Josephson junctions are one of the fundamental building blocks of superconducting quantum devices. With applications ranging from circuit quantum electrodynamics experiments to quantum information processing and quantum sensing, reliable and reproducible devices, and related microfabrication processes, represent a corner stone for every experimental group in the field. There are different microfabrication approaches to produce Josephson junctions, i.e. the trilayer process, the Dolan shadow evaporation, the cross-type junction. The trilayer process allows for high quality junctions but involves many lithography steps and both metal and dielectric deposition/patterning. On the other hand, shadow evaporation has dominated the quantum computing community since, with a single e-beam lithography, few tens of nanometer wide junctions can be produced, allowing for critical currents in the order of tens of nA, facing however sever geometrical limitations. Our effort at Fondazione Bruno Kessler focuses on the development of cross-type Al/Al-Ox/Al Josephson junctions. This method allows for scalability and high geometrical flexibility. Cross junction can be fabricated with just two optical lithography steps and relatively low resources while still reaching state-of-the-art performances. Here we outline the microfabrication process that we have developed, which includes: first layer Al sputtering and relative lithography patterning followed by wet etching of the unwanted metal, then a second layer lithographic definition, followed by the oxidation step to create the junction barrier and, in the end, the second layer Al sputtering and relative lift-off. We then describe our results starting from room temperature DC measurements for different oxidation doses and the cryogenic characterization. By tuning the oxidation dose, specific normal resistance values between 150 Ωμm2 and 5 kΩμm2, corresponding to critical current density values between 50 μA/μm2 and 150 nA/μm2, can be reached. These results imply a large flexibility in the critical current tuning, allowing for a wide range of applications. Finally, we demonstrate the process validity via the characterization of a Josephson parametric amplifier and a transmon qubit. We also investigate towards possible post processing methods to decrease the junctions critical current and to bypass the resolution limitations of optical lithography via thermal annealing, reaching critical current density values in the order of 50 nA/μm2.