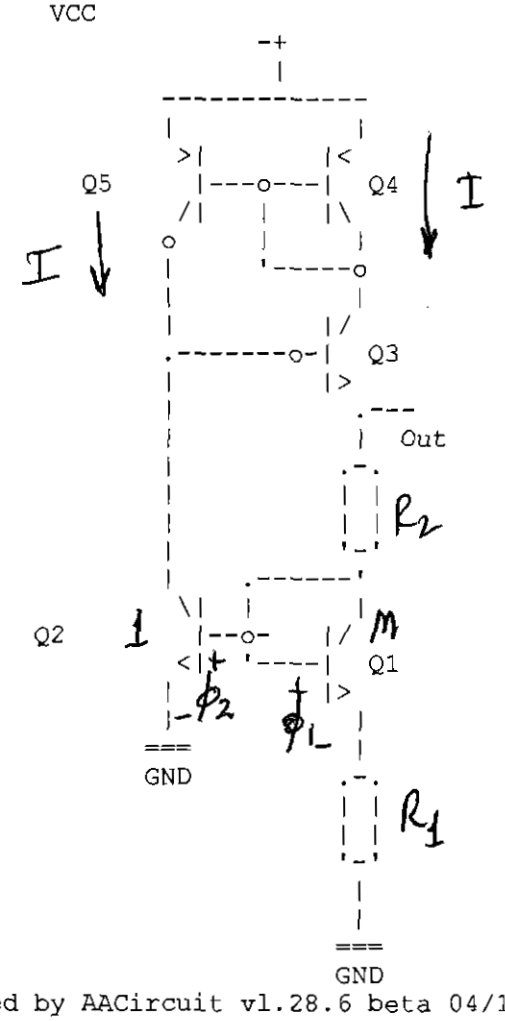
I was looking through some of the example circuits that come with LTSpice, and there's a file with some bandgap voltage references. I'm unfamiliar with the current mirror arrangement in the following schematic...the transistor directly above Out is an NPN, not the PNP I would expect for something like a Wilson current mirror. If I switch it to a PNP, the circuit doesn't work properly anymore. For the bandgap to work properly I'm assuming that Q1 must have a larger emitter area than Q2 to generate a Vbe differential. Any insight would be appreciated!




(created by AACircuit v1.28.6 beta 04/19/05 www.tech-chat.de)

$$\phi_1 = \frac{kT}{q} \ln \frac{I}{n \cdot I_S}$$

$$\phi_2 = \frac{kT}{q} \ln \frac{I}{I_S}$$

$$\phi_1 + I R_1 = \phi_2$$

$$I R_1 = \phi_2 - \phi_1 = \frac{kT}{q} \ln M$$

$$V_{OUT} = I(R_1 + R_2) + \phi_1$$

DEFINE $\dot{X} = \frac{dX}{dT}$

$$\dot{V}_{OUT} = \dot{I}(R_1 + R_2) + \dot{\phi}_1 == \text{IF FLAT} = 0$$

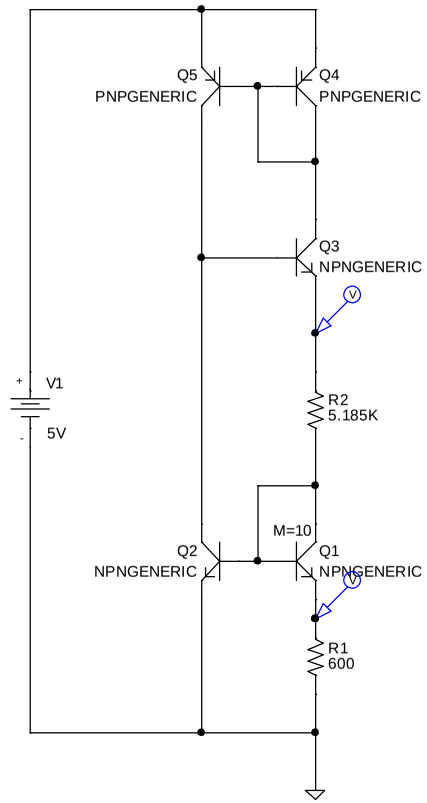
$$\dot{I} = \frac{k}{q R_1} \ln M$$

BASIC TC (Si) FOR P-N JUNCTIONS

$$0 = \frac{k}{q R_1} (\ln M)(R_1 + R_2) - 2\text{mV/°C}$$

SOLVE VIA NEWTON'S METHOD OF SUCCESSIVE APPROXIMATION, OR TWEAK VIA A SIMULATOR

SEE FOLLOWING PAGES.

