

Junior Design

Introduction to PCB Design

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ECE Department

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Assignment #1 Reflection

- Not as simple as it seems!

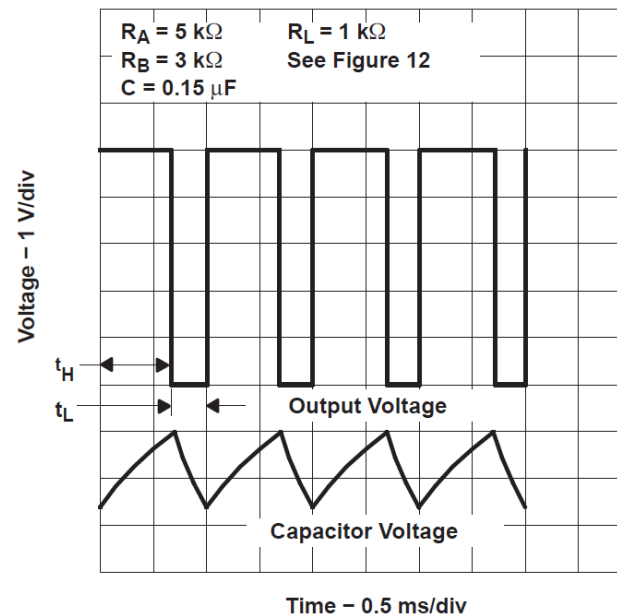
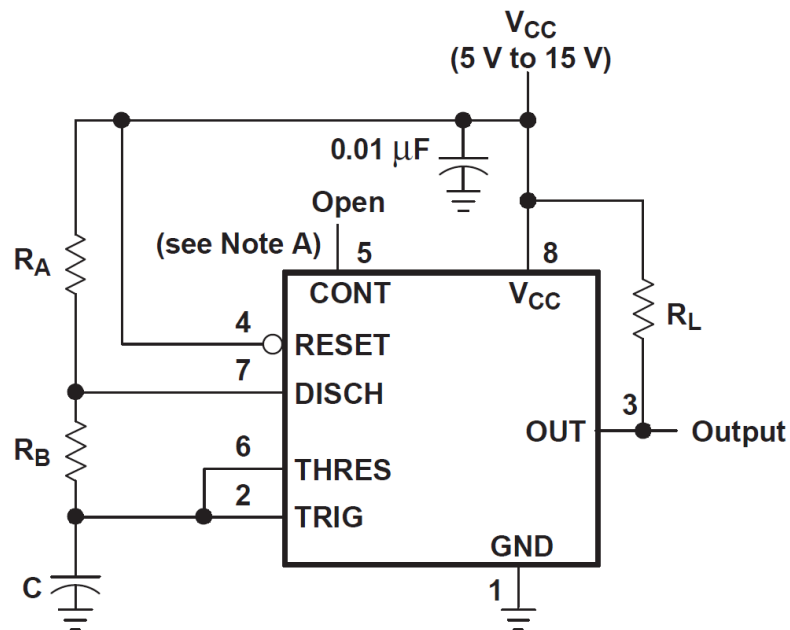
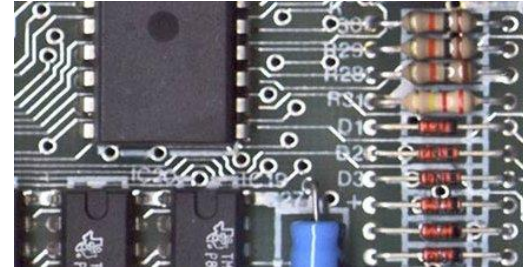


Figure 13. Typical Astable Waveforms

Assignment #1 Reflection

What were some of the challenges faced with this first “Design” Exercise?

