

## Error tolerance strategies

Table: Thermal noise of capacitors at 300 K ( $\sim 27^\circ\text{C}$ )

| Capacitance | $V_{\text{rms}} = \sqrt{\frac{k_{\text{B}}T}{C}}$ | Noise charge $Q_n = \sqrt{k_{\text{B}}TC}$<br>in coulombs | Noise charge<br>in electrons |
|-------------|---|---|------------------------------|
| 1 fF        | 2 mV  | 2 aC  | 13 $e^-$                     |
| 10 fF       | 640 $\mu\text{V}$                                 | 6 aC  | 40 $e^-$                     |
| 100 fF      | 200 $\mu\text{V}$                                 | 20 aC   | 125 $e^-$                    |
| 1000 fF     | 64 $\mu\text{V}$                                  | 64 aC   | 400 $e^-$                    |

# Error tolerance strategies