

POWER SUPPLY TOPOLOGIES

TYPE OF CONVERTER	Buck (Step Down)	Multi-phase Buck (two-phase example)	Boost (Step Up)	Buck - Boost (Step Down/Up)	SEPIC (Step Down/Up)	CUK (Step Up/Down)	Forward	Flyback	Push-Pull	Two-Switch Forward	Half Bridge	Full Bridge
CIRCUIT CONFIGURATION												
IDEAL TRANSFER FUNCTION	$\frac{V_O}{V_{IN}} = \frac{t_{ON}}{T_S} = D$	$\frac{V_O}{V_{IN}} = \frac{t_{ON}}{T_S} = D$	$\frac{V_O}{V_{IN}} = \frac{T_S}{T_S - t_{ON}} = \frac{1}{1-D}$	$\frac{V_O}{V_{IN}} = \left(\frac{t_{ON}}{T_S - t_{ON}} \right) = -\left(\frac{D}{1-D} \right)$	$\frac{V_O}{V_{IN}} = \frac{D}{1-D}$	$\frac{V_O}{V_{IN}} = -\left(\frac{t_{ON}}{T_S - t_{ON}} \right) = -\left(\frac{D}{1-D} \right)$	$\frac{V_O}{V_{IN}} = \frac{N_2}{N_1} \left(\frac{t_{ON}}{T_S} \right) = \frac{N_2}{N_1} D$	$\frac{V_O}{V_{IN}} = \frac{N_2}{N_1} \left(\frac{t_{ON}}{T_S - t_{ON}} \right) = \frac{N_2}{N_1} \left(\frac{D}{1-D} \right)$	$\frac{V_O}{V_{IN}} = 2 \frac{N_2}{N_1} \left(\frac{t_{ON}}{T_S} \right) = 2 \frac{N_2}{N_1} D$	$\frac{V_O}{V_{IN}} = \frac{N_2}{N_1} \left(\frac{t_{ON}}{T_S} \right) = \frac{N_2}{N_1} D$	$\frac{V_O}{V_{IN}} = \frac{N_2}{N_1} \left(\frac{t_{ON}}{T_S} \right) = \frac{N_2}{N_1} D$	$\frac{V_O}{V_{IN}} = 2 \frac{N_2}{N_1} \left(\frac{t_{ON}}{T_S} \right) = 2 \frac{N_2}{N_1} D$
PEAK DRAIN CURRENT*	$I_{D_{MAX}} = I_{RL} + \frac{\Delta I_{L1}}{2}$	$I_{D1_{MAX}} = I_{D2_{MAX}} = \frac{I_{RL}}{2} + \frac{\Delta I_L}{2}$	$I_{D_{MAX}} = I_{RL} \left(\frac{1}{1-D} \right) + \frac{\Delta I_{L1}}{2}$	$I_{D_{MAX}} = I_{RL} \left(\frac{1}{1-D} \right) + \frac{\Delta I_{L1}}{2}$	$I_{D_{MAX}} = I_1 + I_{RL} + \frac{\Delta I_{L1} + \Delta I_{L2}}{2}$	$I_{D_{MAX}} = I_1 + I_2 = I_1 \left(\frac{1}{D} \right)$	$I_{D_{MAX}} = \frac{N_2}{N_1} \left(I_{RL} + \frac{\Delta I_{L1}}{2} \right) + \hat{I}_{MAG}$ (\hat{I}_{MAG} = Peak magnetizing current.)	$I_{D_{MAX}} = I_{RL} \left(\frac{N_2}{N_1} \right) \left(\frac{1}{1-D} \right) + \frac{\Delta I_{L1}}{2}$	$I_{D_{MAX}} = \frac{N_2}{N_1} \left(I_{RL} + \frac{\Delta I_{L1}}{2} \right) + \hat{I}_{MAG}$ (\hat{I}_{MAG} = Peak magnetizing current.)	$I_{D_{MAX}} = \frac{N_2}{N_1} \left(I_{RL} + \frac{\Delta I_{L1}}{2} \right) + \hat{I}_{MAG}$ (\hat{I}_{MAG} = Peak magnetizing current.)	$I_{D_{MAX}} = \frac{N_2}{N_1} \left(I_{RL} + \frac{\Delta I_{L1}}{2} \right) + \hat{I}_{MAG}$ (\hat{I}_{MAG} = Peak magnetizing current.)	$I_{D_{MAX}} = \frac{N_2}{N_1} \left(I_{RL} + \frac{\Delta I_{L1}}{2} \right) + \hat{I}_{MAG}$ (\hat{I}_{MAG} = Peak magnetizing current.)
PEAK DRAIN VOLTAGE*	$V_{DS} = V_{IN} + V_D$	$V_{DS} = V_{IN} + V_D$	$V_{DS} = V_O + V_D$	$V_{DS} = V_{IN} + V_O + V_D$	$V_{DS} = V_O + V_{IN} + V_D$	$V_{DS} = V_O + V_{IN} + V_D$	$V_{DS} = V_{IN} \left(1 + \frac{N_2}{N_1} \right)$	$V_{DS} = V_{IN} + \left(\frac{N_2}{N_1} \right) (V_{OUT} + V_D)$	$V_{DS} = 2V_{IN}$	$(Q1 \text{ or } Q2) \quad V_{DS} = V_{IN} = V_{D1}$	$V_{DS} = V_{IN}$	$V_{DS} = V_{IN}$
AVERAGE DIODE CURRENTS*	$I_{CR1} = I_{RL}(1-D)$	$I_{CR1} = I_{CR2} = \frac{I_{RL}}{2}(1-D)$	$I_{CR1} = I_{RL}$	$I_{CR1} = I_{RL}$	$I_{CR1} = I_{RL}$	$I_{CR1} = I_1 + I_2$ $I_1 + I_2 = I_1 \left(\frac{1}{D} \right) = \left(\frac{1}{1-D} \right) I_{RL}$	$I_{CR1} = \frac{\hat{I}_{MAG}}{2}(D)$ $I_{CR2} = I_{RL}(D)$ $I_{CR3} = I_{RL}(1-D)$	$I_{CR1} = I_{RL}$	$I_{CR1} = \frac{I_{RL}}{2}$ $I_{CR2} = \frac{I_{RL}}{2}$	$I_{CR1,AVE} = I_{CR2,AVE} = \frac{\hat{I}_{MAG} D}{2}$ $I_{CR3,AVE} = I_{RL} D$ $I_{CR4,AVE} = I_{RL}(1-D)$	$I_{CR3} = \frac{I_{RL}}{2}$ $I_{CR4} = \frac{I_{RL}}{2}$	$I_{CR5} = \frac{I_{RL}}{2}$ $I_{CR6} = \frac{I_{RL}}{2}$
DIODE VOLTAGES*	$V_{RM} = V_{IN}$	$V_{RM} = V_{IN}$	$V_{RM} = V_O$	$V_{RM} = V_O + V_{IN}$	$V_{RM} = V_O + V_{IN}$	$V_{RM} = V_O + V_{IN}$	$V_{RM} = \begin{cases} V_{CR1} = V_{IN} \left(1 + \frac{N_2}{N_1} \right) \\ V_{CR2} = V_{IN} \left(\frac{N_2}{N_1} \right) \\ V_{CR3} = V_{IN} \left(\frac{N_2}{N_1} \right) \end{cases}$	$V_{RM} = V_{IN} \left(\frac{N_2}{N_1} \right) + V_O$	$V_{RM} = \begin{cases} V_{CR1} = 2V_{IN} \left(\frac{N_2}{N_1} \right) \\ V_{CR2} = 2V_{IN} \left(\frac{N_2}{N_1} \right) \end{cases}$	$V_{CR1,PK} = V_{CR2,PK} = V_{IN}$ $V_{CR3} = V_{CR4} = \left(\frac{N_2}{N_1} \right) V_{IN}$	$V_{RM} = \begin{cases} V_{CR3} = V_{IN} \left(\frac{N_2}{N_1} \right) \\ V_{CR4} = V_{IN} \left(\frac{N_2}{N_1} \right) \end{cases}$	$V_{RM} = \begin{cases} V_{CR5} = 2V_{IN} \left(\frac{N_2}{N_1} \right) \\ V_{CR6} = 2V_{IN} \left(\frac{N_2}{N_1} \right) \end{cases} \quad V_{CR1} = V_{IN}$
VOLTAGE AND CURRENT WAVEFORMS												

