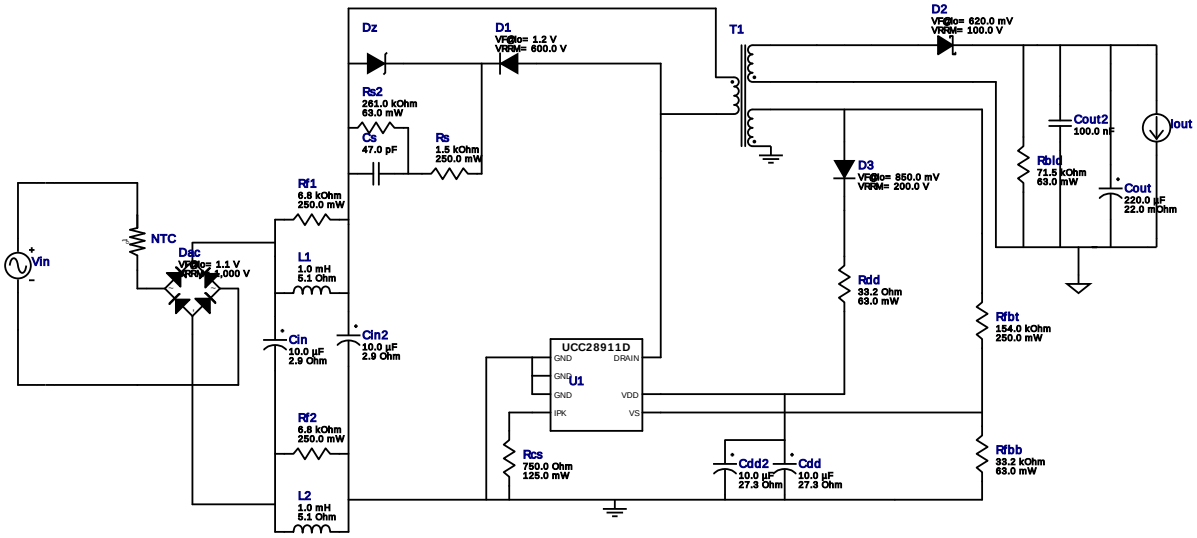
WEBENCH® Design Report

VinMin = 85.0V
VinMax = 265.0V
Vout = 12.0V
Iout = 0.5A

Device = UCC28911D
Topology = Flyback
Created = 5/11/16 9:45:54 AM
BOM Cost = $4.92
BOM Count = 26
Total Pd = 1.59W

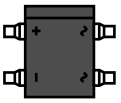
Design : 10925/22 UCC28911D
UCC28911D 85.0V-265.0V to 12.00V @ 0.5A



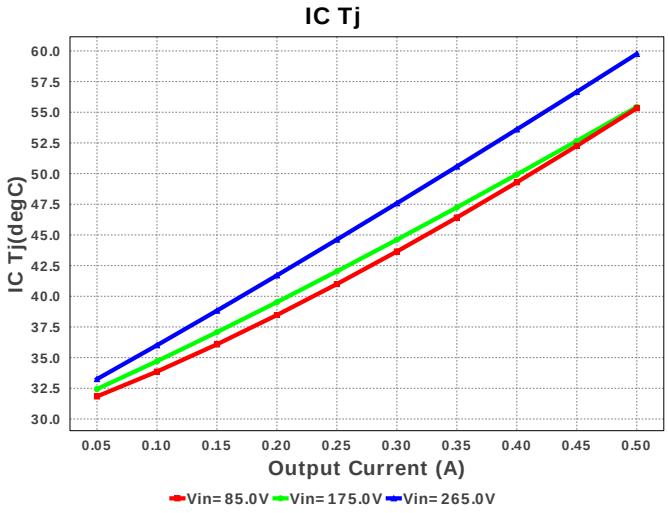
1. Click on the transformer symbol and select 'Design Transformer' to design using specific transformer cores and bobbin

