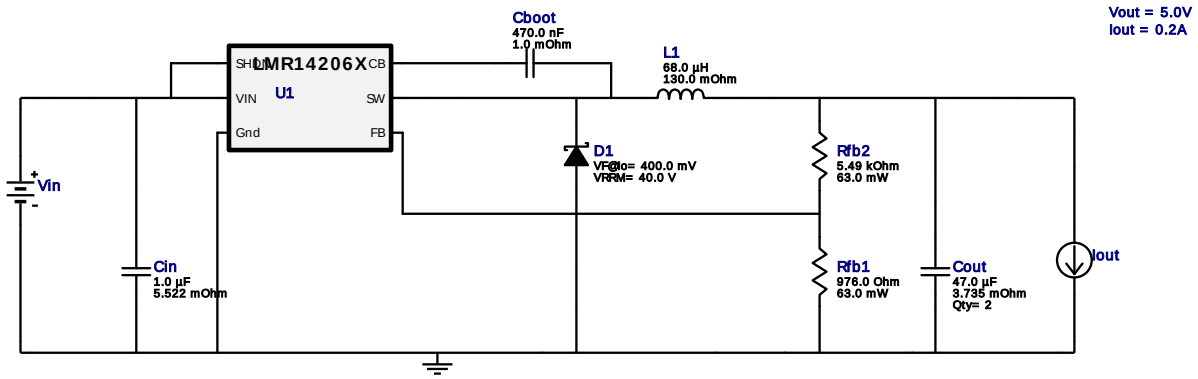
VinMin = 7.0V
VinMax = 24.0V
Vout = 5.0V
Iout = 0.2A

Device = LMR14206XMKE/NOPB
Topology = Buck
Created = 2018-02-14 16:08:45.083
BOM Cost = $1.94
BOM Count = 9
Total Pd = 0.25W

WEBENCH® Design Report

Design : 4399159/31 LMR14206XMKE/NOPB
LMR14206XMKE/NOPB 7.0V-24.0V to 5.00V @ 0.2A



