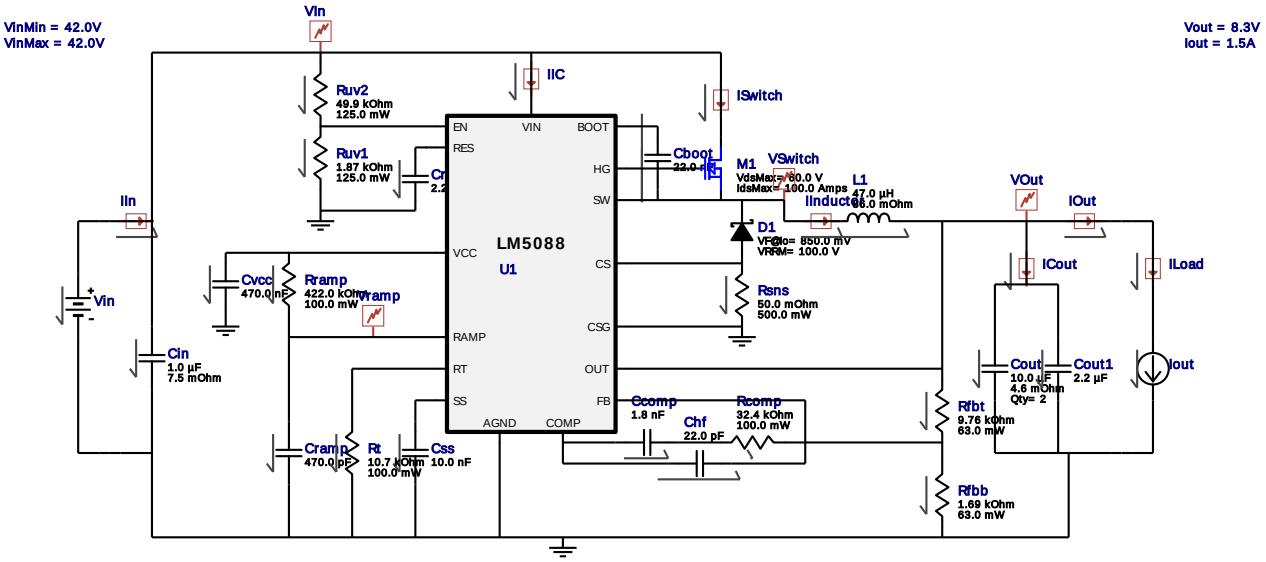
WEBENCH® Electrical Simulation Report

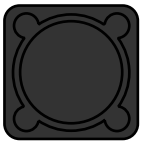
VinMin = 42.0V
VinMax = 42.0V
Vout = 8.3V
Iout = 1.5A

Device = LM5088MH-2/NOPB
Topology = Buck
Created = 5/12/14 12:34:33 AM
User ID = 1176302
Design Id = 193
eSim Id = 2
Simulation Type = Steady State