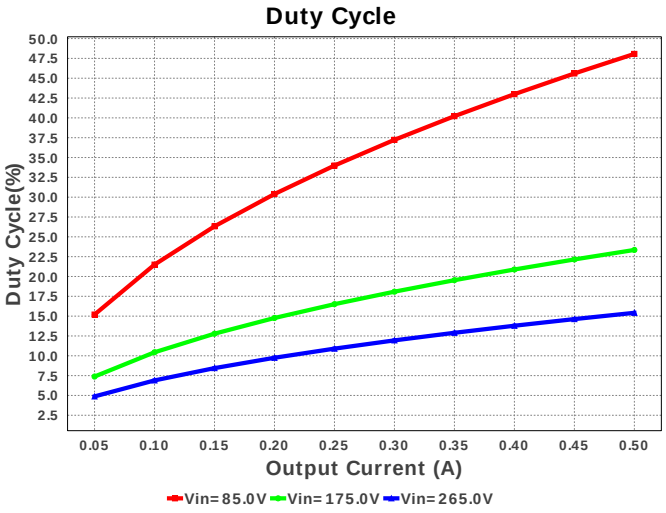
Electrical BOM

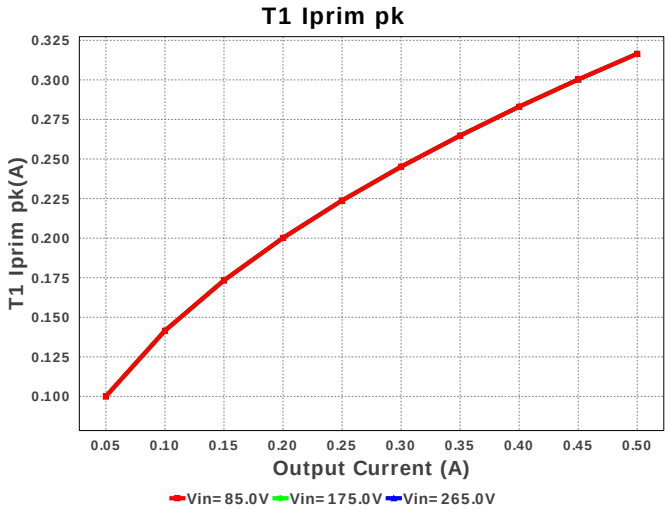
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cdd	Nichicon	UVR1V100MDD1TA Series= ?	Cap= 10.0 uF ESR= 27.3 Ohm VDC= 35.0 V IRMS= 0.0 A	1	$0.03	CAPPR2-5X11 49 mm^2
2.	Cdd2	Nichicon	UVR1V100MDD1TA Series= ?	Cap= 10.0 uF ESR= 27.3 Ohm VDC= 35.0 V IRMS= 0.0 A	1	$0.03	CAPPR2-5X11 49 mm^2
3.	Cin	Kemet	ESG106M400AH4AA Series= 2334	Cap= 10.0 uF ESR= 2.9 Ohm VDC= 400.0 V IRMS= 100.0 mA	1	$0.19	ESG106 144 mm^2
4.	Cin2	Kemet	ESG106M400AH4AA Series= 2334	Cap= 10.0 uF ESR= 2.9 Ohm VDC= 400.0 V IRMS= 100.0 mA	1	$0.19	ESG106 144 mm^2
5.	Cout	Chemi-Con	APXE160ARA221MJ80G Series= PXE	Cap= 220.0 uF ESR= 22.0 mOhm VDC= 16.0 V IRMS= 3.45 A	1	$0.77	CAPSMT_62_J80 156 mm^2
6.	Cout2	MuRata	GRM155R61C104KA88D Series= X5R	Cap= 100.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
7.	Cs	MuRata	GRM21A5C2E470JW01D Series= C0G/NP0	Cap= 47.0 pF VDC= 250.0 V IRMS= 0.0 A	1	$0.06	0805 7 mm^2
8.	D1	ON Semiconductor	1N4937G	VF@Io= 1.2 V VRRM= 600.0 V	1	$0.04	DO-41 43 mm^2

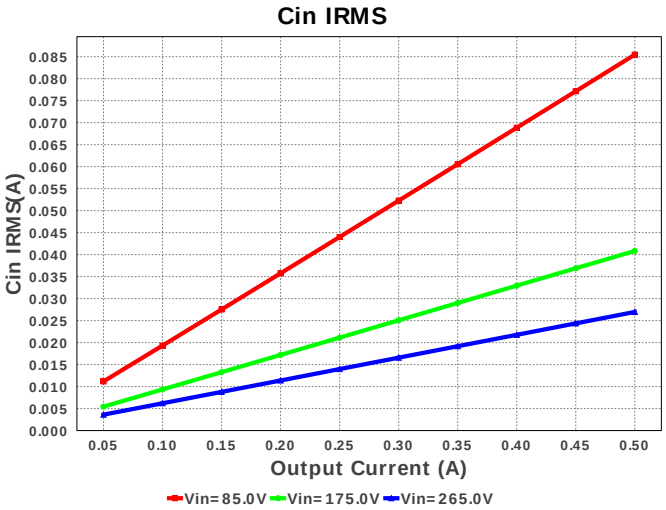
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	D2	Vishay-Semiconductor	SS2PH10-M3	VF@Io= 620.0 mV VRRM= 100.0 V	1	$0.14	DO-220AA 0 mm²
10.	D3	Rohm	RF071M2S	VF@Io= 850.0 mV VRRM= 200.0 V	1	$0.09	 SOD-123 13 mm²
11.	Dac	Vishay-Semiconductor	DF10SA	VF@Io= 1.1 V VRRM= 1,000.0 V	1	$0.24	 DF-S 99 mm²
12.	Dz	ON Semiconductor	1SMB5949BT3G	Zener	1	$0.10	 SMB 44 mm²
13.	L1	Coilcraft	LPS5030-105MRB	L= 1.0 mH DCR= 5.1 Ohm	1	$0.44	 LPS5030 34 mm²
14.	L2	Coilcraft	LPS5030-105MRB	L= 1.0 mH DCR= 5.1 Ohm	1	$0.44	 LPS5030 34 mm²
15.	NTC	Ametherm	SL0310001 Series= miniAMP	Thermistor	1	$0.23	SL03 6 mm²
16.	Rbld	Vishay-Dale	CRCW040271K5FKED Series= CRCW..e3	Res= 71.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
17.	Rcs	Vishay-Dale	CRCW0805750RFKEA Series= CRCW..e3	Res= 750.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
18.	Rdd	Vishay-Dale	CRCW040233R2FKED Series= CRCW..e3	Res= 33.2 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
19.	Rf1	Yageo America	RC1206FR-076K8L Series= ?	Res= 6.8 kOhm Power= 250.0 mW Tolerance= 1.0%	1	$0.01	 1206 11 mm²
20.	Rf2	Yageo America	RC1206FR-076K8L Series= ?	Res= 6.8 kOhm Power= 250.0 mW Tolerance= 1.0%	1	$0.01	 1206 11 mm²
21.	Rfbb	Vishay-Dale	CRCW040233K2FKED Series= CRCW..e3	Res= 33.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
22.	Rfbt	Panasonic	ERJ-8ENF1543V Series= ERJ-8E	Res= 154.0 kOhm Power= 250.0 mW Tolerance= 1.0%	1	$0.01	 1206 11 mm²
23.	Rs	Panasonic	ERJ-8ENF1501V Series= ERJ-8E	Res= 1.5 kOhm Power= 250.0 mW Tolerance= 1.0%	1	$0.01	 1206 11 mm²
24.	Rs2	Vishay-Dale	CRCW0402261KFKED Series= CRCW..e3	Res= 261.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
25.	T1	Core=TDK , CoilFormer=TDK	Core=B66413G0000X197 , CoilFormer=B66414W1008D001	Lp= 1.2 mH Turns Ratio(Nas)= 8:5 Turns Ratio(Nps)= 38:5 Npri= 38.0 Naux= 8.0 Nsec= 5.0	1	$0.86	 TDK_B66305 248 mm²

