Alternating current thin film electroluminescence (ACTFEL) characteristics of amorphous gallium oxide doped with manganese (a-Ga$_2$O$_3$:Mn) have been investigated. The a-Ga$_2$O$_3$:Mn thin films were prepared at room temperature by radio frequency (RF) planar magnetron sputtering from a 2 mol% Mn-doped Ga$_2$O$_3$ target in an oxygen-argon mixture atmosphere. The structure and properties of the deposited a-Ga$_2$O$_3$:Mn films were characterized by x-ray diffraction (XRD), field emission scanning electron microscopy (FESEM), atomic force microscopy (AFM), energy dispersive x-ray analysis (EDX), and Auger electron spectroscopy (AES). The devices for ACTFEL studies were constructed on alumina (Al$_2$O$_3$) substrates using an inverted single-insulating structure, which consists of indium tin oxide (ITO), a-Ga$_2$O$_3$:Mn, lead zirconate titanate (PZT), and Au. The fabricated ACTFEL devices exhibited a broad band EL emission peaked at around 507 nm in green range, which is accounted for by the 3d-3d intrashell transition from the $^4$T$_1$ excited state level to the $^6$A$_1$ ground state in divalent manganese ion. The color coordinates of the EL emission were x=0.197 and y=0.623 in the CIE chromaticity.