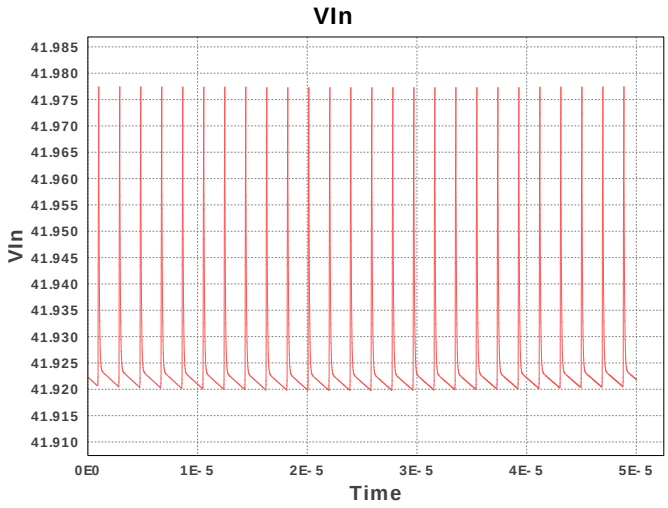
Electrical BOM

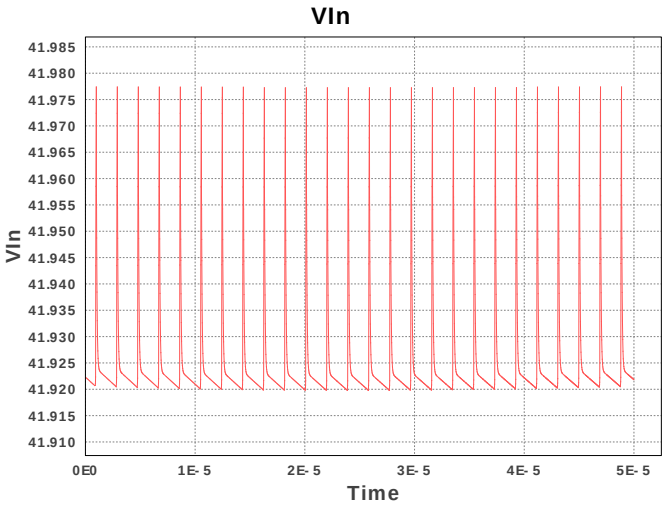
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0603C223K3RACTU Series= X7R	Cap= 22.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0603 5mm2
2.	Ccomp	MuRata	GRM188R71H182KA01D Series= X7R	Cap= 1.8 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5mm2
3.	Chf	Kemet	C0603C220J5GACTU Series= C0G/NP0	Cap= 22.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5mm2
4.	Cin	TDK	C3216X7R2A105M160AA Series= X7R	Cap= 1.0 µF ESR= 7.5 mOhm VDC= 100.0 V IRMS= 5.923 A	1	$0.11	1206 11mm2
5.	Cout	TDK	C3216X5R1C106KT Series= X5R	Cap= 10.0 µF ESR= 4.6 mOhm VDC= 16.0 V IRMS= 2.7 A	2	$0.08	1206 11mm2
6.	Cout1	MuRata	GRM188R61A225KE34D Series= X5R	Cap= 2.2 µF VDC= 10.0 V IRMS= 0.0 A	1	$0.02	0603 5mm2
7.	Cramp	Kemet	C0603C471K5RACTU Series= X7R	Cap= 470.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5mm2
8.	Crst	Kemet	C0603C225K9PACTU Series= X5R	Cap= 2.2 µF VDC= 6.3 V IRMS= 0.0 A	1	$0.02	0603 5mm2
9.	Css	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5mm2
10.	Cvcc	Kemet	C0603C474K4RACTU Series= X7R	Cap= 470.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.02	0603 5mm2
11.	D1	Micro Commercial Components	SK310A-TP	VF@Io= 850.0 mV VRRM= 100.0 V	1	$0.10	SMA 37mm2

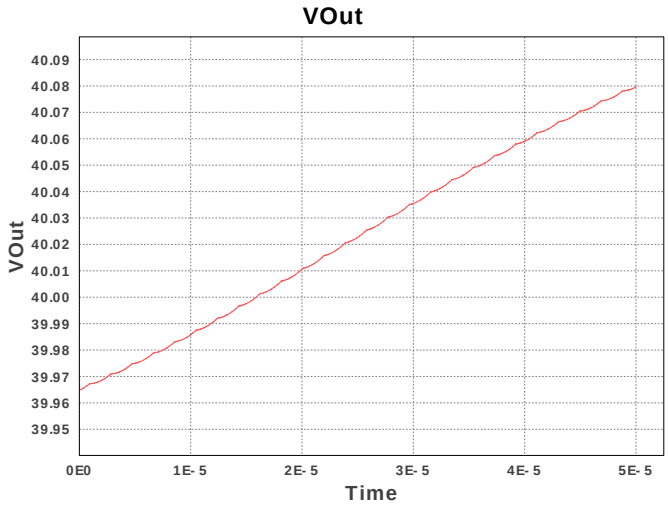
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	L1	Bourns	SRR1260-470M	L= 47.0 µH DCR= 86.0 mOhm	1	$0.41	 SRR1260 210mm2
13.	M1	Texas Instruments	CSD18563Q5A	VdsMax= 60.0 V IdsMax= 100.0 Amps	1	$0.68	 TRANS_NexFET_Q5A 55mm2
14.	Rcomp	Vishay-Dale	CRCW060332K4FKEA Series= CRCW..e3	Res= 32.4 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	 0603 5mm2
15.	Rfbb	Vishay-Dale	CRCW04021K69FKED Series= CRCW..e3	Res= 1.69 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3mm2
16.	Rfbt	Vishay-Dale	CRCW04029K76FKED Series= CRCW..e3	Res= 9.76 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3mm2
17.	Rramp	Vishay-Dale	CRCW0603422KFKEA Series= CRCW..e3	Res= 422.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	 0603 5mm2
18.	Rsns	Stackpole Electronics Inc	CSR1206FK50L0 Series= ?	Res= 50.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	 1206 11mm2
19.	Rt	Vishay-Dale	CRCW060310K7FKEA Series= CRCW..e3	Res= 10.7 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	 0603 5mm2
20.	Ruv1	Panasonic	ERJ-6ENF1871V Series= 225	Res= 1.87 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7mm2
21.	Ruv2	Panasonic	ERJ-6ENF4992V Series= 225	Res= 49.9 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7mm2
22.	U1	Texas Instruments	LM5088MHX-1/NOPB	Switcher	1	$1.47	 MXA16A 59mm2

