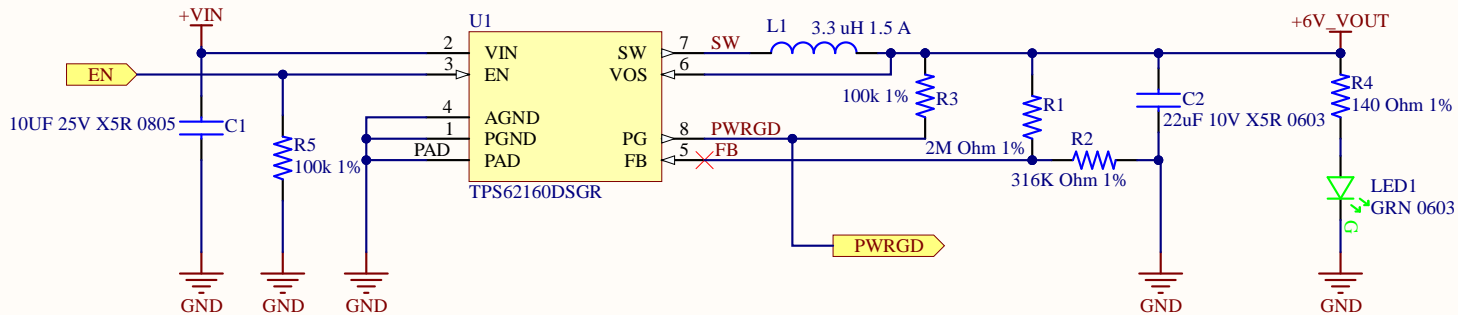


BUCK REGULATOR



Assignment 1 Answer 4:

4.1 From the data sheet of TPS62160, it is suggested that R2 should not exceed 400 kΩ since a minimum current of 2 μA should be allowed to pass through. For higher accuracy, lower resistor values are preferred.

4.2 Based on the above mentioned value of R2, R1 can be calculated using the formula $R1 = R2 * [(Vout/0.8V) - 1]$. Therefore, $R1 = 400 \text{ k}\Omega[(4V/0.8V) - 1] = 1600 \text{ k}\Omega$
 $R1 = 1.6 \text{ M}\Omega$

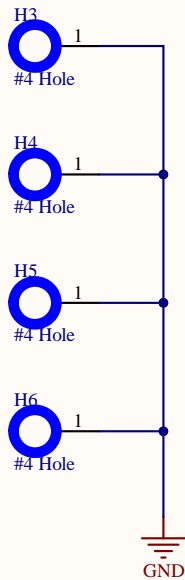
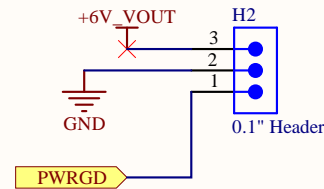
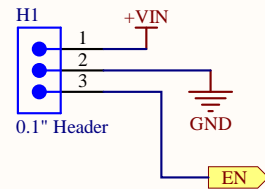
4.3 The nearest standard values to the resistors R1 and R2 are 390 kΩ and 1.5 MΩ. The Digi-Key part number for 390 kΩ is RMCF0603FG390KCT-ND and for 1.5 MΩ, the part number is RMCF0603FT1M50CT-ND. Screenshot of the filters applied to narrow down to a resistor in Digi-Key has been submitted as a part of the ZIP folder.

Assignment 1 Answer 5:

1. A green LED is added as a part of the circuit in order to provide a visual indication of the output voltage status. A buck regulator reduces the voltage at the output compared to that at the input and if, in order to maintain the power, there is a sudden spike in the current at the output, the limiting resistor would not allow the LED to glow. This gives the user a good idea on the behavior of the buck regulator.
2. 3-pin connectors are added since these pins can be used to provide inputs or to tap the required output. These connectors are used mainly to accommodate the interface of the regulator with the other components on the board.
3. Enable (EN) pin is connected to the input connector instead of Vin in order to maximise its utility. EN can be used to help save power. This is possible because only when the EN pin is high, the device starts its operation. In the older setting where Vin was connected to EN, the device would operate whenever there was some input voltage available. Now, the system can be designed in such a way that only when EN is high, the input voltage is considered for operation. When EN is low, the device is forced to shutdown. Also, connecting EN to an appropriate signal of a power rail helps in sequencing of multiple power rails.
4. Power Good (PG) pin, as the datasheet mentions, has an inbuilt capability to indicate whether the Vout has reached the appropriate level. This pin is again connected to the output connector since based on the value at this pin, startup sequencing of multiple power rails can be initiated. The output from PG can be used to determine whether the voltage provided by the regulator is adequate and can be considered for the operation of other components on the board.

Title LPEDT_Assignment		
Size A	Number 1	Revision 1
Date:	9/06/2020	Sheet of
File:	C:\Users\...\Regulator.SchDoc	Drawn By: Sarayu Managoli

MECHANICAL



Title LPEDT_Assignment		
Size A	Number 2	Revision 1
Date: 9/06/2020	Sheet of	
File: C:\Users\...\Regulator_Mechanical.SchDoc	Drawn By: Sarayu Managoli	