Printed Circuit Boards

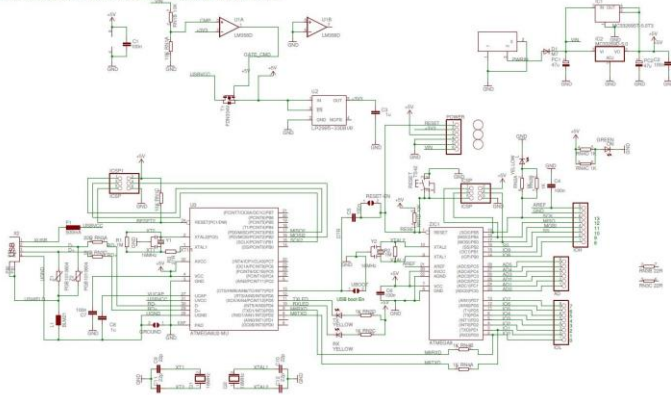


https://en.wikipedia.org/wiki/Printed_circuit_board

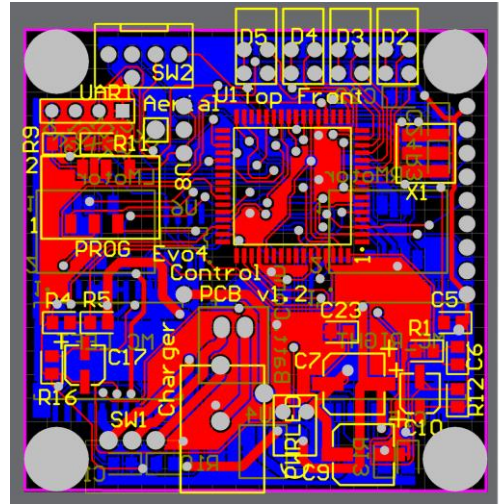
PCB Design Process

Arduino™ UNO Reference Design

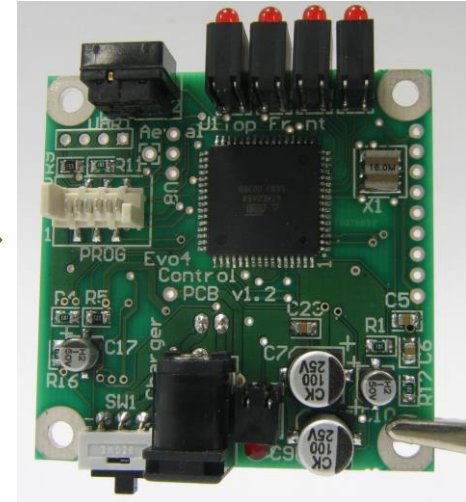
Reference Design and Prototype PCB are provided as a guide for design. Components are not guaranteed to be available in the quantities shown. The Customer must verify the availability of components and the availability of the quantities shown. The Customer must verify the availability of components and the availability of the quantities shown. The Customer must verify the availability of components and the availability of the quantities shown.



