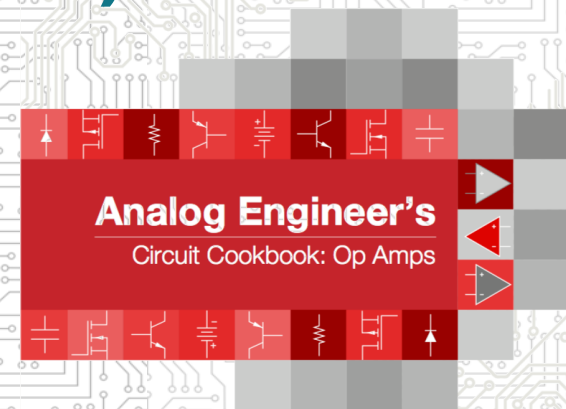


How to Design Low-Side Voltage-to-Current (V-I) converter with MOSFET

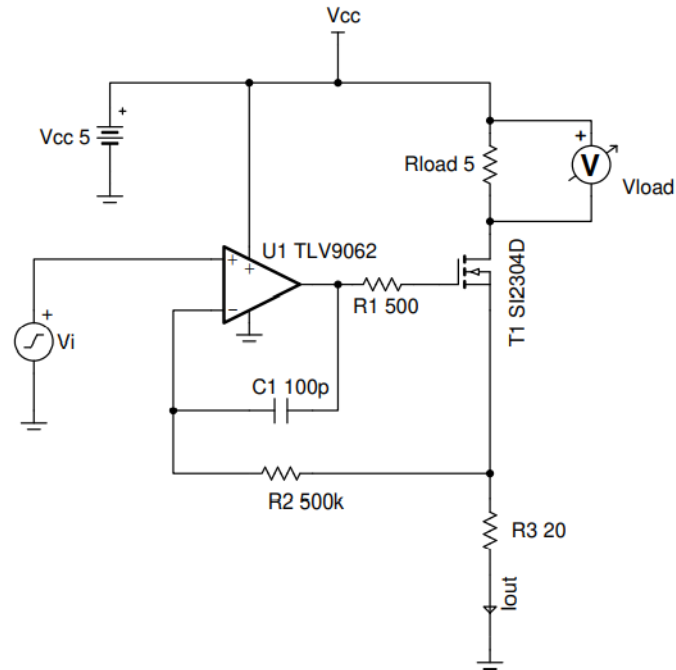
General Purpose Amplifiers

www.ti.com/general-amps

www.ti.com/circuitcookbooks



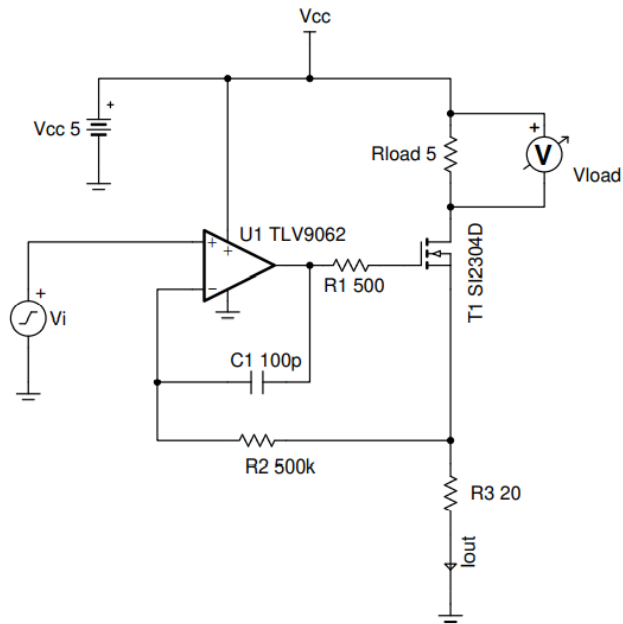
Circuit Description



TI Precision Labs: www.ti.com/precisionlabs

Design Steps

Input		Output		Supply	
V_{iMin}	V_{iMax}	I_{oMin}	I_{oMax}	V_{cc}	V_{ee}
0 V	2 V	0 mA	100 mA	5V	0V

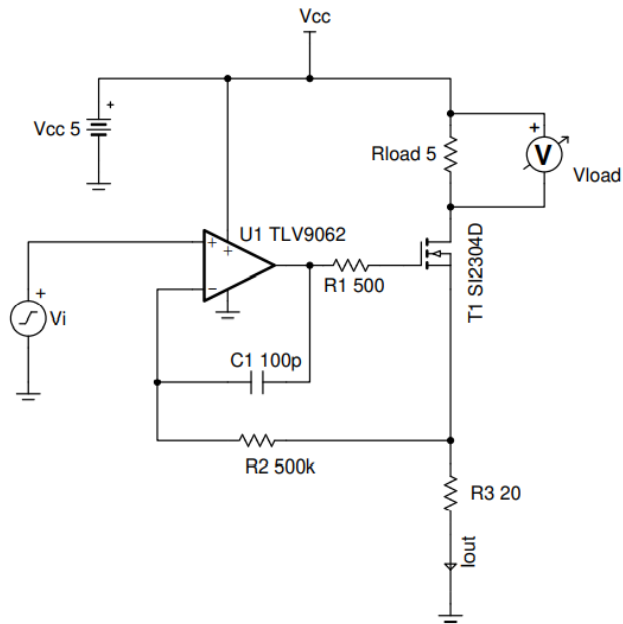


$$I_o = \frac{V_i}{R_3}$$

$$R_3 = \frac{V_{iMax} - V_{iMin}}{I_{oMax} - I_{oMin}} = \frac{2V - 0V}{100mA - 0mA} = 20\Omega$$