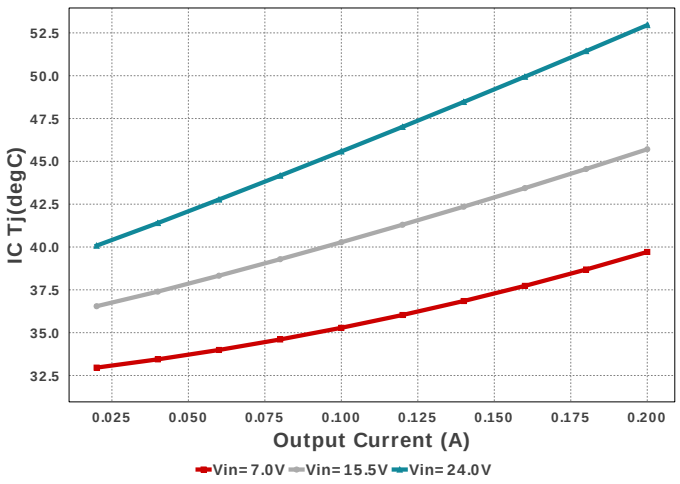
My Comments

No comments

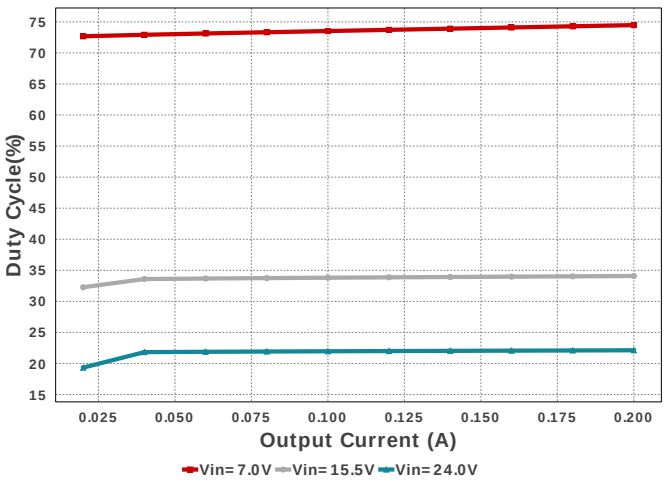
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A474KE15D Series= X5R	Cap= 470.0 nF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Cin	TDK	C1608X5R1H105K080AB Series= X5R	Cap= 1.0 uF ESR= 5.522 mOhm VDC= 50.0 V IRMS= 2.2162 A	1	$0.03	0603 5 mm²
3.	Cout	MuRata	GRM31CR60J476ME19L Series= X5R	Cap= 47.0 uF ESR= 3.735 mOhm VDC= 6.3 V IRMS= 4.091 A	2	$0.11	1206_190 11 mm²
4.	D1	Diodes Inc.	ZLLS400TA	VF@Io= 400.0 mV VRRM= 40.0 V	1	$0.16	SOD-323 9 mm²
5.	L1	Bourns	SRU1048-680Y	L= 68.0 µH DCR= 130.0 mOhm	1	$0.36	SRU1048 144 mm²
6.	Rfb1	Vishay-Dale	CRCW0402976RFKED Series= CRCW..e3	Res= 976.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
7.	Rfb2	Vishay-Dale	CRCW04025K49FKED Series= CRCW..e3	Res= 5.49 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
8.	U1	Texas Instruments	LMR14206XMKE/NOPB	Switcher	1	$1.14	MK06A 11 mm²

