WEBENCH® Design Report

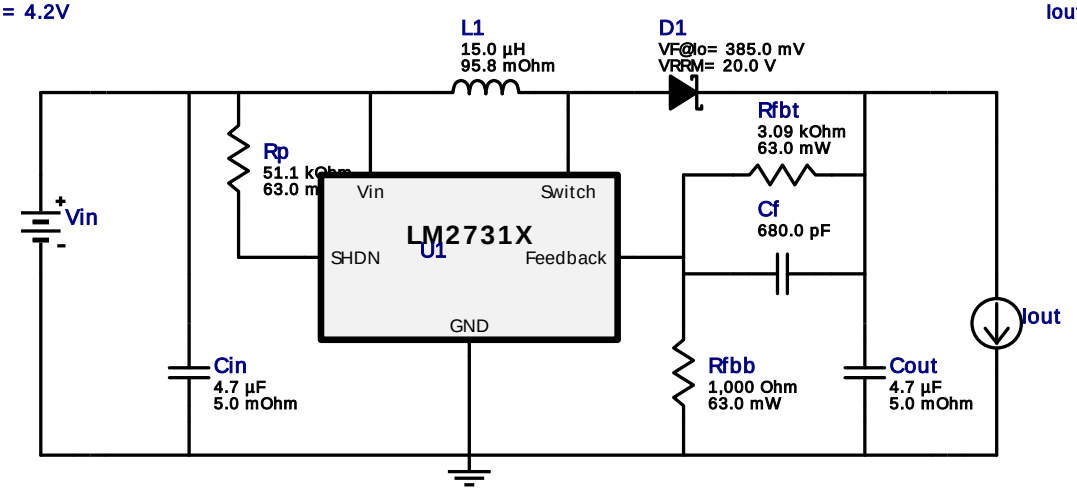
VinMin = 3.5V
VinMax = 4.2V
Vout = 5.0V
Iout = 0.7A

Device = LM2731XMF/NOPB
Topology = Boost
Created = 3/5/14 5:26:09 AM
BOM Cost = $1.20
Total Pd = 1.0W
Footprint = 127.0mm2
BOM Count = 9