schematic



layout



Fabrication
and
assembly

PCB Design Tools

OrCAD™

CADENCE PCB SOLUTIONS

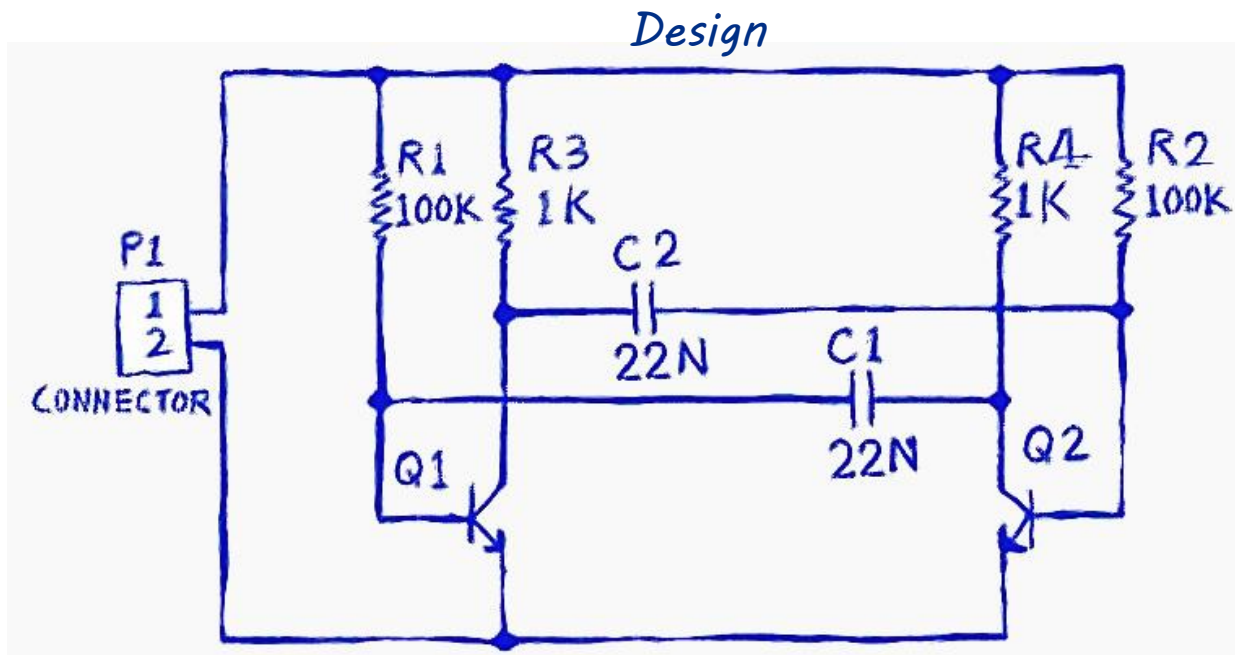
KiCad

Altium
Designer®



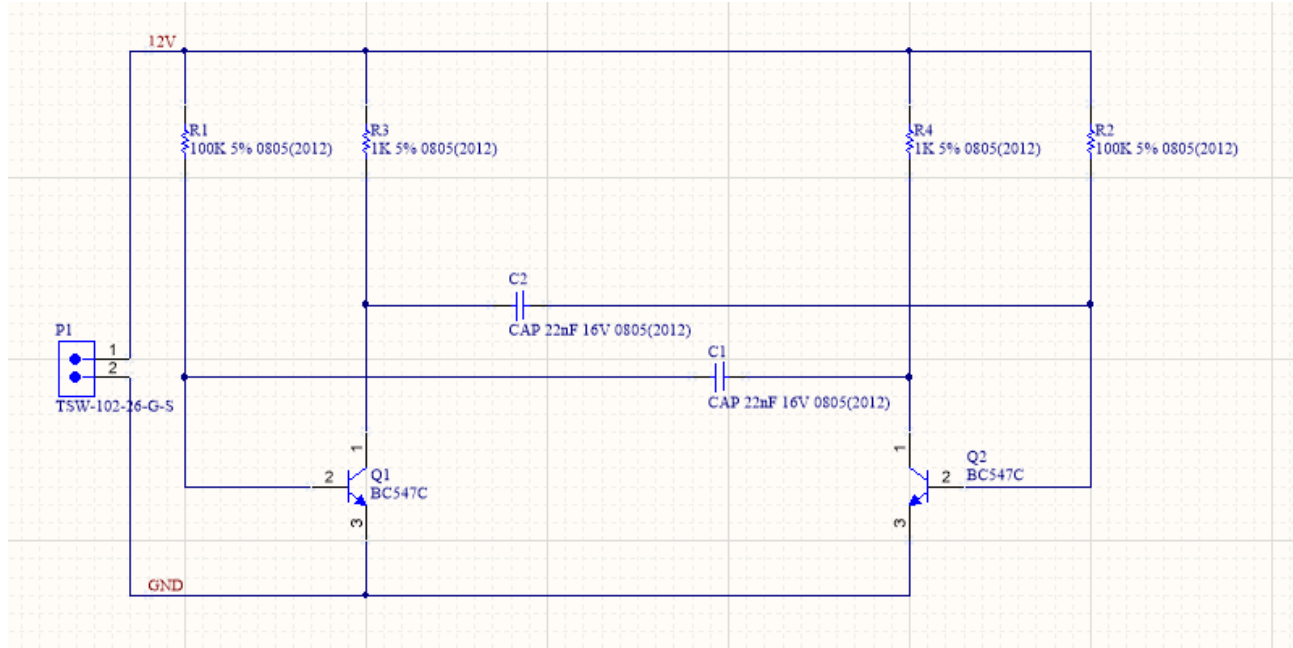
xpedition®

PCB Design Process



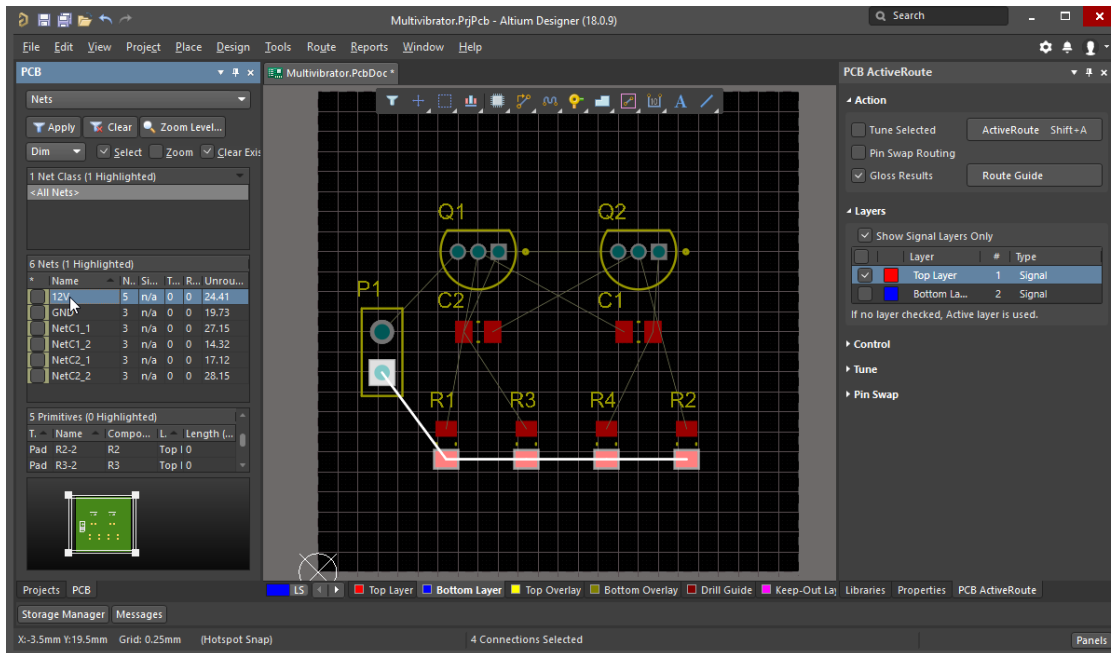