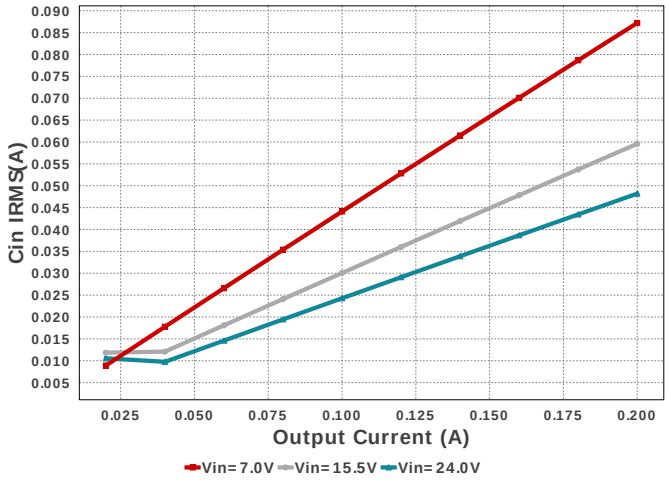
IC Tj



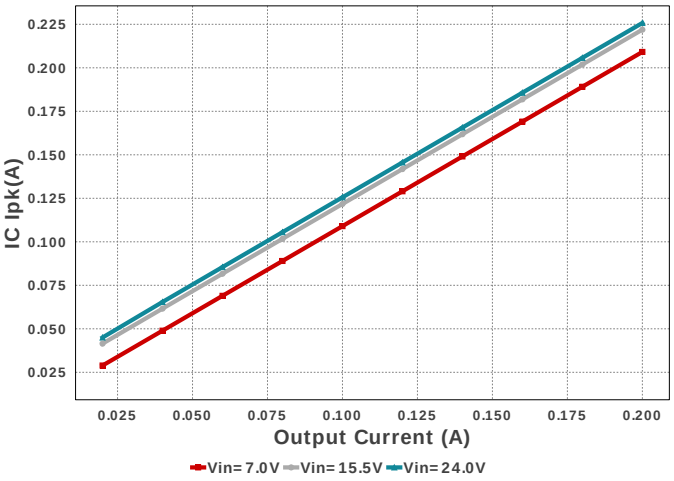
Duty Cycle



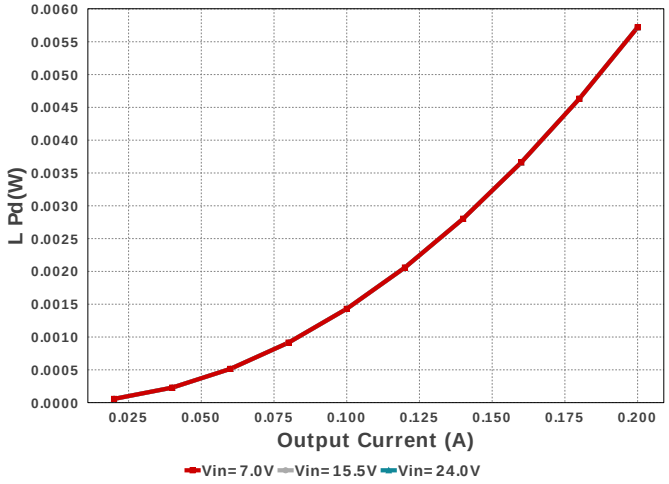
Cin IRMS



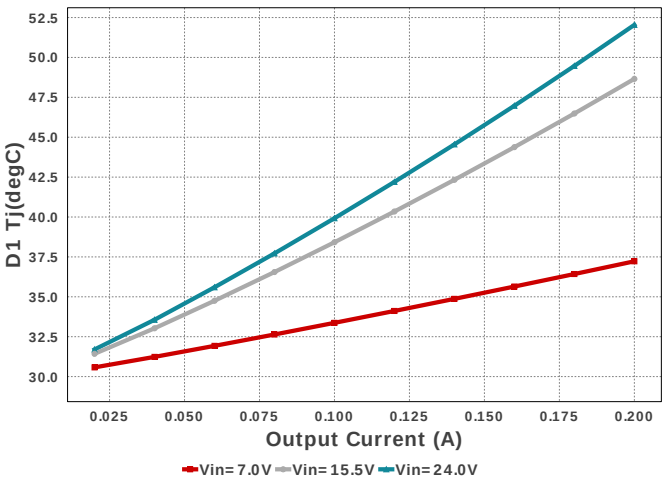
IC Ipk

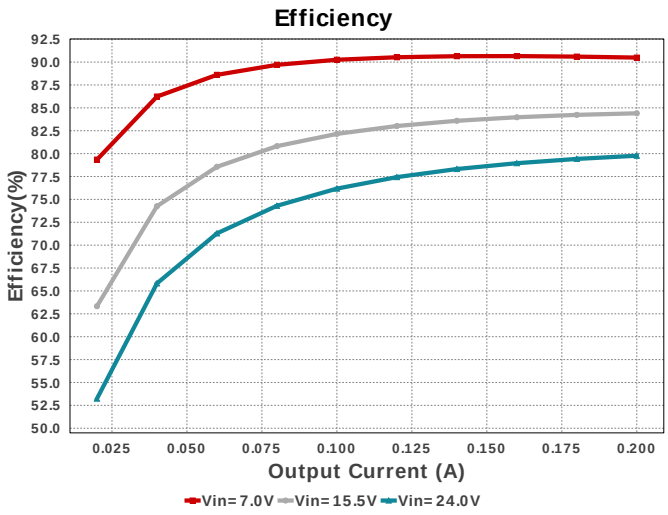


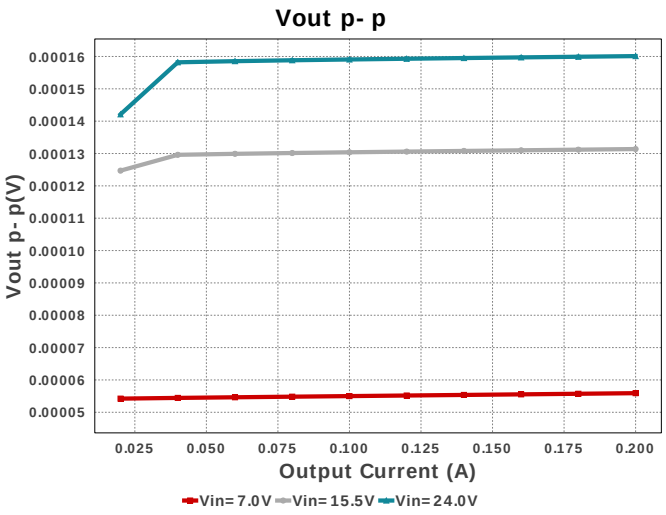
L Pd

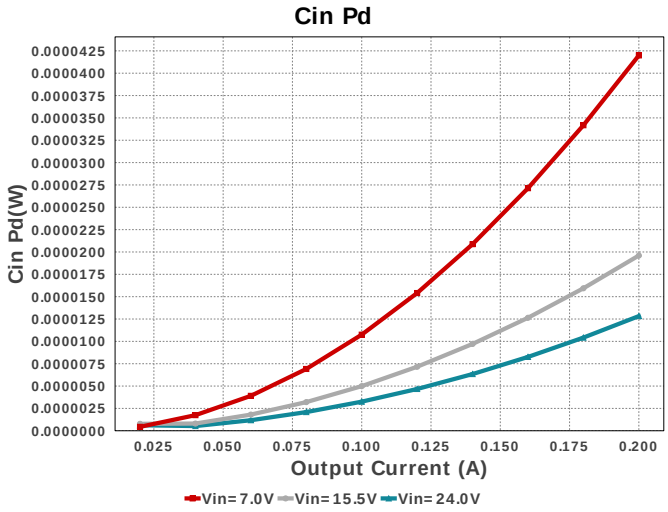


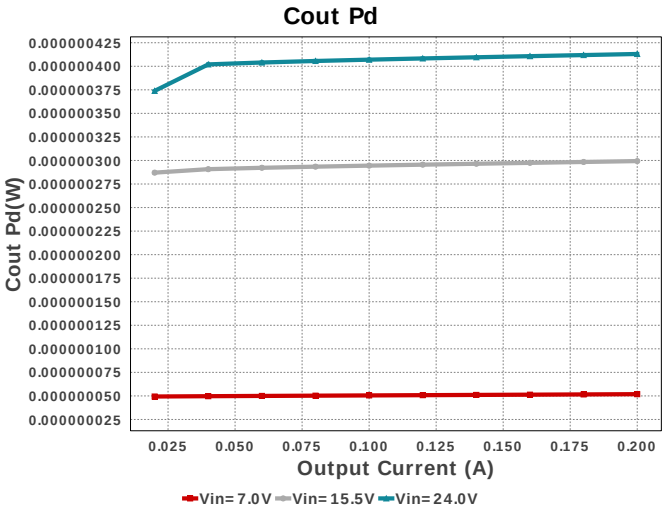
D1 Tj

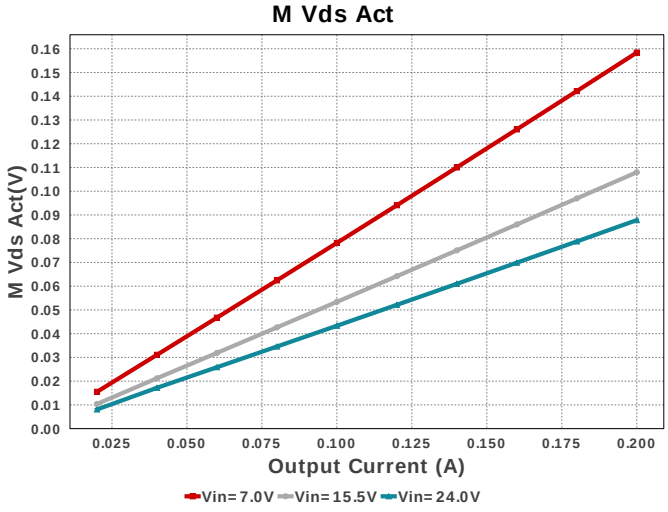


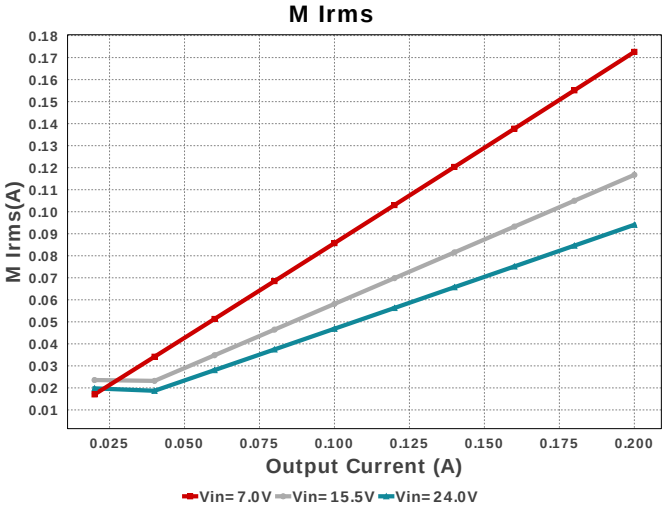


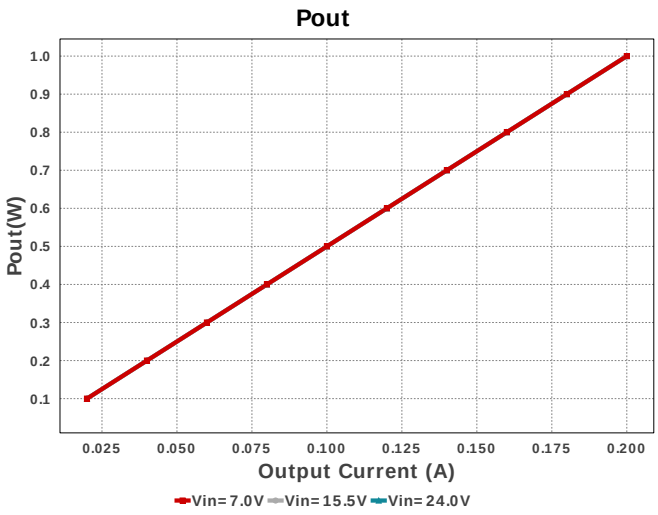


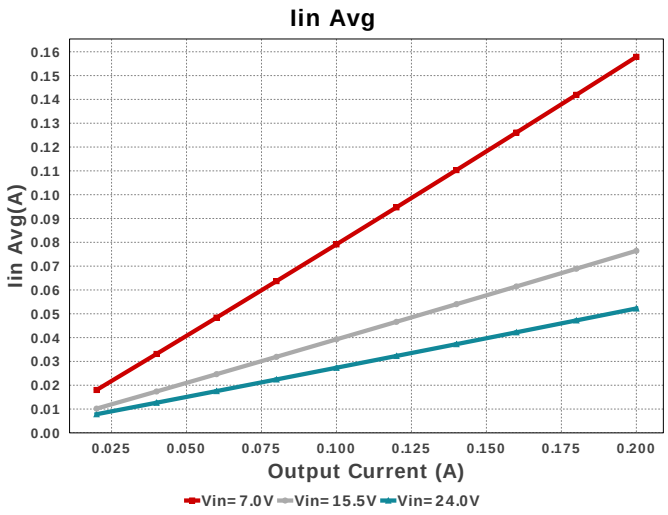


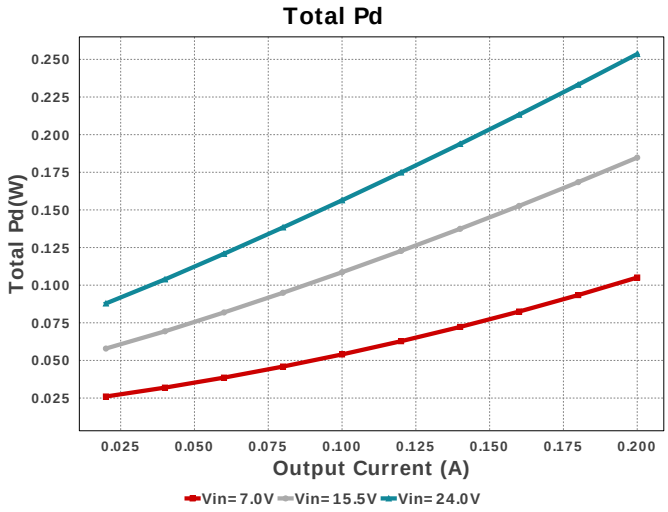


