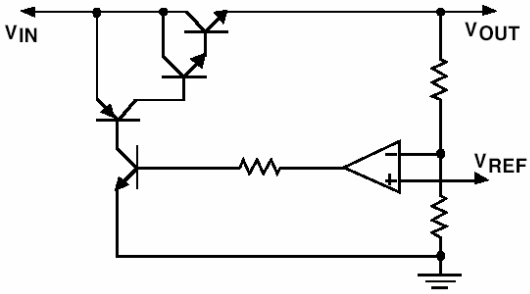
Linear Voltage Regulators

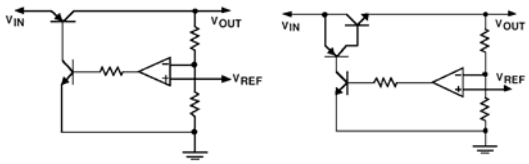
Power Design for Embedded Systems

How will you power your embedded system?
Linear Regulator? Switching Regulator? Battery?
What is Dropout Voltage? Quiescent Current?

Standard (NPN) Regulator



LDO and Quasi-LDO Regulator



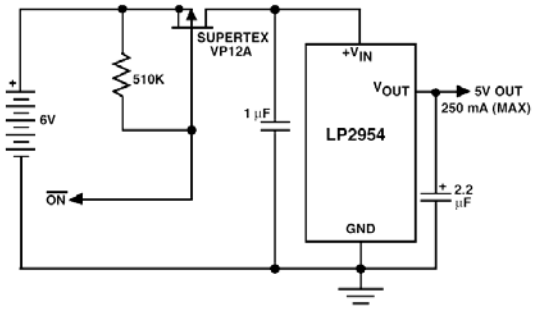
Linear Regulator Summary

LDO	QUASI-LDO	STD
V_D = PNP SAT ~ 0.1V to 0.7V	V_D = VBE + PNP SAT ~ 0.9V to 1.5V	V_D = 2 VBE + PNP SAT ~ 1.7V to 2.5V
$I_G \leq 20$ - 40 mA	$I_G \leq 10$ mA	$I_G \leq 10$ mA
$I_{L(MAX)} = 1A$	$I_{L(MAX)} = 7.5A$	$I_{L(MAX)} = 10A$

Typically good for battery powered designs due to low dropout voltage. However, watch for higher ground pin current that may drain battery. Consider regulator shutdown feature.

Typically good for AC powered designs due to low cost and high load current. However, watch for higher dropout voltage that forces a higher voltage input source.

Adding External Shutdown



Selecting the Best Regulator for Your Application

The best choice for a specific application can be determined by evaluating the requirements such as:

- Maximum Load Current
- Type of Input Voltage Source (Battery or AC)
- Output Voltage Precision (Tolerance)
- Quiescent (Idling) Current
- Special Features (Shutdown Pin, Error Flag, etc.)

For more information about power designs, refer to:

http://www.national.com/appinfo/power/

Many other good sources are also available on the web.