

LM(2)5116 Quick Start Component Calculator

Version 1.2

Revision date: 20 Feb 2008

Note: The components calculated in this worksheet are reasonable starting values for a design using the LM(2)5116. They are not optimized for any particular performance attribute.

Step 1 - General Requirements

Enter parameters in shaded cells.

Vout (V)	24	24
Vin(min) (V)	24	24
Vin(max) (V)	100	100
Maximum Ave Load Current (A)	4	4
Ripple Current % of Maximum Load Current	80%	25%
VCCX voltage (V)	12	0

Recommended IC **LM5116** **LM5116**

Step 2 - Current Limit

Target (% beyond Max Load)	25%	15%
Average Load Current at Current Limit (A)	5	4.6
Short Circuit Current (A)	9.2	5.9
Current Sense Method	R-sense	R-sense
Low-side MOSFET Rds (mOhm)	20.0	20.0

Rs (mOhm)	11.9	18.6
-----------	------	------

Step 3 - Switching Frequency

Decrease Switching Frequency or check Vin range!

Fsw limited by Vin : Vout ratio

Step 4 - Output Capacitors

Fsw (kHz)	250	250
Rt (kΩ)	12.50	12.50
Cout1 (μF)	188	188
Cout2 (μF)	22	22
Cout (μF)	210	210
Capacitor ESR (Ω)	0.008	0.008
ΔVout (mV)	26.7	8.3

Step 5 - Inductor Value

L (μH)	22.8	73.0
--------	------	------

Step 6 - Ramp Capacitor

Cramp (pF)	636	1,308
Rramp (kΩ)	206.2	128.7

Step 7 - VIN Undervoltage Shutdown

Required ?	Yes	Yes
VIN Under Voltage Threshold (V)	10	10
Ruv2 (kOhm)	102.0	102.0
Ruv1 (kOhm)	13.33	13.33

Step 8 - Current Limit Hiccup Duty Cycle

Cft (μF)	1.00	1.00
toff (ms)	1.31	1.31
ton (ms)	1.02	1.02
Duty Cycle	43.8%	43.8%

Step 9 - Feedback Resistors

Rfb1 (Ω)	1,210	1,210
Rfb2 (Ω)	22,691	22,691

Step 10 - Diode Emulation Mode

Required ?	No	No
Rdem (Ω)	4,837	1,476

Step 11 - Chb & Cvcv Capacitor

Low-side MOSFET Qg at VGS=4.5V (nC)	20.0	20.0
Low-side MOSFET Qg at VGS=10V (nC)	34.0	34.0
Cvcv (μF)	0.78	0.55
Hi-side MOSFET Qg at VGS=4.5V (nC)	20.0	20.0
Hi-side MOSFET Qg at VGS=10V (nC)	34.0	34.0
Chb (μF)	0.39	0.27
VCC Start-Up Current ICC (mA)	14.7	14.7
VCC Run Current ICC (mA)	20.5	14.7

Step 12 - Input Capacitor

Cin (μF)	10.0	9.2
----------	------	-----

Step 13 - Compensation Network

Bandwidth Fc (kHz)	25.00	25.00
Modulator Gm(mod) (A/V)	8.37	5.38
Modulator cross over frequency Fc(mod) (kHz)	6.35	4.08
Rcomp (kΩ)	89.4	139.2
Ccomp (pF)	712	457
Chf (pF)	19	12
Error Amp Zero (kHz)	2.50	2.50

Step 14 - Soft Start Capacitor

tss(min) (ms)	5.04	8.40
tss (ms)	12.10	12.10
Css (μF)	0.100	0.100