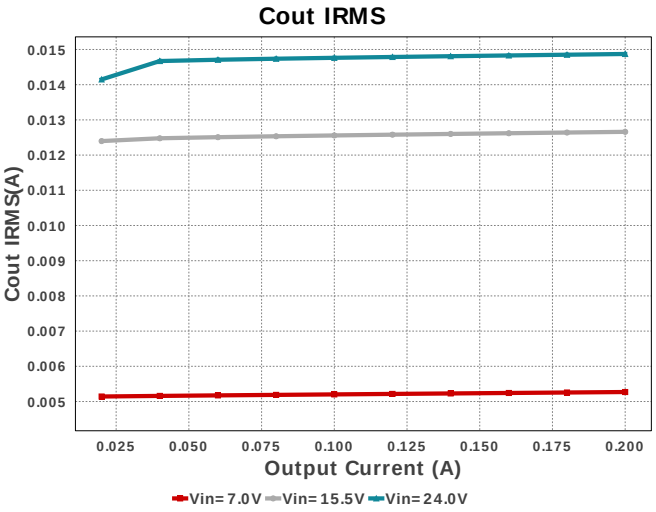


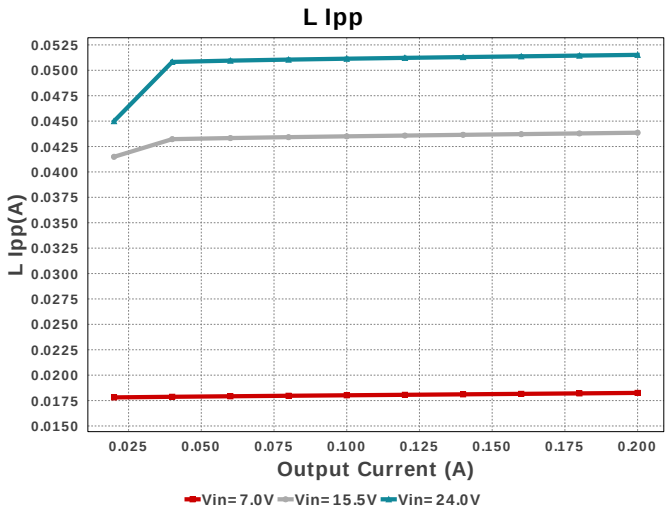


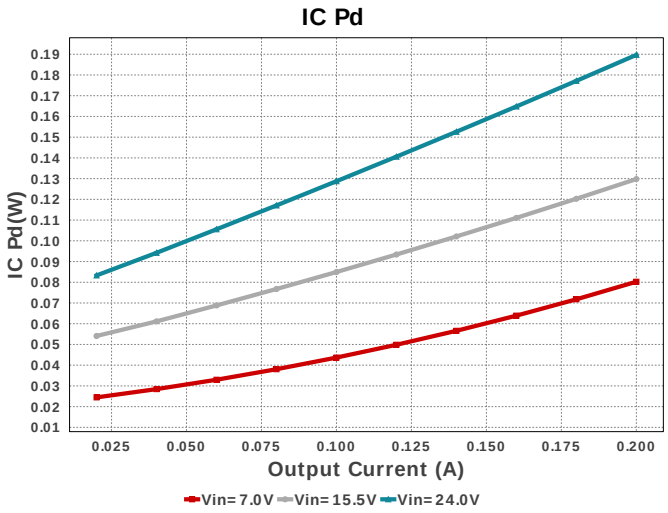


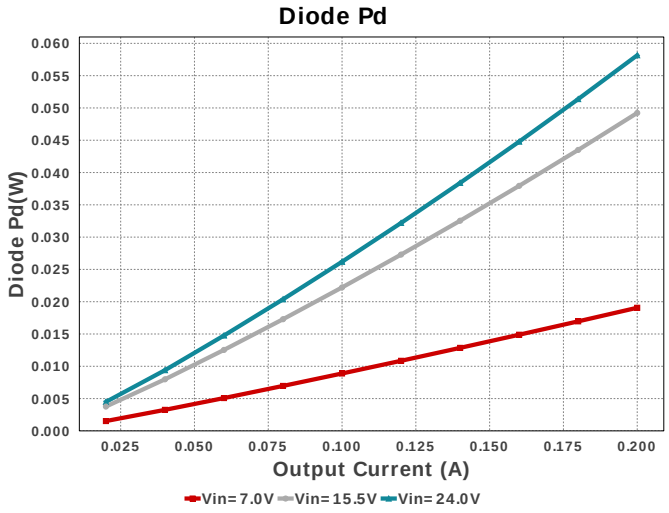












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	48.196 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	14.872 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	225.759 mA	Current	Peak switch current in IC
4.	Iin Avg	52.233 mA	Current	Average input current
5.	L Ipp	51.519 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	94.076 mA	Current	Q Iavg
7.	BOM Count	9	General	Total Design BOM count