PCB Design Process

Schematic



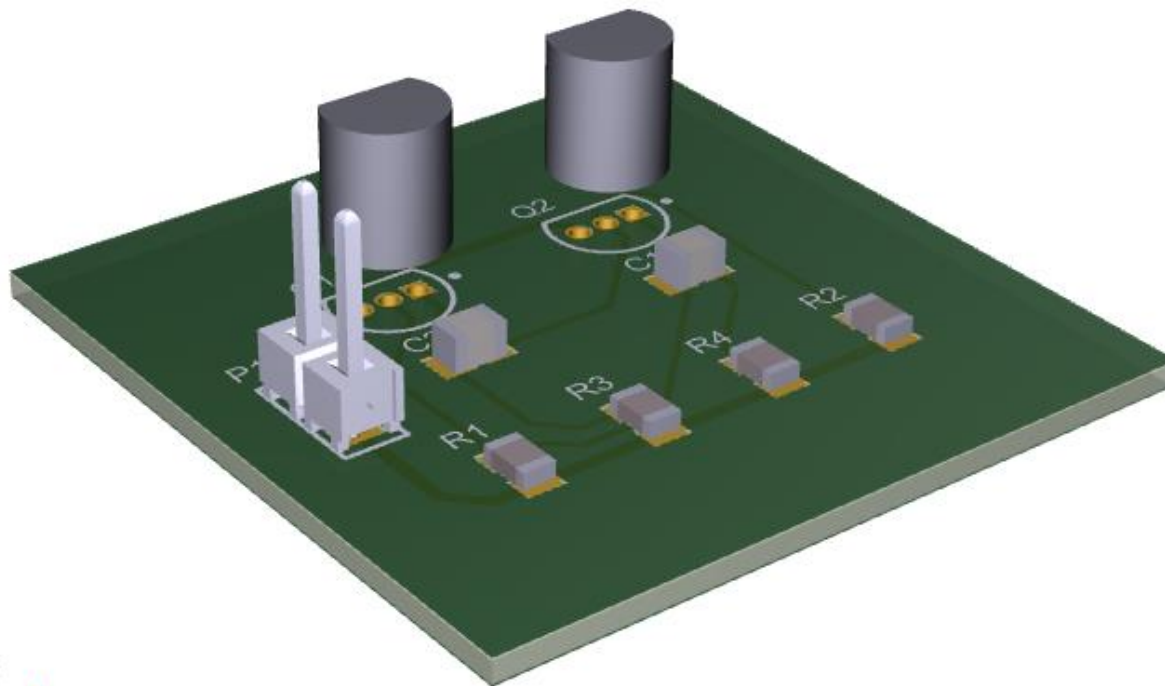
PCB Design Process

Layout

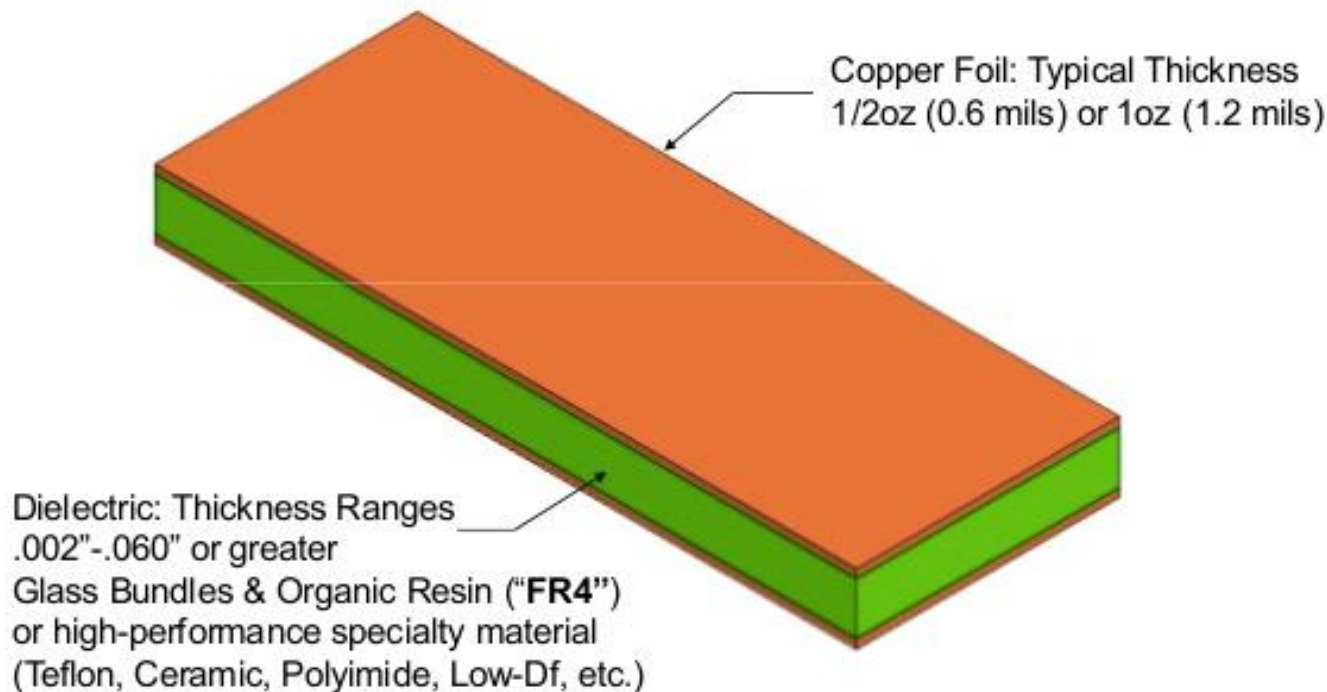


PCB Design Process

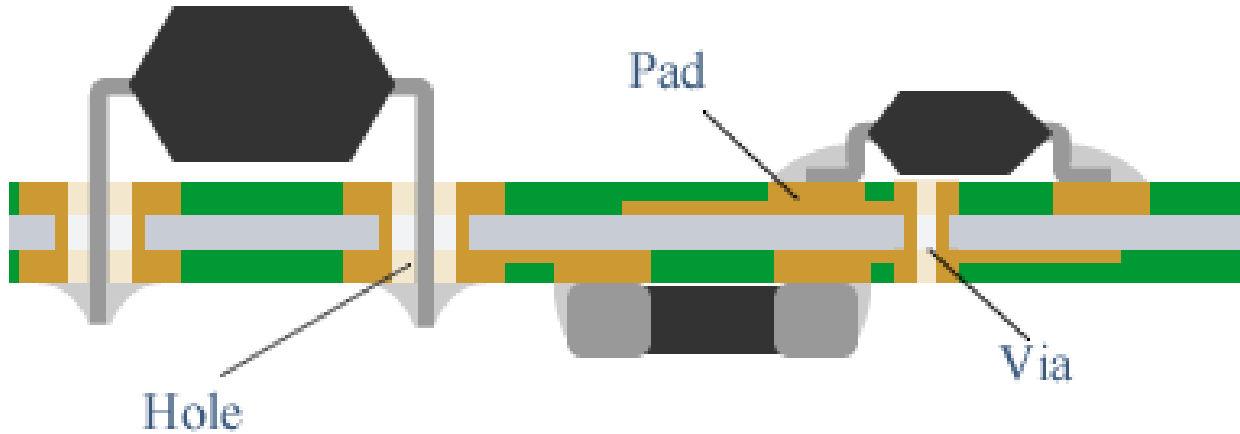
Fabrication and Assembly



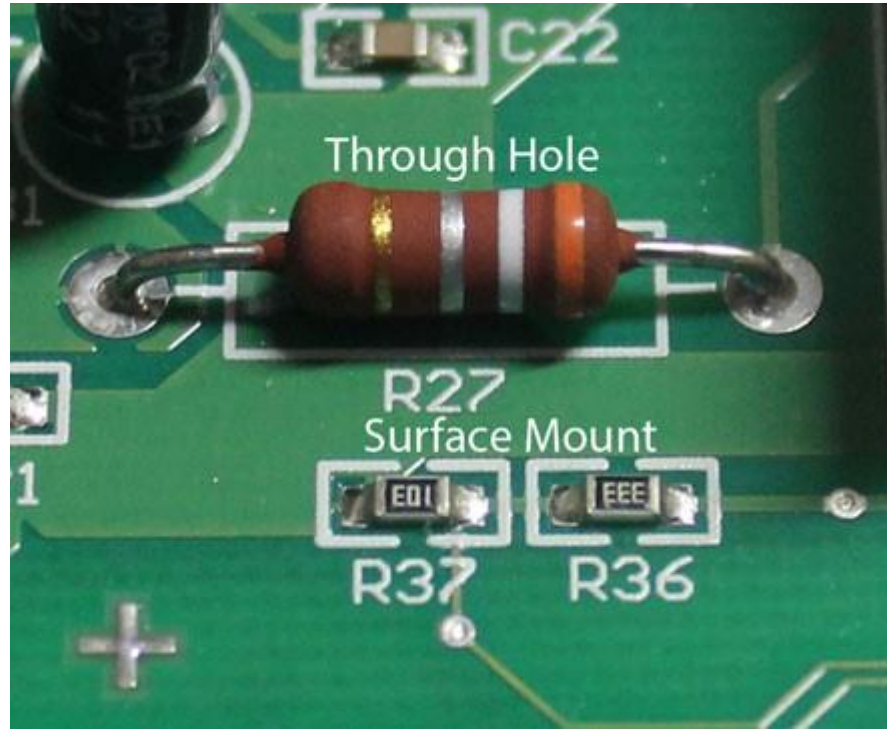
