Abstract
A 4-phase, quasi-current-mode hysteretic buck converter with digital frequency
synchronization, online comparator offset-calibration and digital current sharing control
is presented. The switching frequency of the hysteretic converter is digitally synchronized
to the input clock reference with less than ±1.5% error in the switching frequency range
of 3-9.5MHz. The online offset calibration cancels the input-referred offset of the
hysteretic comparator and enables ±1.1% voltage regulation accuracy. Maximum current-
sharing error of ±3.6% is achieved by a duty-cycle-calibrated delay line based PWM
generator, without affecting the phase synchronization timing sequence. In light load
conditions, individual converter phases can be disabled, and the final stage power
converter output stage is segmented for high efficiency. The DC-DC converter achieves
93% peak efficiency for $V_i = 2V$ and $V_o = 1.6V$. 