Design Steps

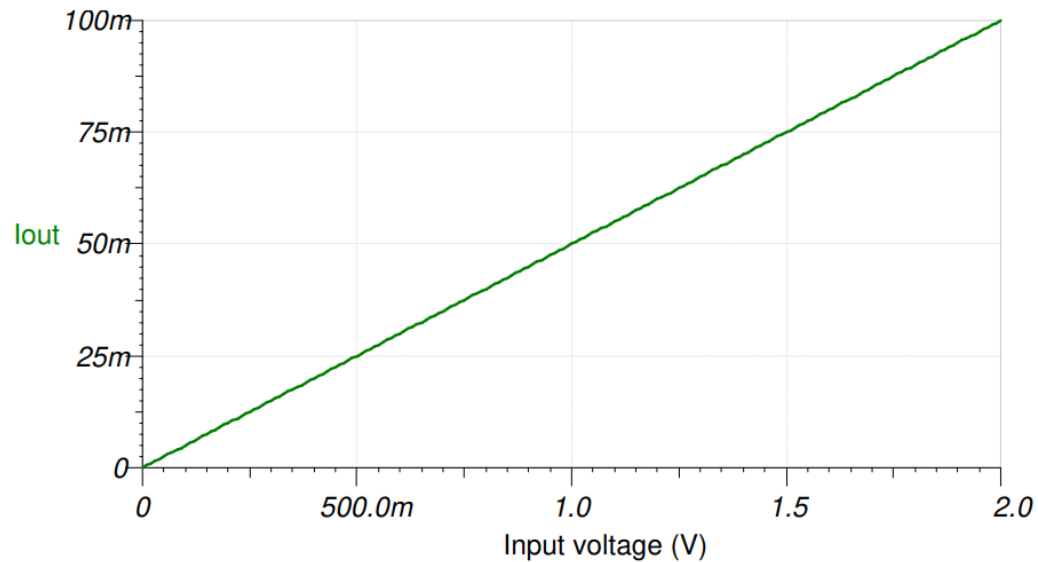
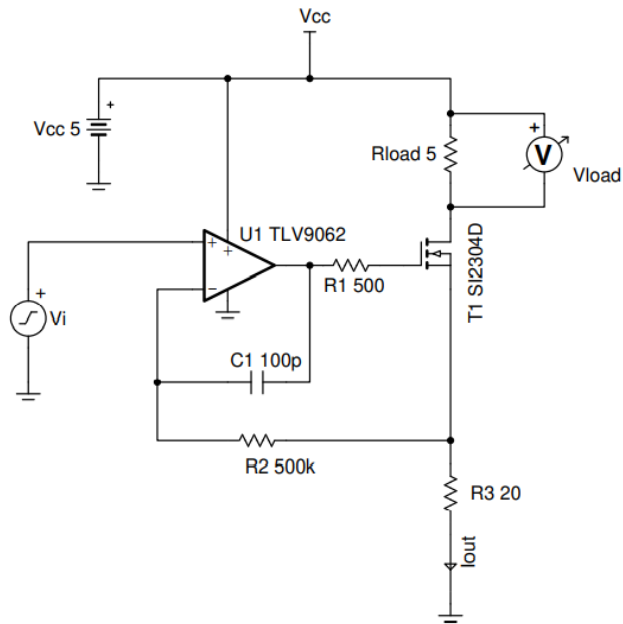
Input		Output		Supply	
V_{iMin}	V_{iMax}	I_{oMin}	I_{oMax}	V_{cc}	V_{ee}
0 V	2 V	0 mA	100 mA	5V	0V