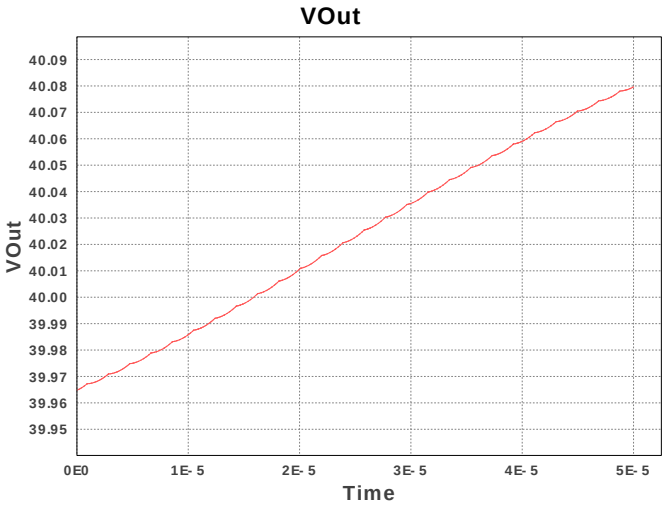
Simulation Parameters

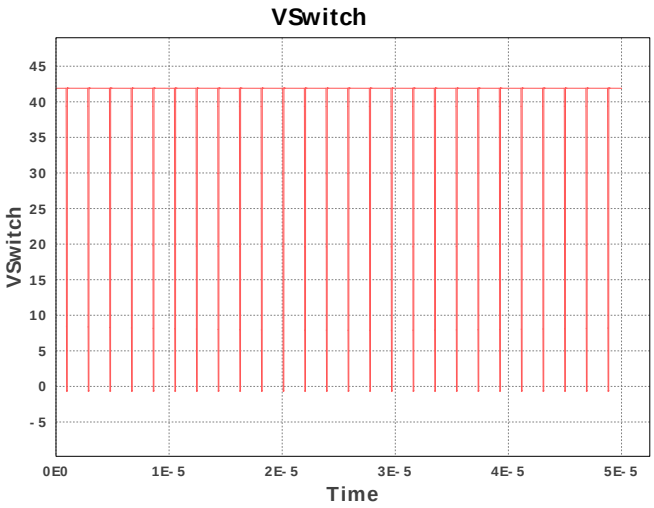
#	Name	Parameter Name	Description	Values
1.	Cin	IC	Initial Condition Across Cin	42.0 V
2.	Cout	IC	Initial Condition Across Cout	0 V
3.	Css	IC	Initial Condition across the capacitor	1.205 V
4.	Cvcc	IC	Initial Condition across the capacitor	7.7 V
5.	L1	IC	Initial Condition through the inductor	1.5 A
6.	Rramp	R	Default Resistance	1.00E+10 Ohm
7.	Iout	I	Load Current	1.5 A

