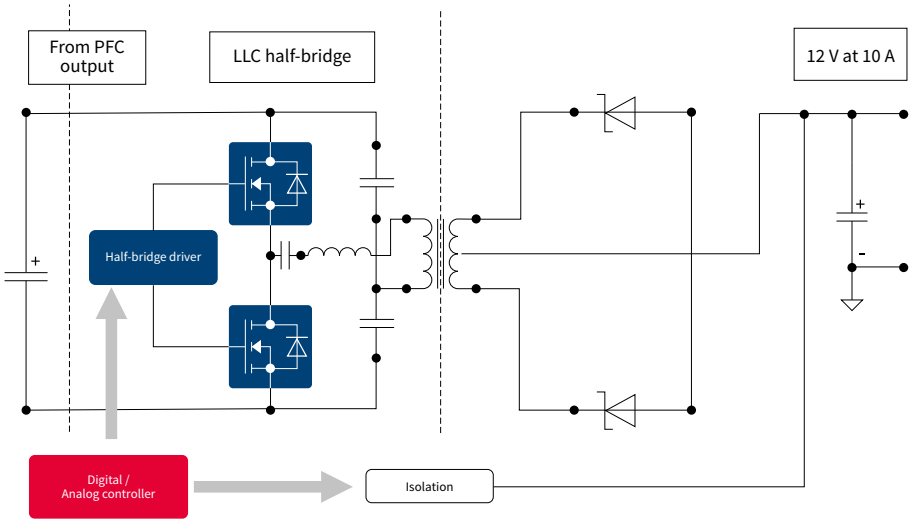
CoolMOS™ CE – target topologies

Two switch topologies – half-bridge LLC
Typically used in PC power and TV power supplies

The ideal MOSFET for the LLC converter would allow for zero dead time (maximum power transfer) and no conduction loss. Hence selecting a lower $R_{DS(on)}$ MOSFET will help lower condition losses. Since LLC operates fully in ZVS-mode (given appropriate MOSFET Q_G, Q_{oss}, selected Q_{max} and m-values – and ample pre-programmed deadtime), switching loss caused by E_{oss} can be considered negligible, and to this extent, E_{oss} is not a critical MOSFET parameter for LLC.



Design equations for MOSFET selection
$V_{DS} = V_{in}$
$I_D = I_{out}$ * (NS / NP)
$V_{DS\_FET} = 1.5 * V_{DS}$ (with derating for all variables on board)
$R_{DS(on)}$ max. 25°C for acceptable power dissipation in MOSFET package = (1.5 * P_{device}) / (Ipk^2 * D). Ipk is derated value of I_D to cover all worst case operation conditions

In LLC topology, the MOSFET body diode could potentially experience hard current commutation in abnormal conditions, if steps are not taken specifically to avoid this either by a good control scheme or additional circuitry in the topology. The CoolMOS™ CE addresses the potential issue of reverse recovery of body diode by employing a self-snubbing scheme causing the channel to partially turn on at high dV/dt (induced by C_{GD}/C_{GS} voltage divider) in order to prevent avalanche breakdown, thus providing the extra measure of protection during hard body diode commutation.

Input voltage V_{DC} [V]	Output voltage [V]	Output voltage V_o [V]	Rac [Ω]	Lr [uH]	Lp [uH]	Cr [nF]	600 V CoolMOS™ CE device options	500 V CoolMOS™ CE device options
400	250	24	128	109	356	20	IPx60R400CE	IPx50R380CE
400	200	24	160	136	445	16	IPx60R460CE	IPx50R500CE
400	150	24	213	181	594	12	IPx60R650CE	IPD50R650CE
400	100	24	320	272	890	8	IPx60R800CE	IPD50R800CE
400	75	24	427	363	1187	6	IPx60R1k0CE	IPD50R950CE