



Application Note #022

Summary of Linear Vibration Motors (LRA)

Linear vibration motors are an excellent choice for haptic feedback applications requiring a device with high reliability and exceptionally long life. Compared to traditional ERM vibration motors, LRA's are a superior choice for haptic applications due to their faster rise / fall times. Vibration energy is generated by an internal mass that oscillates back and forth along one axis at its resonant frequency.



ERM
Eccentric Rotating Mass Motor



LRA
Linear Resonant Actuator

Our LRA's are designed to have a resonant frequency / vibration frequency in the 200 hz range which research has shown to be optimal for the nerve receptors of the skin.

LRAs are an excellent alternative to brushless vibration motors as the only internal parts that are subject to wear and failure are its internal springs. Unlike conventional brushed DC vibration motors, linear resonant actuators must be driven by an AC signal at the devices resonant frequency. A number of companies make haptic IC drivers for linear vibration motors that supply the correct AC drive signals and contain a library of haptic effects you can choose from. These driver ICs also provide over drive and braking signals to the vibration motor which further improves rise and fall times thus providing a superior haptic feedback experience for the user. Unlike brushed ERM vibration motors, varying the amplitude of the applied voltage will only change the amplitude of the vibration force, not the frequency of vibration. The frequency of vibration is fixed at the LRA's resonant frequency. Due to the LRA's Hi-Q, applying a frequency above or below the resonant frequency of the LRA will result in the LRA producing a lower vibration amplitude or if far from the resonant frequency, no vibration at all