PCB Materials



PCB Layer Stack

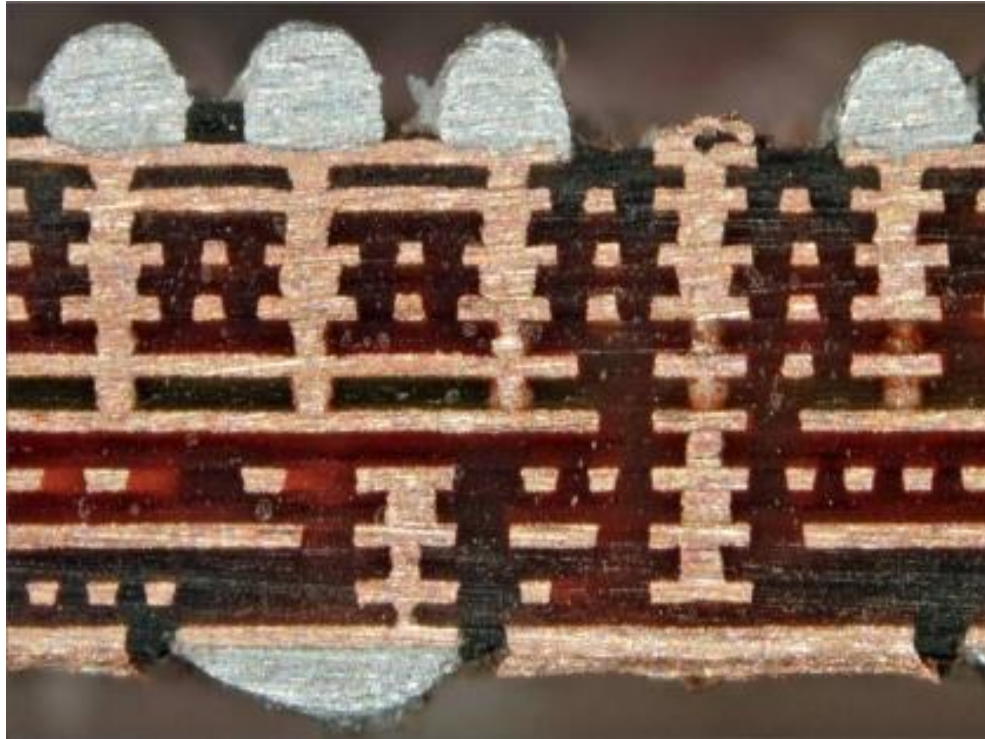


Through Hole vs. Surface Mount Devices



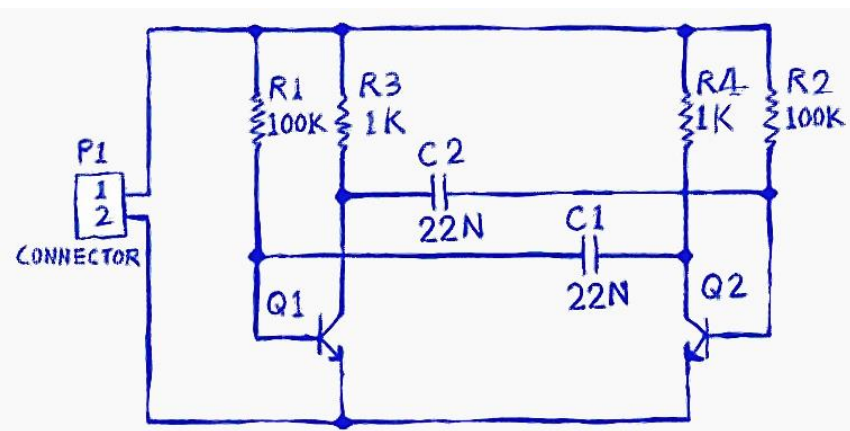
A close-up photograph of a green printed circuit board (PCB) populated with various electronic components. A