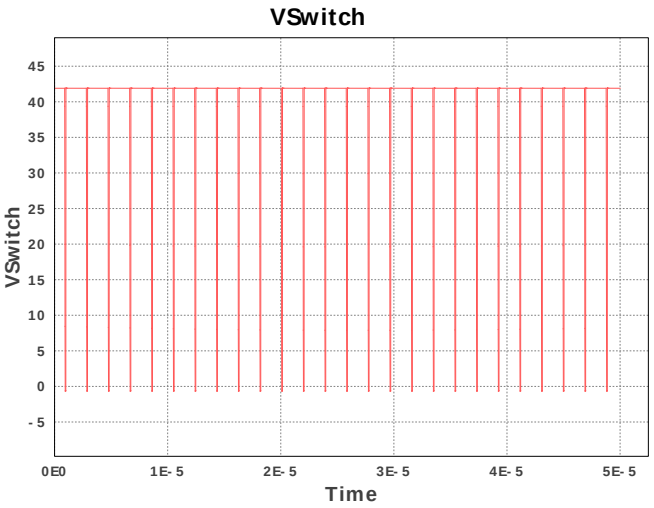


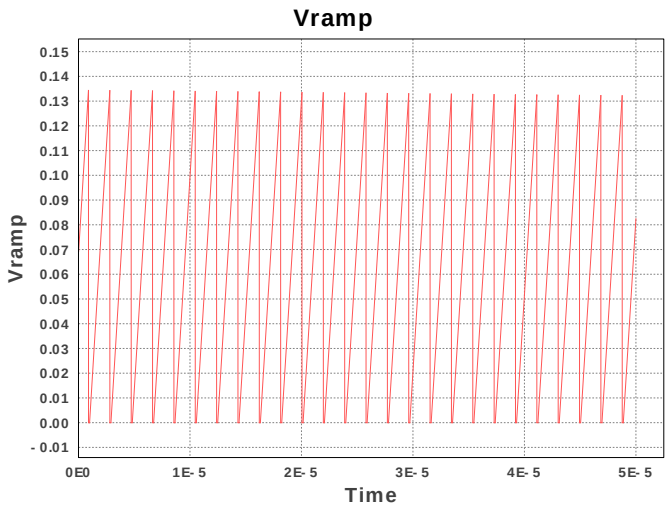


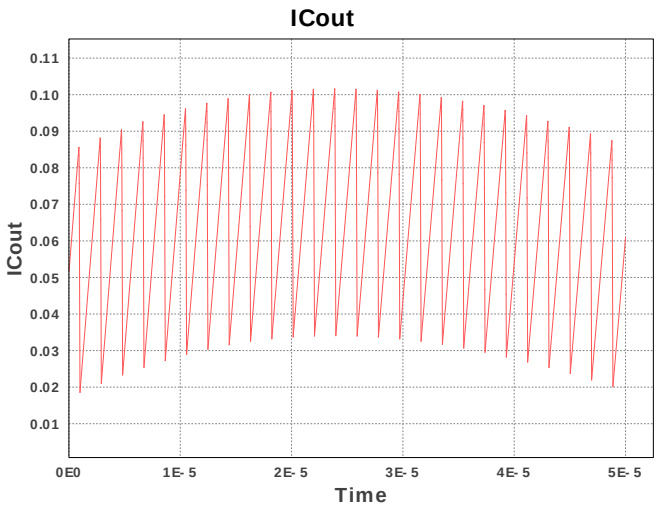


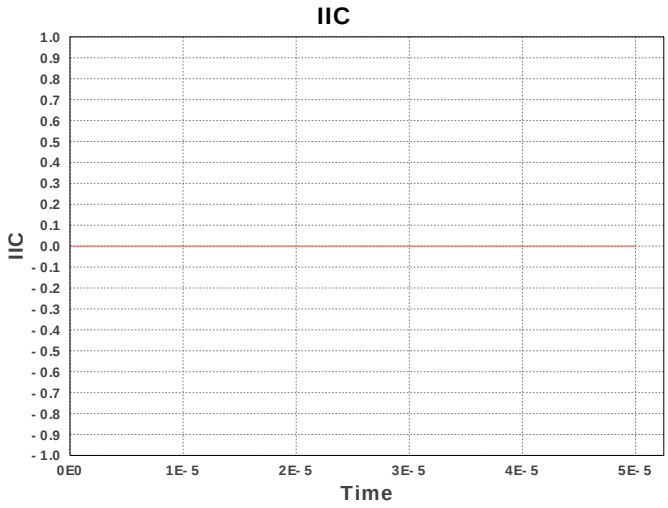


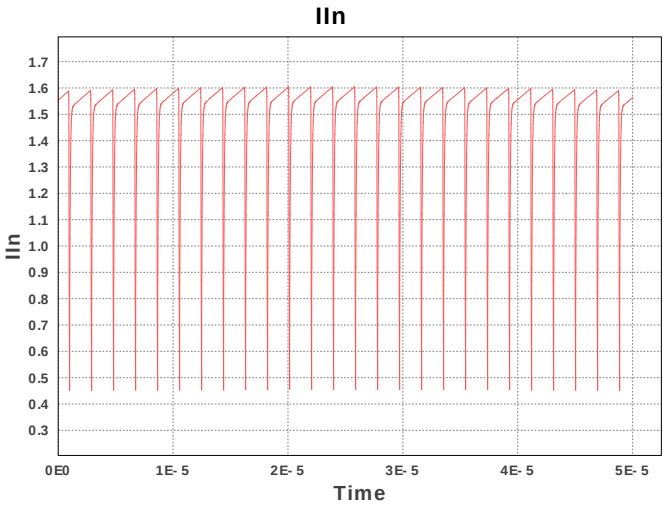


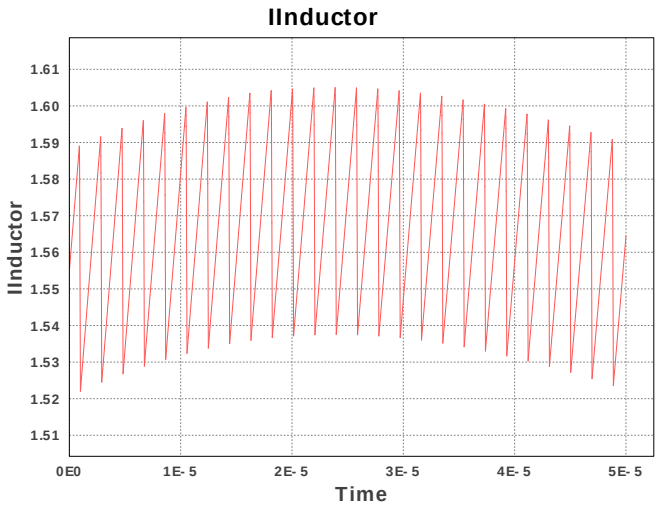


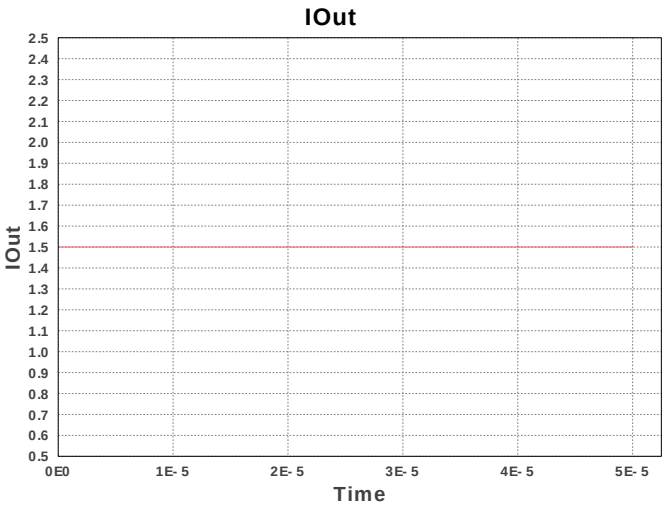


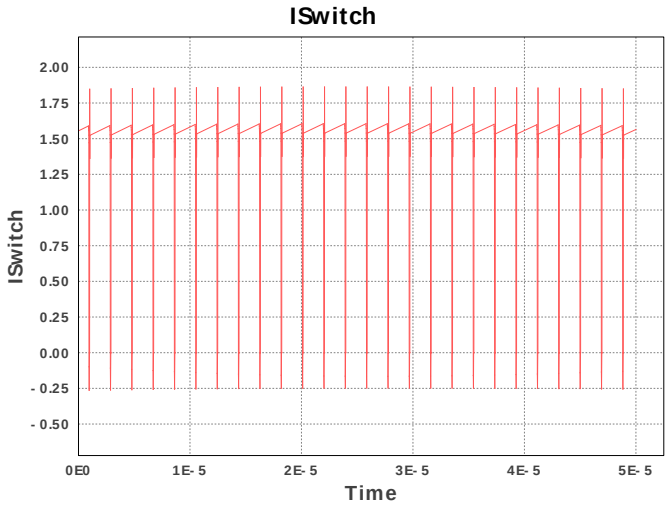


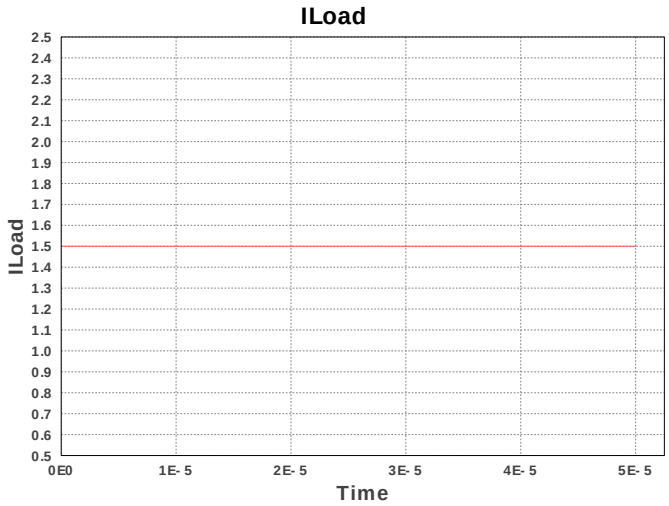












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	614.743 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	84.203 mA	Current	Output capacitor RMS ripple current
3.	I lim	4.0 A	Current	Current limit threshold
4.	Iin Avg	345.08 mA	Current	Average input current
5.	L Ipp	291.688 mA	Current	Peak-to-peak inductor ripple current
6.	SW Ipk	1.646 A	Current	Peak switch current
7.	BOM Count	23	General	Total Design BOM count
8.	FootPrint	477.0 mm2	General	Total Foot Print Area of BOM components
