



LTC2057 can (should) be used instead

Both collector currents are about 100uA, therefore the base current is about 0.5uA, and neglectable small.

R4/R5 define the desired temperature, since they set  $V_{BE}$  of Q2.

The die temperature is regulated with OP A and Q2. OP A regulates the temperature, so that  $V_{BE}$  equals  $V_{CE}$ .  $V_{BE}$  is used as a temperature sensor with a sensibility of  $-2mV/^{\circ}C$ . Is the temperature too high, then  $V_{BE}$  is smaller than the desired voltage set by R4/R5, and we have an increased base current, and  $V_{CE}$  is smaller than  $V_{BE}$ , due to the increased voltage drop on R3 and so OP A stops further heating.

OP B implements with R1 and Q2 a constant current source for the zener diode. It increases the output voltage as long as  $V_{BE}$  is smaller than  $V_{CE}$ . An increase of  $V_{BE}$  forces a reduction of  $V_{CE}$  due to the increased collector current and the increased voltage drop on R2. Therefore the condition  $V_{BE} = V_{CE}$  is only true for one  $V_{BE}$  at a fixed temperature.

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