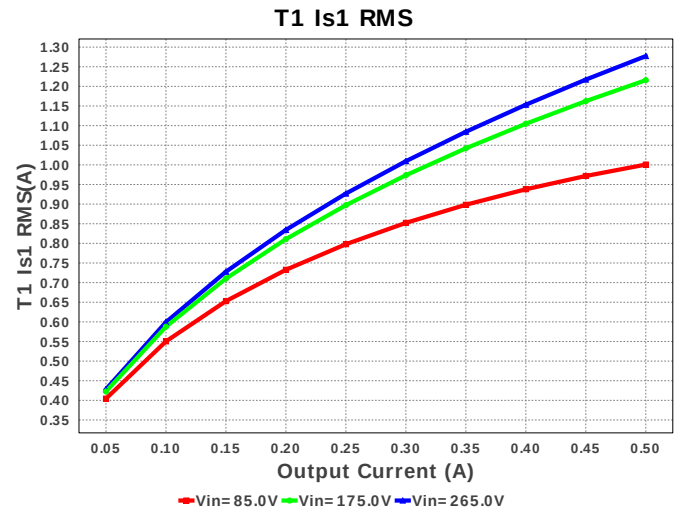
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
26.	U1	Texas Instruments	UCC28911D	Switcher	1	$0.98	 D0007A 55 mm^2

