The current-voltage ($I-V$) characteristics of $M$-DNA molecules were investigated by attaching on the three-terminal electrode. The current variation monitored between source and drain by sweeping the gate voltage. For the current work, we mainly report the experimental results obtained from $M$-DNA prepared using $\lambda$ (lambda) DNA. Once $M$-DNA molecules were trapped on the top electrode, the sample chamber was evacuated to minimize the humidity effects on the measurement of $I-V$ characteristics. We found that the current of $M$-DNA molecules measured between source and drain ($I_{DS}$) increases as both the gate voltage increases and decreases. Since the $I_{DS}$ data obtained in this work were collected on vacuum, we suggest that the $I_{DS}$ modulation caused by the gate voltage is due to the field effect.