**Lesson 3: Part Selection**

After you have watched this lesson's video, you can try out these activities to improve your skills:

1. **Part Selection For Your Own Design**  
   Try to follow the part selection steps ('basics') outlined in this video to perform the part selection for your own, previous electronics project. Have your part selections changed from what you previously chose? Did you require additional components?
2. **Distributor Part Search**  
   Go to other electronics distributor websites (DigiKey, Farnell, ...) and try out their part search using the example from the video. How do the part searches compare? Which one do you prefer?
3. **Microcontroller Choice**  
   What microcontroller alternatives would you choose for this design? Are there any pin-to-pin compatible microcontrollers that could be used as a replacement?
4. **Data Converters**  
   What alternative data converters (ADCs and DACs) would you choose that are suitable for this application?
5. **Power Supplies**  
   If we use a linear, LDO regulator with a dropout voltage of +1V1 for all +3V3 rails in our design, what power loss would we suffer?
6. **Analogue Circuitry**  
   Compare the Johnson noise of the three following resistors: 100 Ohms, 1k, and 10k. What is the combined Johnson noise of two resistors in parallel, and two resistors in series?
7. **Surrounding Circuitry**  
   Look up the differences between various ceramic capacitor types (X5R, Y5V, C0G, and so on). What are each's benefits and drawbacks?

**Lesson 5**

1. **RLC Filters**  
   Using the online RLC filter tool, design an RLC low-pass filter that has a cut-off frequency of 100kHz and damping ratio of 1.25. Inspect the frequency response, and note the inductor and resistor values. What capacitor size did you choose?
2. **RC Filters**  
   Cascade a high-pass RC filter with a low-pass RC filter, and set R=1k for both and C=1nF for both. What type of filter is the combined structure? What is the input impedance vs frequency?