

LM(2)5085 COT PFET Buck Switching Controller Quick Start

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Note: The components calculated in this worksheet are reasonable starting values for a design using the LM(2)5085. They are not optimized for any particular performance attribute. The most recent version of this excel file can be found in the product folders of the parts at national.com. Make sure to input or select values in all of the blue shaded cells even if a value already exists in that cell. Blue shaded cells require input from user.



Step 1 - General Requirements

Vin(max) [V]	30
Vin(nom) [V]	24
Vin(min) [V]	21
Target Vout [V]	19
Io(max), Maximum load current [A]	2.5
Io(min), Minimum load current [A]	0
Recommended Controller IC	LM25085

Step 2 - Feedback Resistors

RFB2/RFB1 =	14.2
User select RFB2, upper feedback resistor [kOhm]	10
Recommended value for RFB1, lower feedback resistor [kOhm]	0.706
User select RFB1, lower feedback resistor [kOhm]	3.4
Actual Vout [V]	4.926

Step 3 - Frequency Setting

Maximum allowed frequency [kHz]	1000
Desired Switching Frequency [kHz]	480
User select the PFET	SI7465
Td(off) - Td(on), Difference of PFET On/Off delays [nSec]	57
Calculated value for Rf [kOhm]	237.29

Step 4 - Inductor Selection

Minimum recommended value for L1 [uH]	29.0
User Select the value for L1 [uH]	15.0
Peak Inductor Current [A]	3.0

Step 5 - Current Limit Setting

User select the Current Limit Type	1
User select the value for RSEN, Current sensing resistor [mOhm]	10
Max power dissipation at Io(max) in the selected sense resistor [W]	0.06
Recommended minimum value for RADJ [kOhm]	1.21
User select the value for RADJ [kOhm]	2.05
Nominal current limit [A]	7.9
Max power dissipation in the selected sense resistor at max current limit [W]	0.85

Step 6 - Input Capacitor

Maximum Allowable Input Ripple [Vp-p]	0.5
CIN(min), Minimum Required Input Capacitor [uF]	9
User Select the value for CIN [uF]	47
Maximum RMS Ripple Current in CIN [A]	0.74

Step 7 - Output Capacitor & Ripple Configuration

User select the ripple Configuration Type	2
Recommended value for R4 [mOhm]	120
Maximum allowed value for R4 [mOhm]	724
User select the value for R4 [mOhm]	120
Minimum Recommended Output Capacitor COUT [uF]	8
User Select the value for COUT [uF]	94
Maximum RMS Current Ripple [A]	0.28

Minimum recommended value for Cff Capacitor [pF]	2200
User select the value for Cff [pF]	3300
Resulting Min Output Ripple [mVp-p]	30
Resulting Max Output Ripple [mVp-p]	116

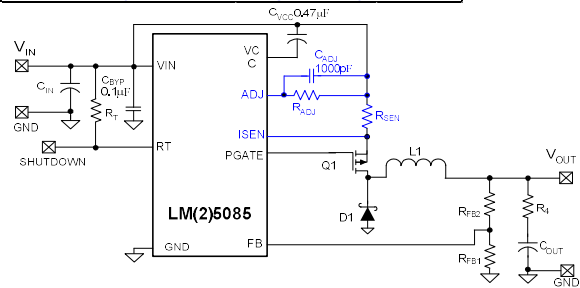
Step 8 - Power Dissipation in controller

Qg, MOSFET total gate charge [nC]	40
Power dissipation in the controller IC [W]	0.62
Temperature Rise using the MSOP-8 package [°C]	78
Temperature Rise using the MSOP-8EP package [°C]	28
Temperature Rise using the LLP-8 package [°C]	33

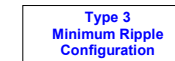
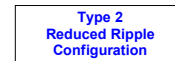
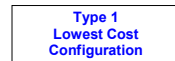
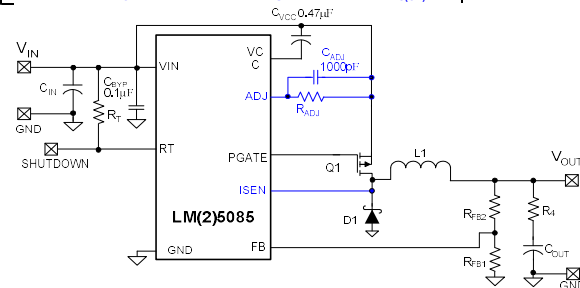
Step 9 - Power Dissipation in D1

User select the diode, D1	MBRB2060
Forward diode drop at maximum load current [V]	0.65
Maximum power dissipation in D1 [W]	1.0

<Current Sense Type1> Sense the voltage across RSEN



<Current Sense Type2> Sense the voltage across Q1's RDS(ON)



List of Components and Parameters

Description	Reference	Value	Min Rating
COT Buck PFET Controller	U1	LM25085	
Output Inductor	L1	15.0uH	
PFET	Q1	SI7465	
Diode	D1	MBRB2060	
Lower Feedback Resistor	RFB1	3.4kOhm	1/16 W
Upper Feedback Resistor	RFB2	10.0kOhm	1/8 W
Frequency Setting Resistor	RT	#####	1/16 W
Current Limit Sense Resistor	Rsen or RdsOn	10mOhm	0.85W
Current Limit Setting Resistor	RADJ	2.05kOhm	1/8 W
Ripple Setting Resistor	R4	120mOhm	0.01W
Input Capacitor	CIN	47.0uF	30V
Output Capacitor	COUT	94. uF	19V
Vcc Capacitor	CVCC	0.47uF	9V
Bypass Capacitor on Vcc	CBYP	0.1uF	30V
Noise Filter for Current Limit	CADJ	1000pF	30V
Feedforward Capacitor	Cff	3300	19V

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