$$\int_0^\infty f(x|h)f(h)\,\mathrm{d}h = \int_0^\infty \prod_{j=1}^n \frac{1}{kh}\sum_{i=1}^k K(\frac{X_{2,j}-X_{1,i}}{h})f(h)\,\mathrm{d}h$$

Suppose K is the gaussian kernel, then:

$$= \int_0^\infty \prod_{j=1}^n \frac{1}{kh}\sum_{i=1}^k \frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}(\frac{X_{2,j}-X_{1,i}}{h})^2}f(h)\,\mathrm{d}h$$

$$= \int_0^\infty (\frac{1}{kh})^n \prod_{j=1}^n \sum_{i=1}^k \frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}(\frac{X_{2,j}-X_{1,i}}{h})^2}f(h)\,\mathrm{d}h$$

$$= (\frac{1}{k})^n \int_0^\infty (\frac{1}{h})^n \prod_{j=1}^n \sum_{i=1}^k \frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}(\frac{X_{2,j}-X_{1,i}}{h})^2}f(h)\,\mathrm{d}h$$

$$= (\frac{1}{k\sqrt{2\pi}})^n \int_0^\infty (\frac{1}{h})^n \prod_{j=1}^n \sum_{i=1}^k e^{-\frac{1}{2}(\frac{X_{2,j}-X_{1,i}}{h})^2}f(h)\,\mathrm{d}h$$

$$= (\frac{1}{k\sqrt{2\pi}})^n \int_0^\infty (\frac{1}{h})^n \sum_{i_n=1}^k \sum_{i_{n-1}=1}^k \cdots \sum_{i_2=1}^k \sum_{i_1=1}^k e^{-\frac{1}{2h^2}\sum_{L=1}^n (X_{2,L}-X_{1,i_L})^2}f(h)\,\mathrm{d}h$$

Recall our choice of prior is: $f(h) = \frac{2B}{\sqrt{\pi}}\frac{1}{h^2}e^{\frac{-B^2}{h^2}}I_{(0,\infty)}$

As B is fixed we treat it like a constant.

Plugging this in yields:

$$= (\frac{1}{k\sqrt{2\pi}})^n \int_0^\infty (\frac{1}{h})^n \sum_{i_n=1}^k \sum_{i_{n-1}=1}^k \cdots \sum_{i_2=1}^k \sum_{i_1=1}^k e^{-\frac{1}{2h^2}\sum_{L=1}^n (X_{2,L}-X_{1,i_L})^2}\frac{2B}{\sqrt{\pi}}\frac{1}{h^2}e^{\frac{-B^2}{h^2}}I_{(0,\infty)}\,\mathrm{d}h$$

$$= (\frac{1}{k\sqrt{2\pi}})^n \frac{2B}{\sqrt{\pi}} \int_0^\infty \sum_{i_n=1}^k \sum_{i_{n-1}=1}^k \cdots \sum_{i_2=1}^k \sum_{i_1=1}^k (\frac{1}{h})^{n+2} e^{-\frac{1}{2h^2}(2B^2+\sum_{L=1}^n (X_{2,L}-X_{1,i_L})^2)}\,\mathrm{d}h$$

$$= (\frac{1}{k\sqrt{2\pi}})^n \frac{2B}{\sqrt{\pi}} \sum_{i_n=1}^k \sum_{i_{n-1}=1}^k \cdots \sum_{i_2=1}^k \sum_{i_1=1}^k \int_0^\infty (\frac{1}{h})^{n+2} e^{-\frac{1}{2h^2}(2B^2+\sum_{L=1}^n (X_{2,L}-X_{1,i_L})^2)}\,\mathrm{d}h$$

let $u = h^2$ $du = 2hdh$

Integral bounds stay the same then:

$$= (\frac{1}{k\sqrt{2\pi}})^n \frac{B}{\sqrt{\pi}} \sum_{i_n=1}^k \sum_{i_{n-1}=1}^k \cdots \sum_{i_2=1}^k \sum_{i_1=1}^k \int_0^\infty (\frac{1}{u}^{\frac{n+1}{2}}) e^{-\frac{1}{2u}(2B^2+\sum_{L=1}^n (X_{2,L}-X_{1,i_L})^2)}\,\mathrm{d}u$$

The function inside the integral is $IG(\frac{n+3}{2}, .5(2B^2 + \sum_{L=1}^n (X_{2,L} - X_{1,i_L})^2))$

Thus, the integral evaluates to: $\frac{\Gamma(\frac{n+3}{2})}{(.5(2B^2+\sum_{L=1}^n (X_{2,L}-X_{1,i_L})^2))^{\frac{n+3}{2}}}$

So the marginal likelihood is:

$$= (\frac{1}{k\sqrt{2\pi}})^n \frac{B}{\sqrt{\pi}} \sum_{i_n=1}^k \sum_{i_{n-1}=1}^k \cdots \sum_{i_2=1}^k \sum_{i_1=1}^k \frac{\Gamma(\frac{n+3}{2})}{(.5(2B^2+\sum_{L=1}^n (X_{2,L}-X_{1,i_L})^2))^{\frac{n+3}{2}}}$$

The sum is iterated and very large, but it is still odd that the form is closed. I meant that the form is closed under the Gaussian Kernel, I may have unintentionally misled you earlier sorry. It is not entirely obvious how things change as k increases or as n increases.