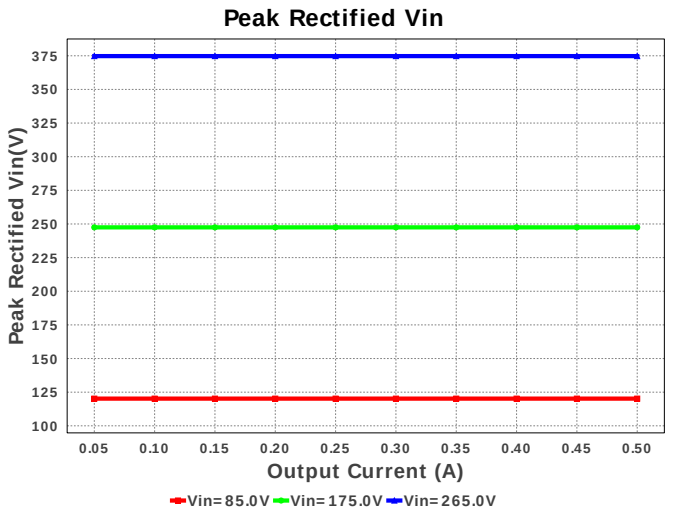


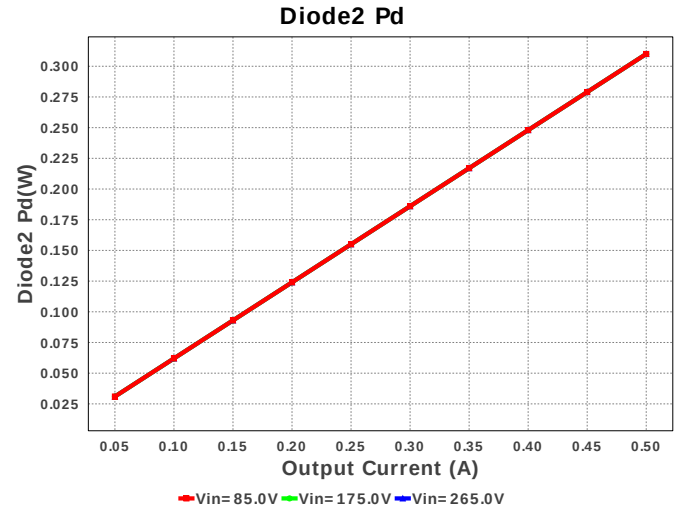


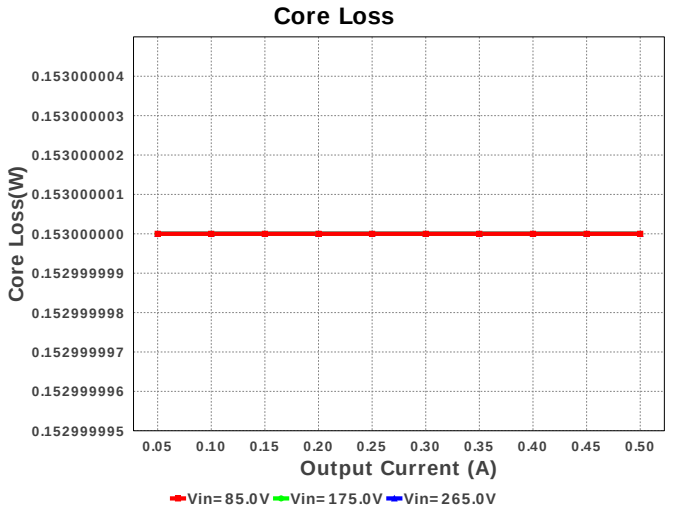


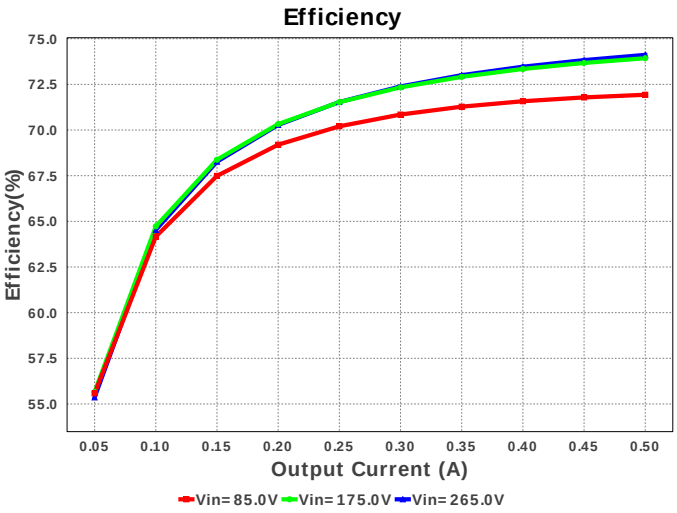


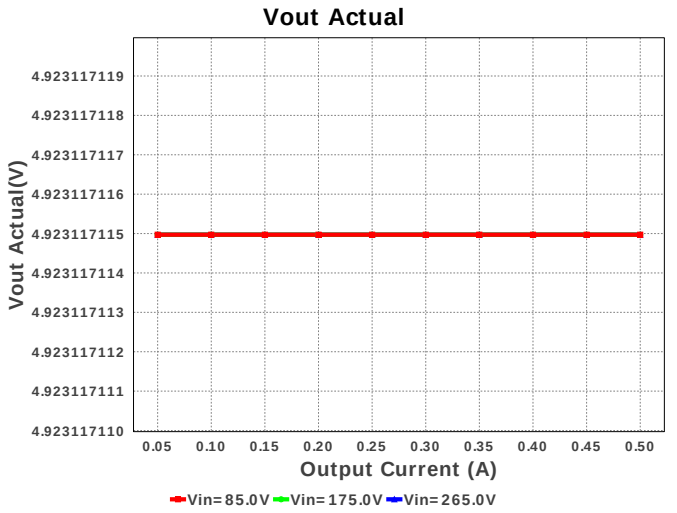


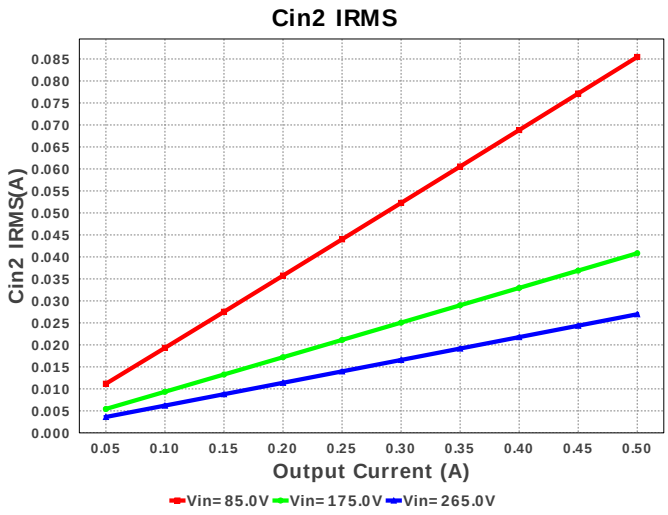


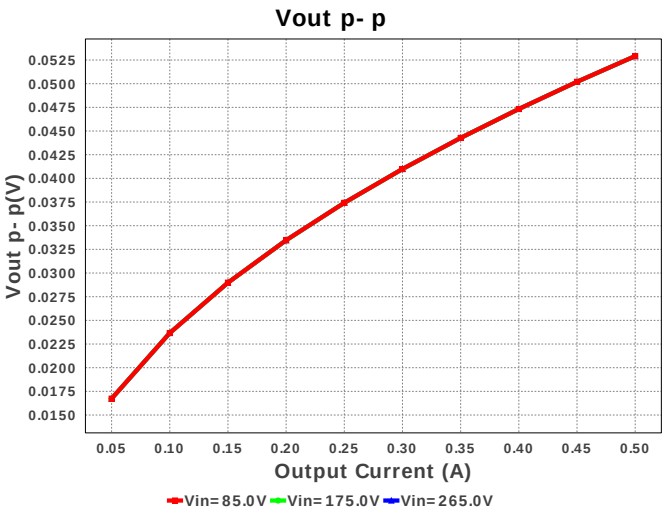


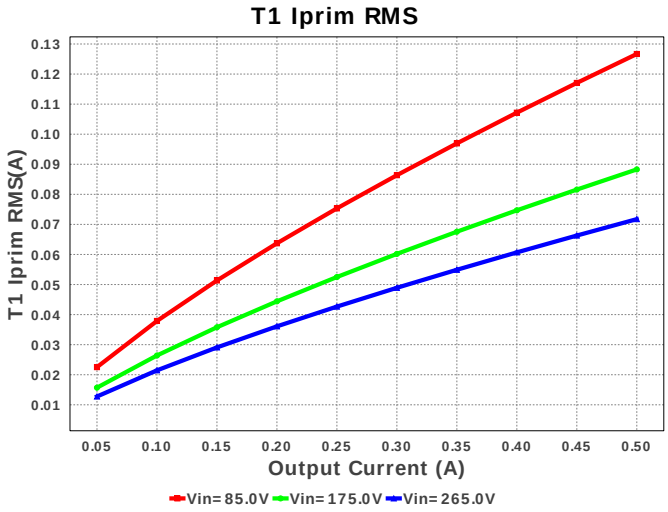


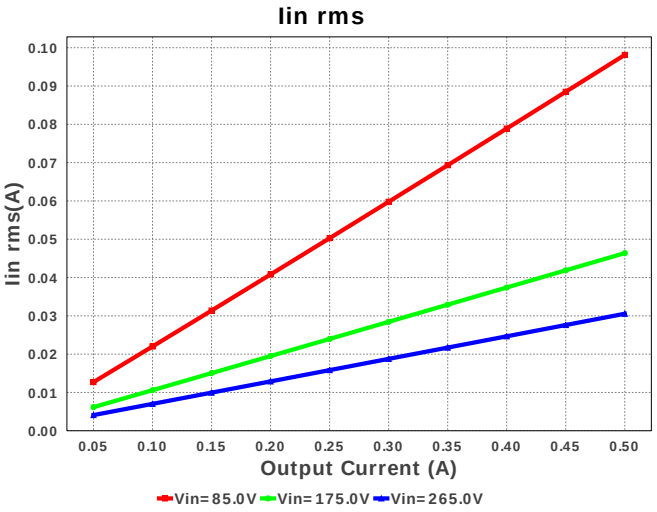


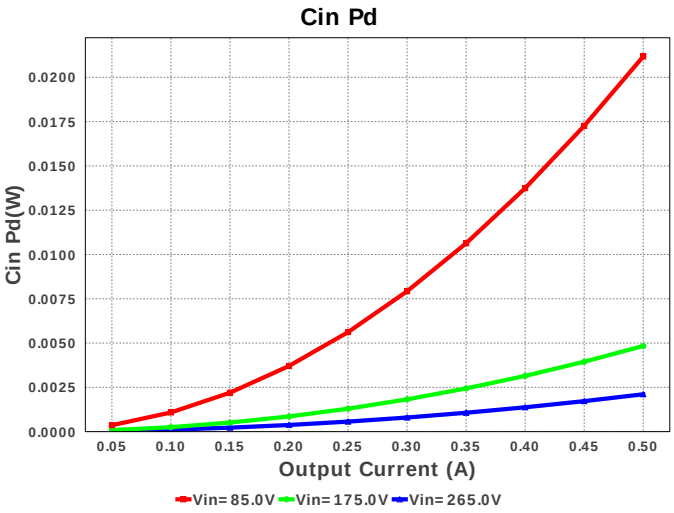


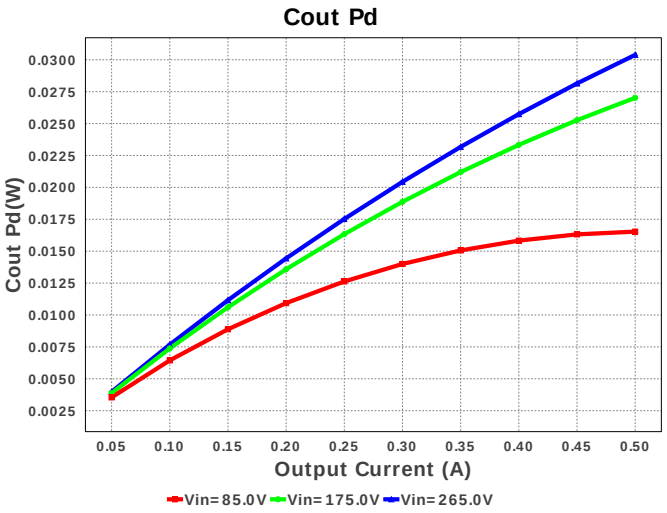


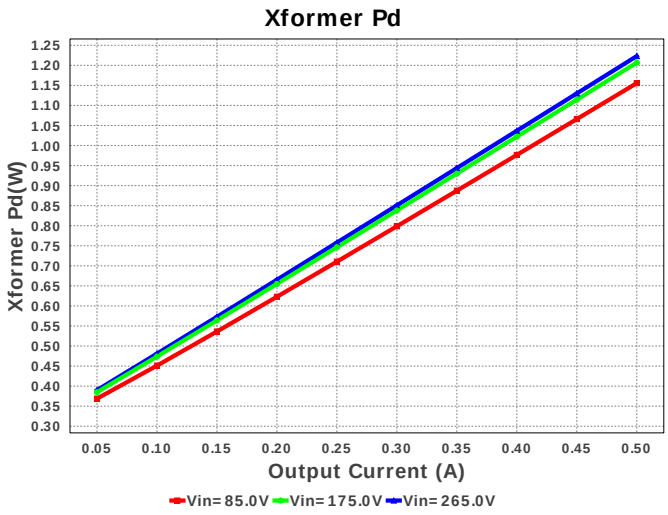


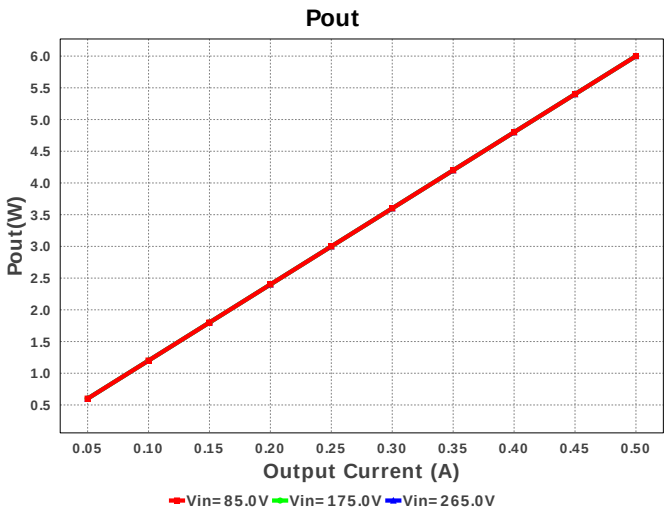


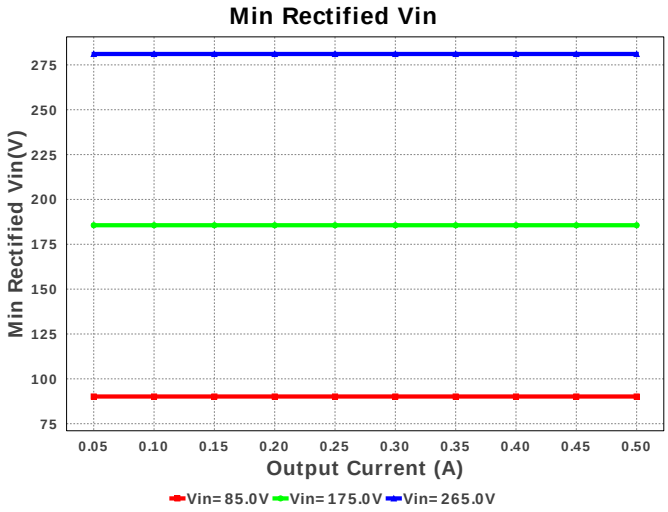


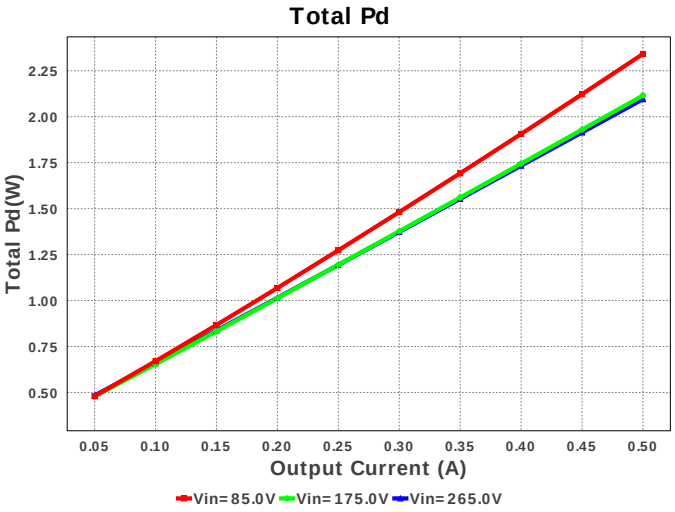


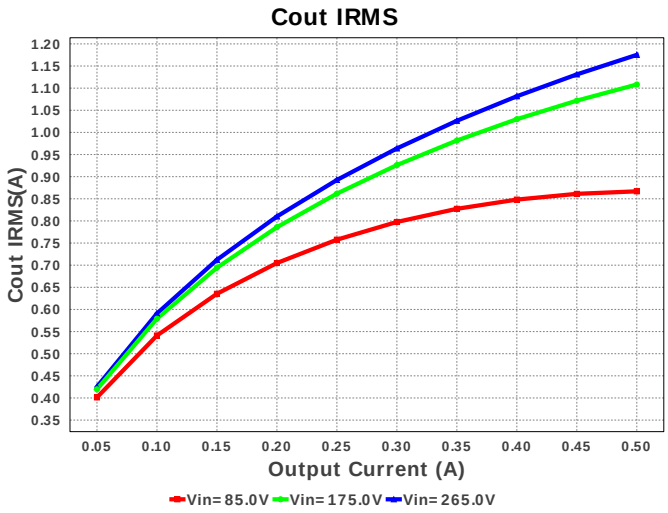


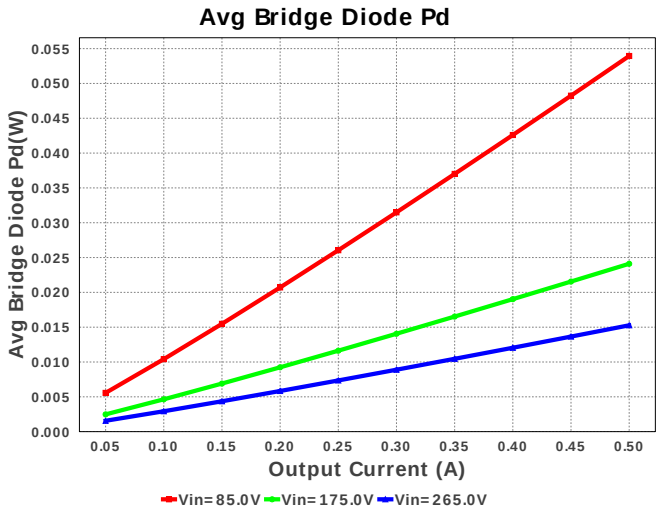


