Advanced techniques for the control of electromagnetic interference (EMI) and for the optimization of the electromagnetic compatibility (EMC) performance have been developed under the constraints typical of miniature electronic devices (MED). The electromagnetic coexistence of multiple systems and their mutual interaction have been the underlying theme of the work. The research results concern different aspects related to the integration of radio-frequency (RF) electronics in MEDs and hearing instruments (HI). To control internal EMI, a novel near-field parasitic resonator (NFPR) has been researched. The structure allows for effective suppression of radiation from the MED, while taking into consideration the integration and miniaturization aspects. To increase the sensitivity of the system, a compact LNA suitable for on-body applications has been developed. The LNA allows for an increase in the overall sensitivity of a system comprised of two HIs communicating among them. To optimize the on-body and off-body communication links of HIs, a novel wearable antenna was designed. The design originates from considerations about the EM environment where the antenna operates. An EMC-robust alternative to the on-body link was investigated through the use of body-coupled communications (BCC) and integrated with the antenna in a unique system. Overall, the novel researched solutions effectively addressed a set of intraand inter-system EMI and EMC issues, as dictated by the complexity of emerging modern miniature electronics.