red insulated wire is soldered to a circular pad on the right side of the board. Several surface-mount components are visible, including resistors labeled R417, R456, and R454, and capacitors labeled C408, C421, C420, and C456. A circular metal component, possibly a mounting bracket or a shield, is attached to the board near the red wire. The PCB has a complex pattern of copper traces and solder points.

Multi-Layer PCB Cross Section



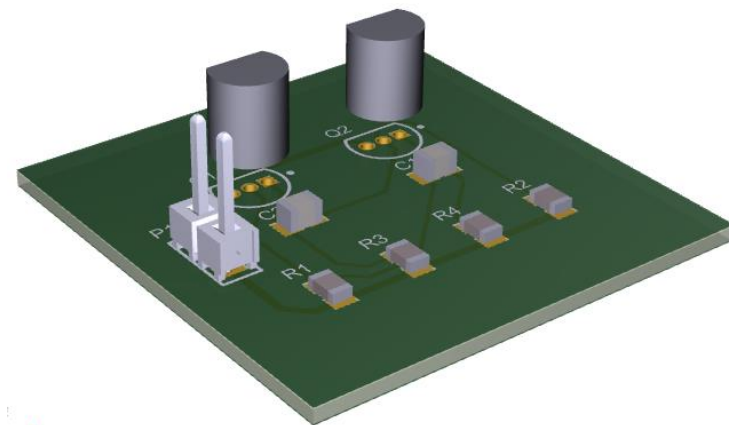
Design for Manufacturing (DFM)

Layout versus Schematic (LVS)