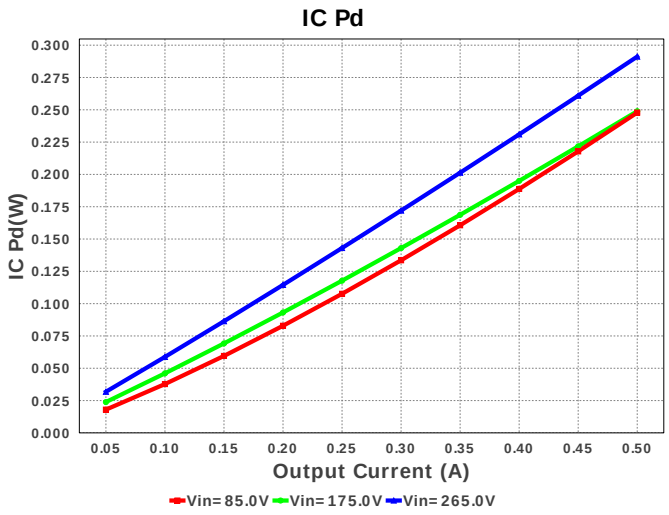


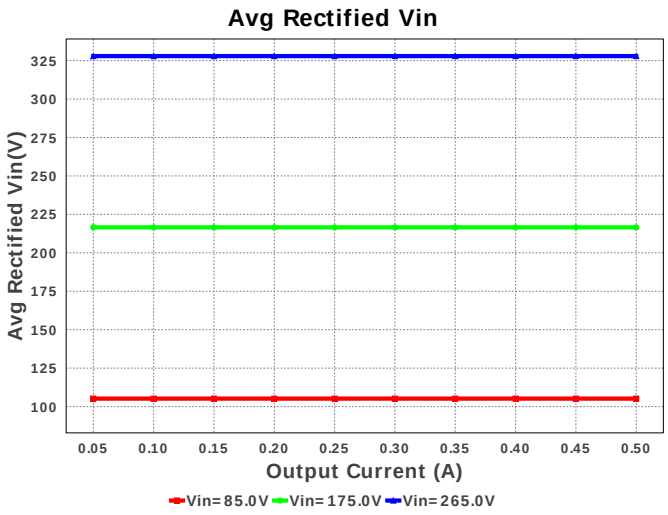


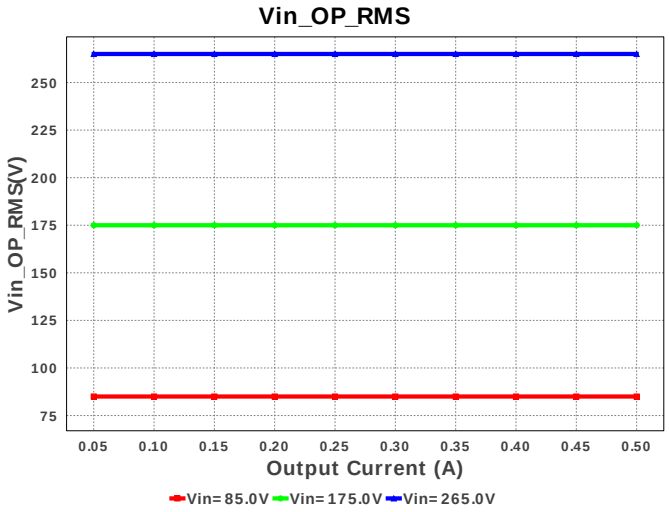


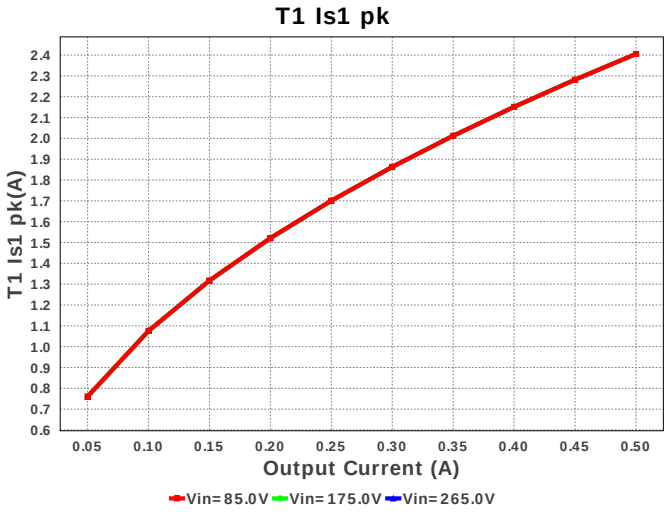












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	77.497 mA	Current	Input capacitor RMS ripple current
2.	Cin2 IRMS	77.497 mA	Current	Input Capacitor Cin2 RMS Ripple Current
3.	Cout IRMS	451.471 mA	Current	Output capacitor RMS ripple current
4.	Iin rms	89.292 mA	Current	RMS Input Current
5.	T1 Iprim RMS	111.576 mA	Current	Transformer Primary RMS Current
6.	T1 Iprim pk	245.517 mA	Current	Transformer Primary Peak Current
7.	T1 Is1 RMS	673.666 mA	Current	Transformer Secondary1 RMS Current
8.	T1 Is1 pk	1.892 A	Current	Transformer Secondary1 Peak Current