8.	FootPrint	199.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	1.2 MHz	General	Switching frequency
10.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	87.825 mV	General	Voltage drop across the MosFET
12.	Mode	CCM	General	Conduction Mode
13.	Pout	1.0 W	General	Total output power
14.	Total BOM	$1.94	General	Total BOM Cost
15.	D1 Tj	52.042 degC	Op_Point	D1 junction temperature
16.	Vout Actual	5.068 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
17.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
18.	Cross Freq	13.793 kHz	Op_point	Bode plot crossover frequency
19.	Duty Cycle	22.126 %	Op_point	Duty cycle
20.	Efficiency	79.771 %	Op_point	Steady state efficiency
21.	IC Tj	52.954 degC	Op_point	IC junction temperature
22.	ICThetaJA	121.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
23.	IOUT_OP	200.0 mA	Op_point	Iout operating point
24.	Phase Marg	50.975 deg	Op_point	Bode Plot Phase Margin
25.	VIN_OP	24.0 V	Op_point	Vin operating point
26.	Vout p-p	160.116 µV	Op_point	Peak-to-peak output ripple voltage
27.	Cin Pd	12.827 µW	Power	Input capacitor power dissipation
28.	Cout Pd	413.055 nW	Power	Output capacitor power dissipation
29.	Diode Pd	58.157 mW	Power	Diode power dissipation
30.	IC Pd	189.702 mW	Power	IC power dissipation
31.	L Pd	5.72 mW	Power	Inductor power dissipation
32.	Total Pd	253.589 mW	Power	Total Power Dissipation
33.	Vout Tolerance	4.109 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	200.0 m	Maximum Output Current
2.	VinMax	24.0	Maximum input voltage
3.	VinMin	7.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	LMR14206X	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LMR14206X** Product Folder : http://www.ti.com/product/LMR14206 : contains the data sheet and other resources.