9.	Frequency	525.0 kHz	General	Switching frequency
10.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
11.	Mode	CCM	General	Conduction Mode
12.	Pout	12.45 W	General	Total output power
13.	Total BOM	$3.21	General	Total BOM Cost
14.	D1 Tj	130.269 degC	Op_Point	D1 junction temperature
15.	Duty Cycle	21.357 %	Op_point	Duty cycle
16.	Efficiency	85.901 %	Op_point	Steady state efficiency
17.	IC Tj	55.116 degC	Op_point	IC junction temperature
18.	IOUT_OP	1.5 A	Op_point	Iout operating point
19.	M1 Tj	34.935 degC	Op_point	M1 MOSFET junction temperature
20.	VIN_OP	42.0 V	Op_point	Vin operating point
21.	Vout p-p	3.537 mV	Op_point	Peak-to-peak output ripple voltage
22.	Cin Pd	2.834 mW	Power	Input capacitor power dissipation
23.	Cout Pd	16.307 µW	Power	Output capacitor power dissipation
24.	Diode1 Pd	1.003 W	Power	Diode1 power dissipation
25.	IC Pd	627.9 mW	Power	IC power dissipation
26.	L Pd	241.875 mW	Power	Inductor power dissipation
27.	M1 Pd	98.498 mW	Power	M1 MOSFET total power dissipation
28.	M1 PdCond	5.385 mW	Power	M1 MOSFET conduction losses
29.	M1 PdSw	93.113 mW	Power	M1 MOSFET switching losses
30.	Rsns Pd	69.578 mW	Power	Current Limit Sense Resistor Power Dissipation
31.	Total Pd	2.043 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	1.5 A	Maximum Output Current
2.	Iout1	1.5 Amps	Output Current #1
3.	SoftStart	1.0 ms	Soft Start Time (ms)
4.	VinMax	42.0 V	Maximum input voltage
5.	VinMin	42.0 V	Minimum input voltage
6.	Vout	8.3 V	Output Voltage
7.	Vout1	8.3 Volt	Output Voltage #1
8.	base_pn	LM5088	Base Product Number
9.	source	DC	Input Source Type
10.	Ta	30.0 degC	Ambient temperature
11.	UserFsw	525.0 kHz	Customer Selected Frequency

Design Assistance

1. **LM5088** Product Folder : http://www.ti.com/product/lm5088 : contains the data sheet and other resources.