9.	Avg Rectified Vin	105.181 V	General	Average Rectified Voltage for the AC Line Period
10.	BOM Count	26	General	Total Design BOM count
11.	D1 trr	300.0 ns	General	D1 Reverse Recovery Time
12.	D2 trr	0.0 ns	General	Output Diode Reverse Recovery Time
13.	D3 trr	25.0 ns	General	Auxiliary Diode Reverse Recovery Time
14.	FootPrint	1.29 k mm^2	General	Total Foot Print Area of BOM components
15.	Frequency	105.0 kHz	General	Switching frequency
16.	Pout	6.0 W	General	Total output power
17.	Total BOM	$4.92	General	Total BOM Cost
18.	Vout Actual	4.923 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
19.	Vout OP	12.0 V	Op_Point	Operational Output Voltage
20.	Duty Cycle	61.959 %	Op_point	Duty cycle
21.	Efficiency	79.053 %	Op_point	Steady state efficiency
22.	IC Tj	61.486 degC	Op_point	IC junction temperature
23.	ICThetaJA	102.2 degC/W	Op_point	IC junction-to-ambient thermal resistance
24.	IOUT_OP	500.0 mA	Op_point	Iout operating point
25.	Min Rectified Vin	90.155 V	Op_point	Minimum voltage seen at rectified input
26.	Peak Rectified Vin	120.207 V	Op_point	Peak voltage seen at rectified input
27.	Vin_OP_RMS	85.0 V	Op_point	AC Input RMS Voltage
28.	Vout p-p	41.62 mV	Op_point	Peak-to-peak output ripple voltage
29.	Avg Bridge Diode Pd	48.921 mW	Power	Average Power Dissipation in the Bridge Diode over the AC Line Period
30.	Cin Pd	17.417 mW	Power	Input capacitor power dissipation
31.	Core Loss	39.905 mW	Power	

#	Name	Value	Category	Description
32.	Cout Pd	4.484 mW	Power	Output capacitor power dissipation
33.	Diode2 Pd	310.0 mW	Power	Diode2 power dissipation
34.	IC Pd	308.077 mW	Power	IC power dissipation
35.	Total Pd	1.59 W	Power	Total Power Dissipation
36.	Xformer Pd	347.765 mW	Power	Transformer power dissipation
37.	Vout Tolerance	8.64 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	500.0 m	Maximum Output Current
2.	VinMax	265.0	Maximum input voltage
3.	VinMin	85.0	Minimum input voltage
4.	Vout	12.0	Output Voltage
5.	line_fsw	60.0	Light Output in Lumen
6.	base_pn	UCC28911	Base Product Number
7.	source	AC	Input Source Type
8.	Ta	30.0	Ambient temperature

Design Assistance

1. **UCC28911** Product Folder : http://www.ti.com/product/UCC28911 : contains the data sheet and other resources.