Microsoft Excel - AN4215_DS2712_Switching_Speed_Calculation_Worksheet.xls

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Switching-Speed Calculation for the DS2712 Switch-Mode Battery Charger

See Tab 2 for speed results

See Tab 3 for reference schematic

= User or device-specific parameter required

= Recommended value, may adjust as necessary

= Calculated value

Parameter	Value	Notes
Vin	5	Charge source voltage
Vdiode	0.35	Charge source protection diode drop
Qsw drop	0.133	Vds(on) or Vce(sat) for the switching transistor at the Icharge operating point
Qcc drop	0.133	Charge control transistor Vds(on) or Vce(sat) at Icharge operating point (if applicable to circuit such as DS2712)
Rparasitic	0.2	Other significant parasitic resistances in the Icharge path such as battery holders, connectors, fuses, etc.
Vcatch	0.35	Catch diode voltage drop
Rsense	0.1	Icharge sense resistor
L	4.70E-05	Switch-mode inductor
Battery Cells	2	Number of cells in charge circuit
Vbatt min	2	Minimum battery voltage for cell stack (1.0V per cell is minimum for fast-charge)
Vbatt nom	2.9	Nominal battery voltage for cell stack (1.45V per cell is normal for bulk of fast-charge)
Vbatt max	3.3	Maximum battery voltage for cell stack (1.65V per cell is maximum for fast-charge)
Vbatt precharge	2	Nominal battery voltage for cell stack during precharge (1.0V per cell is maximum)
Vbatt topoff	3.1	Nominal battery voltage for cell stack during topoff (1.55V per cell is a nominal value for bulk of topoff)
Viref	0.125	Fast-charge voltage reference for sense resistor; see device data sheet; DS2715 = 121mV is default
Vhys-comp	0.024	Hysteresis for fast-charge voltage reference; see device data sheet; DS2715 = 28mV is default
Vhys-comp/2	0.012	Half of the fast-charge hysteresis value
Vsense-fc	0.113	DC voltage regulated across sense resistor in fast-charge is the voltage reference for the DS2712
tpdly	2.00E-07	Internal Vsense comparator time delay; 200ns is a typical value
tsw on	2.00E-07	Switching transistor turn-on time delay from control signal request (if applicable; more likely necessary in bipolar circuits; often much less than tsw_off)
tsw off	2.00E-07	Switching transistor turn-off time delay from control signal request (if applicable; more likely necessary in bipolar circuits where 2us or more is possible)

Circuit Parameters / Switching Speed / Reference Schematic

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