$$P_{R3} = \frac{V_{iMax}^2}{R_3} = \frac{2V^2}{20\Omega} = 0.2W$$

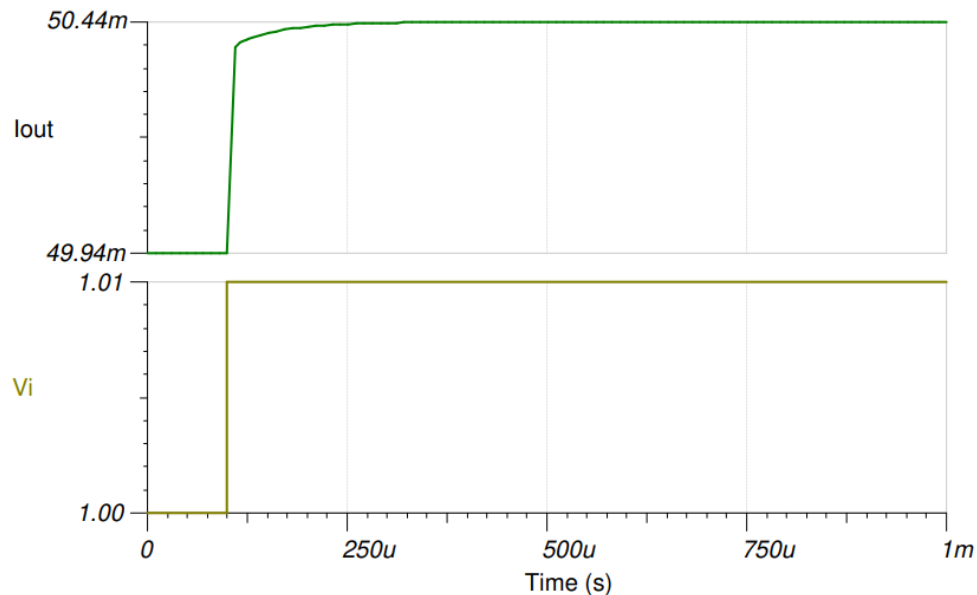
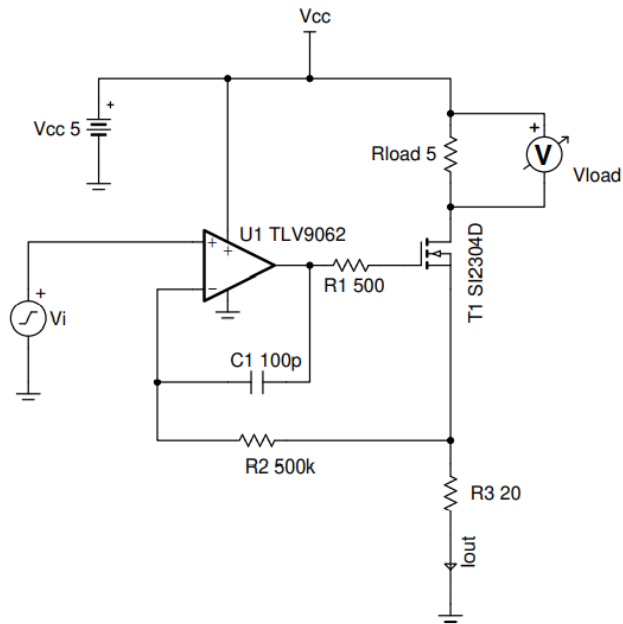
DC Results

Input		Output		Supply	
V_{iMin}	V_{iMax}	I_{oMin}	I_{oMax}	V_{cc}	V_{ee}
0 V	2 V	0 mA	100 mA	5V	0V



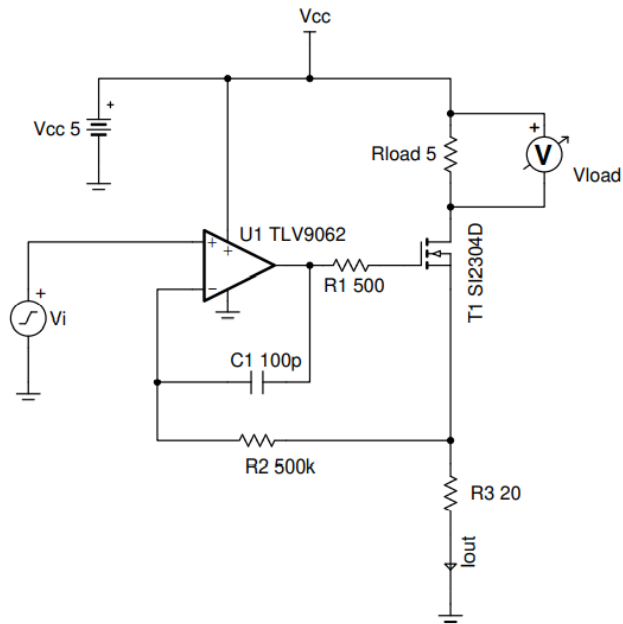
Transient Results

Input		Output		Supply	
V_{iMin}	V_{iMax}	I_{oMin}	I_{oMax}	V_{cc}	V_{ee}
0 V	2 V	0 mA	100 mA	5V	0V



Design Notes

Input		Output		Supply	
V_{iMin}	V_{iMax}	I_{oMin}	I_{oMax}	V_{cc}	V_{ee}
0 V	2 V	0 mA	100 mA	5V	0V



Design Notes:

1. Rail-to-rail input op amp or V_{cm} to ground
2. Include R1, R2, and C1 for stability
3. Check R3 power dissipation

TI Precision Labs: www.ti.com/precisionlabs

Design Resources

EE Cookbook: Op Amp

www.ti.com/circuitcookbooks

Step-by-step circuit design of common op amp building block circuits.

TI Designs

www.TI.com/tidesigns

Ready-to-use reference designs with theory, calculations, simulations schematics, PCB files, bench test results

Analog Engineer's Pocket Reference

www.TI.com/analogrefguide

PDF, iTunes app and hardcopy available
PCB, analog, mixed signal design formulae
Conversions, tables, equations

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