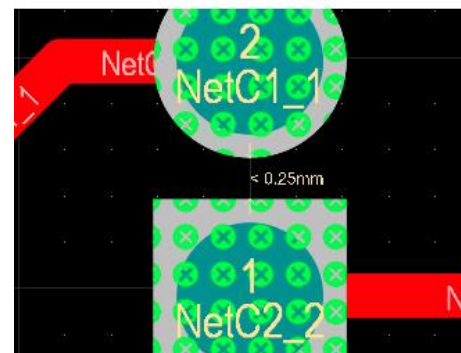
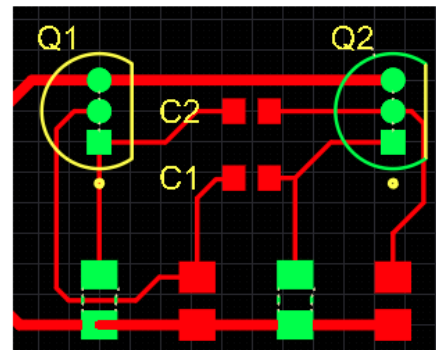
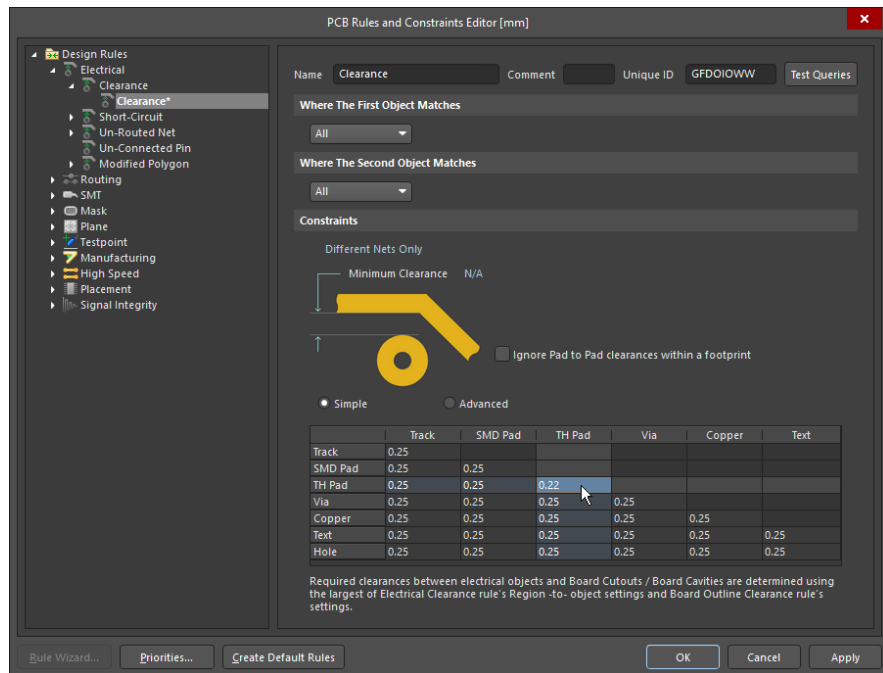
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Design for Manufacturing (DFM)

Design Rule Checking (DRC)

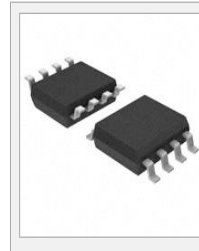


Acquiring Components



[Product Index](#) > [Integrated Circuits \(ICs\)](#) > [Clock/Timing - Programmable Timers and Oscillators](#) > Texas Instruments
NA555DR

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Product Overview	
Digi-Key Part Number	296-21752-1-ND
Quantity Available	14,024 Can ship immediately
Manufacturer	Texas Instruments
Manufacturer Part Number	NA555DR
Description	IC OSC SGL TIMER 100KHZ 8-SOIC
Lead Free Status / RoHS Status	Lead free / RoHS Compliant
Moisture Sensitivity Level (MSL)	1 (Unlimited)
Manufacturer Standard Lead Time	14 Weeks
Detailed Description	555 Type, Timer/Oscillator (Single) IC 100kHz 8-SOIC

Documents & Media	
Datasheets	NA,NE,SA,SE_555
Featured Product	xx555 Single Precision Timers
EDA / CAD Models	Download from Ultra Librarian
Online Catalog	Programmable Timers and Oscillators

Product Attributes		Select All	<input type="checkbox"/>
Categories	Integrated Circuits (ICs) Clock/Timing - Programmable Timers and Oscillators	<input type="radio"/>	<input checked="" type="radio"/>

Price & Procurement		
Quantity	<input type="text" value="1"/>	
	<input type="text" value="296-21752-1-ND"/>	<input type="button" value="Go"/>
Customer Reference		
Add to Cart		
Add to BOM		
All prices are in USD.		
Price Break	Unit Price	Extended Price
1	0.48000	\$0.48
10	0.36400	\$3.64
100	0.22700	\$22.70
500	0.15532	\$77.66
1,000	0.11948	\$119.48
Submit a request for quotation on quantities greater than those displayed.		

Alternate Package This part is also available in the following packaging:	
Tape & Reel (TR)	296-21752-2-ND
Minimum Quantity:	2,500
Quantity Available:	10,000 - Immediate

ASSIGNMENT #2

1. INSTALL THE DESIGN TOOLS

2. COMPLETE AN ALTIUM TUTORIAL

**3. RE-DESIGN YOUR 555 TIMER
OSCILLATOR CIRCUIT AS A PCB**