Design : 3886784/18 LM2731XMF/NOPB
LM2731XMF/NOPB 3.5V-4.2V to 5.0V @ 0.7A

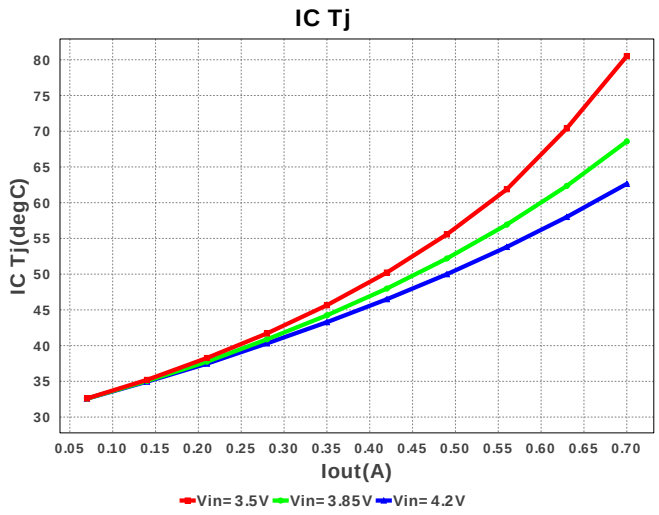
VinMax = 4.2V

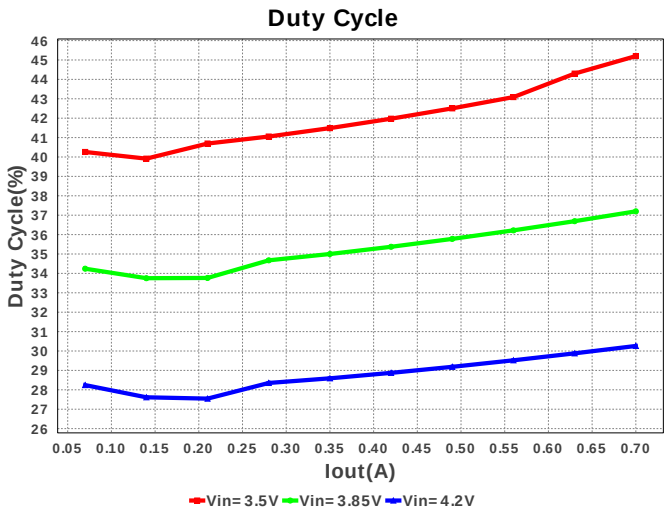
Iout = 0.7A

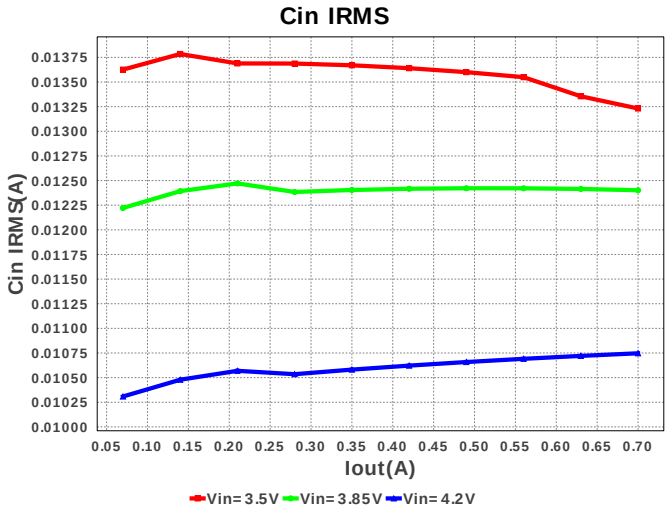


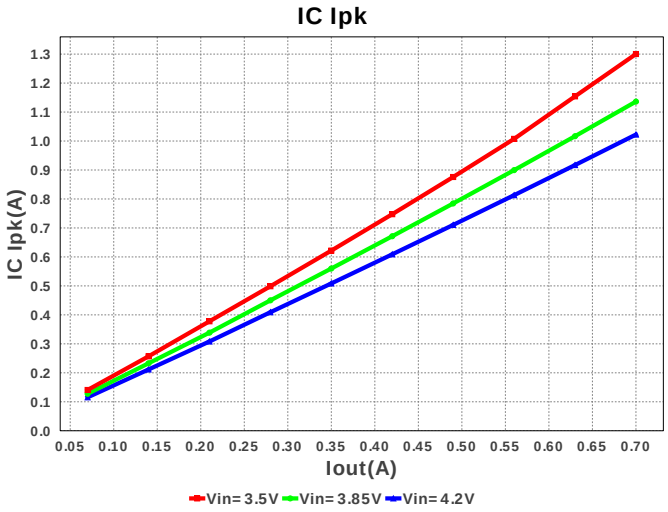
Electrical BOM

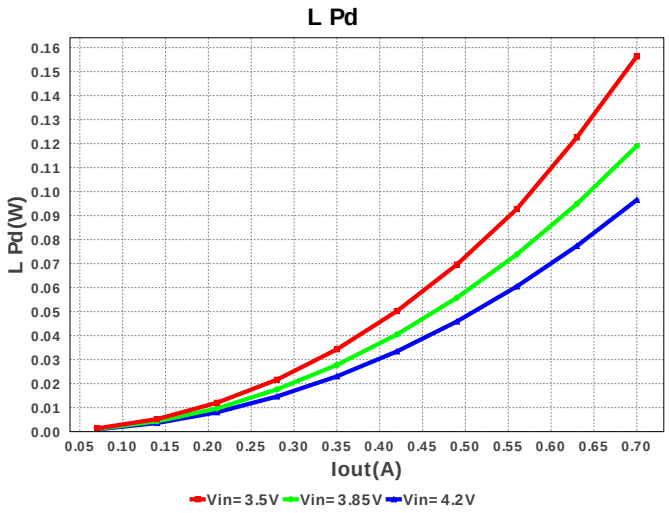
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cf	Yageo America	CC0805KRX7R9BB681 Series= X7R	Cap= 680.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7mm2
2.	Cin	MuRata	GRM188R60J475KE19D Series= X5R	Cap= 4.7 µF ESR= 5.0 mOhm VDC= 6.3 V IRMS= 2.0 A	1	$0.02	0603 5mm2
3.	Cout	MuRata	GRM188R60J475KE19D Series= X5R	Cap= 4.7 µF ESR= 5.0 mOhm VDC= 6.3 V IRMS= 2.0 A	1	$0.02	0603 5mm2