* For reliable operation, follow recommendations in data sheets and application notes. Continuous current mode shown.

PWM Controllers

Intersil offers an extensive selection of switching regulator products for both isolated and non-isolated systems that provide optimum solutions across a wide range of cost vs. performance trade-off points. Intersil provides complete reference designs for specific applications, such as CPU power, as well as generalized designs that can be customized for specific requirements. A wide variety of single- and multiple-output controllers, including products with integrated MOSFETs and linear regulators, provide system designers with the flexibility to optimize power delivery in their systems.



MOSFET Drivers

Intersil offers power MOSFET drivers for a wide array of high performance applications ranging from power supplies to motor drives.

Power MOSFET Driver Features:

- Industry's highest-performance 80V and 100V MOSFET drivers
- Large family of high current, low side, and synchronous buck drivers
- All Intersil drivers feature fast propagation delays for use in multi-MHz power supplies

Integrated DC/DC Switching Regulators

These "plug and play" solutions integrate PWM control, drivers, MOSFETs, and the pass elements along with all the protection and control functions (like soft start, OCP, UVLO & loop compensation) required for precise voltage regulation. The monolithic design of these parts provides a high efficiency compact solution, ideal for space saving applications. Intersil's switching regulator portfolio offers a broad selection of products with choices on switching frequency, output currents and packages. This family is fully supported with detailed application notes, iSIM (Intersil's simulation tool) and Eval boards.



Intersil PWM Controllers and Drivers

Buck Controllers

Single Phase (External FETs)
ISL6420A
ISL6439
ISL6526/26A
ISL6527/27A
ISL8104/05/05A/06/07*
ISL8118

* Coming Soon

Single Phase (Multiple Output, External FETs)

ISL6440/41/42/43/44/45
ISL8120*

Multiphase (External FETs)

ISL8120*
ISL8101/02/03

Multiphase (External Driver and FETs)

ISL6558
ISL6316
ISL6564A

Integrated DC/DC Switching Regulators

Single Outputs
ISL6410/10A
ISL8010/11/12/13/14*
EL7554/56
ISL8502*
ISL8560*

Multiple Outputs

ISL6558
ISL6455/55A
ISL65424*/26
ISL8501*

Single-Ended Controllers (Boost, Buck-Boost, SEPIC, CUK, Forward, Flyback, Two-Switch Forward)

ISL6840/41/42/43/44/45
ISL6721/22A/23A
ISL6729
ISL8401
ISL8843
ISL8840A/41A/42A/43A/44A/45A

Current-Mode Double-Ended Controllers (Full Bridge, Push-Pull)

ISL6551
ISL6741
ISL6742
ISL6744
ISL6745
ISL6752
ISL6753

Voltage-Mode Double-Ended Controllers (Half Bridge, Full Bridge)

ISL6740/40A
ISL6742
ISL6744
ISL6745
ISL6753

MOSFET Drivers

ISL2110/11
ISL6612B/13B/14B
ISL6207/08/09
ISL6700
EL7202/12/22
HIP2100/01
HIP4080/81/82/83/86



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