A random variable ξ is uniformly distributed over $(-a, a)$.

Moment generating function equals

$$M_\xi(t) = E\left(e^{t\xi}\right) = \int_{-\infty}^{\infty} e^{tx} f_\xi(x)dx = \int_{-a}^{a} \frac{e^{tx}}{2a} dx = \frac{1}{2a} \frac{e^{tx}}{t}\bigg|_{x=-a}^{x=a} = \frac{1}{2at}\left(e^{ta} - e^{-ta}\right)$$

$$E(\xi^{2n}) = M_\xi^{(2n)}(0)$$

For arbitrary a, b, random variable η , uniformly distributed on (c, d), has such a moment:

$$m_k = \frac{1}{k+1} \sum_{i=0}^{k} c^i d^{k-i}$$

In our case $k = 2n; c = -a; d = a$;

Thus,

$$E(\xi^{2n}) = \frac{1}{2n+1}\left(\sum_{i=0}^{2n} (-a)^i a^{2n-i}\right) = \frac{a^{2n}}{2n+1} \sum_{i=0}^{2n} (-1)^i = \frac{a^{2n}}{2n+1}$$