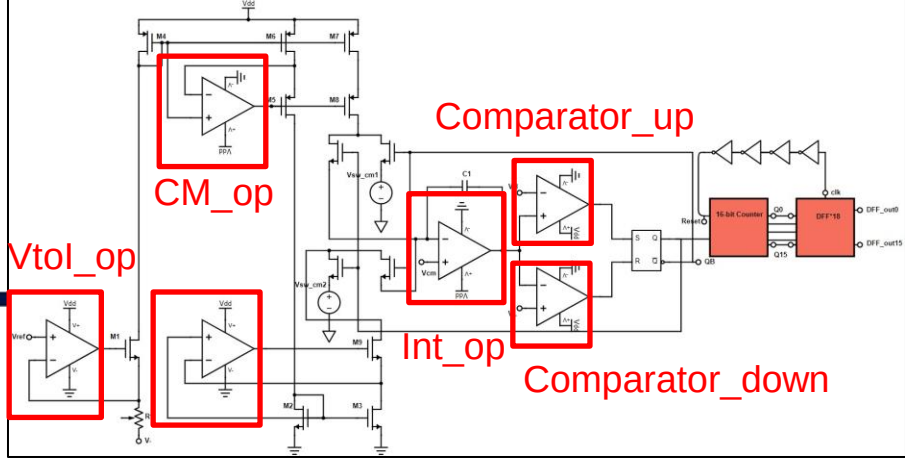


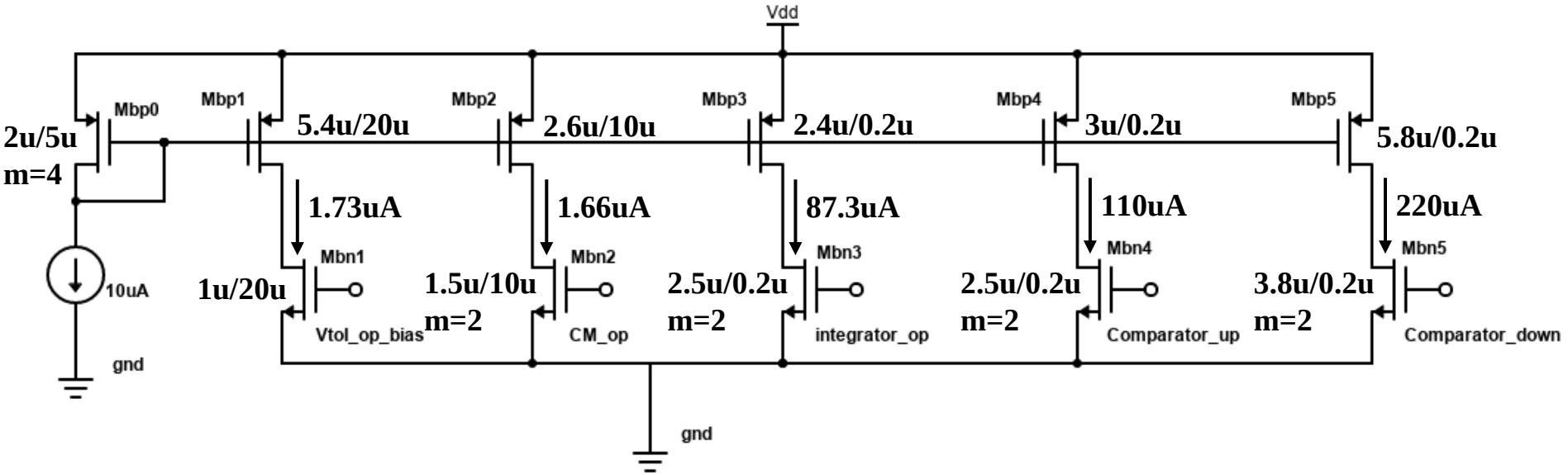

DFF




Counter

# OP_Vbias Circuit mos sizing



# SPEC

| Specification | Spec. | Pre-sim(TT) | Post-sim(TT) |
|---|---|---|---|
| Power Supply(V) | 1.8V(Analog) | 1.8V(Analog) | 1.8V(Analog) |
| Dynamic Range | 500Ω-5MΩ | 500Ω-5MΩ | 500Ω-5MΩ |
| Counter Output bit | 16 | 16 | 16 |
| Total Current (mA) | 4.5 | 3.52~3.64 | 3.34~3.46 |
| Total Power (VDD,mW) | 8 | 6.336~6.552 | 6.012~6.228 |
| Chip size($mm^2$) | <1.2 x 1.2 | | 1.018 x 1.018 |
| Integrator Range(ΔV) | 0.6-1.2V | 0.58 – 1.22V | 0.58 – 1.22V |