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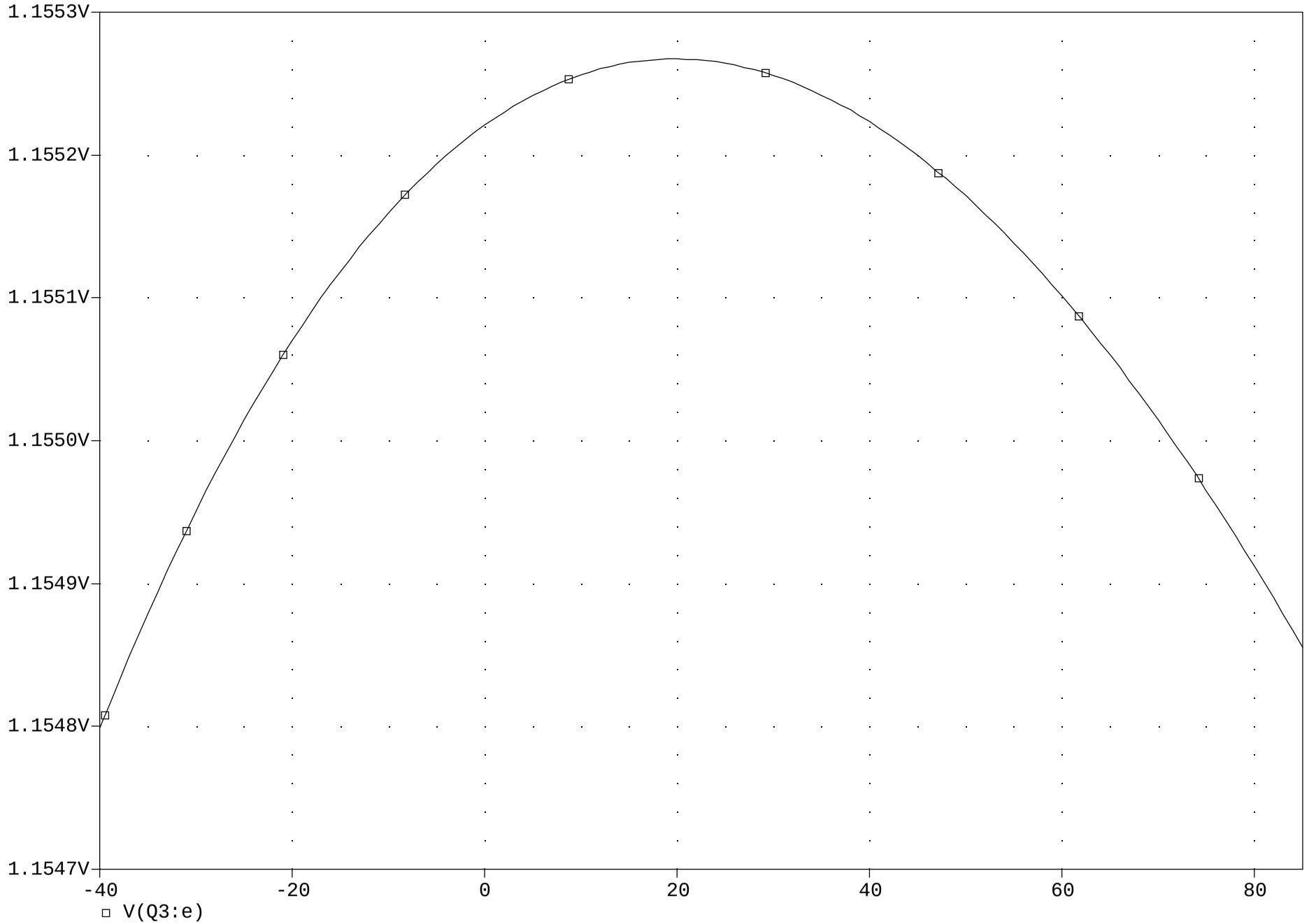
Title:
Bandgaps

| Size | FileName: | REV |
|---|---|---|
| A | D:\Projects\Expments\SED\BandGaps_2010_09_26_SED.sch | A |

| | |
|---|---|
| September 26, 2010, 10:28 AM | Sheet 1 of 1 |

D:\Projects\Expments\SED\BandGaps_2010_09_26_SED_SIM.pdf




ANALOG INNOVATIONS, INC. Temperature(s): -40.0 September 26, 2010