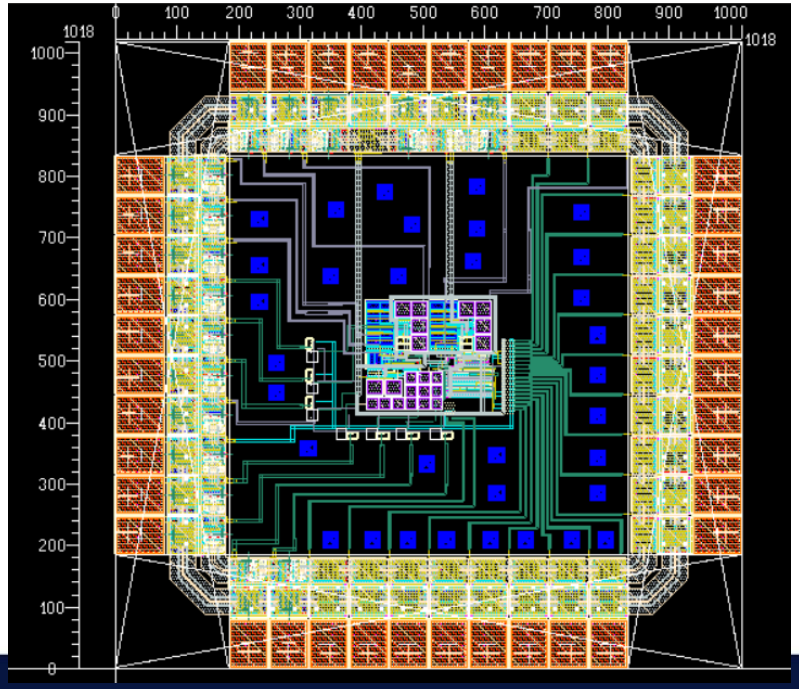
# SPEC

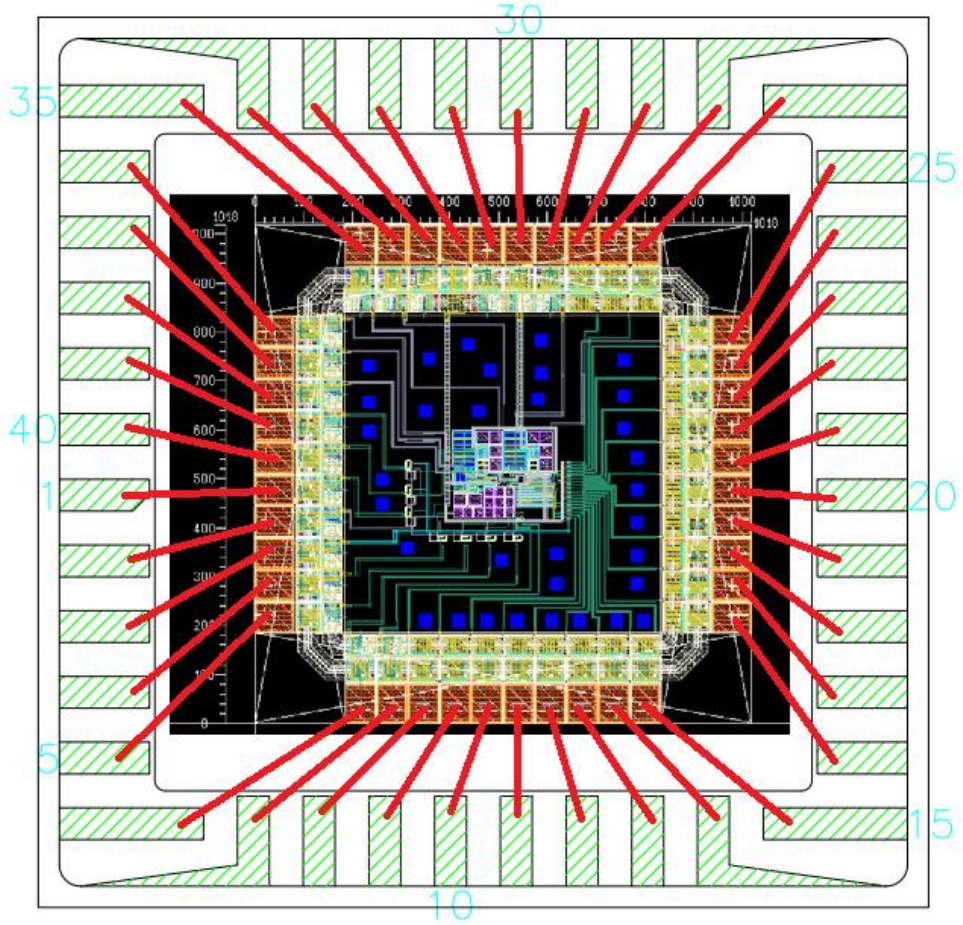
| Specification | SPEC |
|---|---|
| Dynamic range | 500~5M |
| CM Power | 0.144mW |
| Power supply | 1.8V |
| Output Bit | 17 |
| Variable parameter | |
| Rsens | 500~5M |
| ΔV | 0.6V |
| C | 3pF |
| $\delta$ | 0.1 |

| | Vref = 50mV | Vref = 500mV |
|---|---|---|
| | 500~500k$\Omega$ | 5k~5M$\Omega$ |
| $\delta$ | 0.1 | 0.1 |
| Isens | 100uA~0.1uA | 100uA~0.1uA |
| C | 3pF | 3pF |
| ΔV | 0.6V | 0.6V |
| fmax | 2.78M | 2.78M |
| fmin | 2.78k | 2.78k |

# Layout and Wiring

- **Chip Size : 1018*1018 um^2**
- **Power Dissipation : 6.55mW**
- **Max Frequency : 2.78MHz**



# Layout and Placing