4.	D1	ON Semiconductor	MBR0520LT1G	VF@Io= 385.0 mV VRRM= 20.0 V	1	$0.06	SOD-123 13mm2
5.	L1	Bourns	SRN6045-150M	L= 15.0 µH DCR= 95.8 mOhm	1	$0.16	SRN6045 64mm2
6.	Rfbb	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1,000 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3mm2
7.	Rfbt	Vishay-Dale	CRCW04023K09FKED Series= CRCW..e3	Res= 3.09 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3mm2
8.	Rp	Vishay-Dale	CRCW040251K1FKED Series= CRCW..e3	Res= 51.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3mm2
9.	U1	Texas Instruments	LM2731XMF/NOPB	Switcher	1	$0.90	MK05A 0mm2

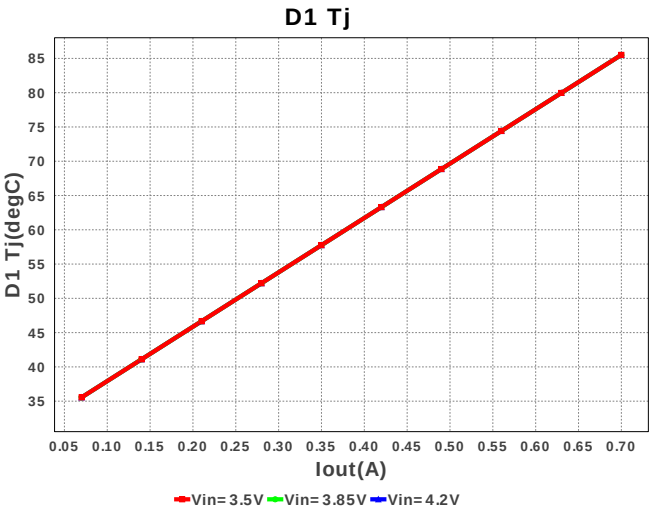


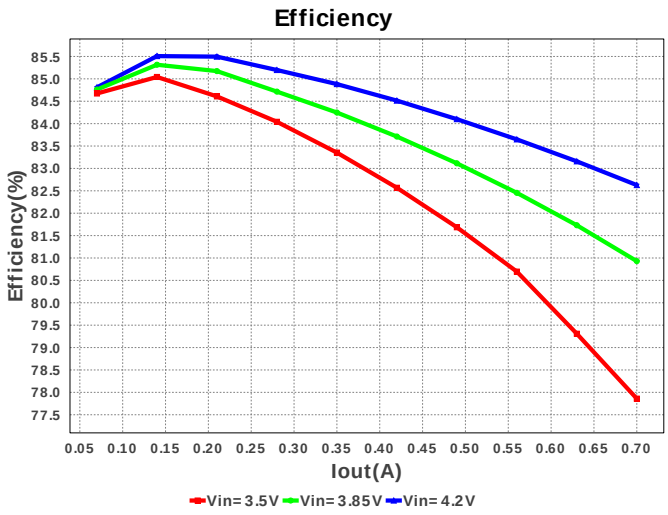


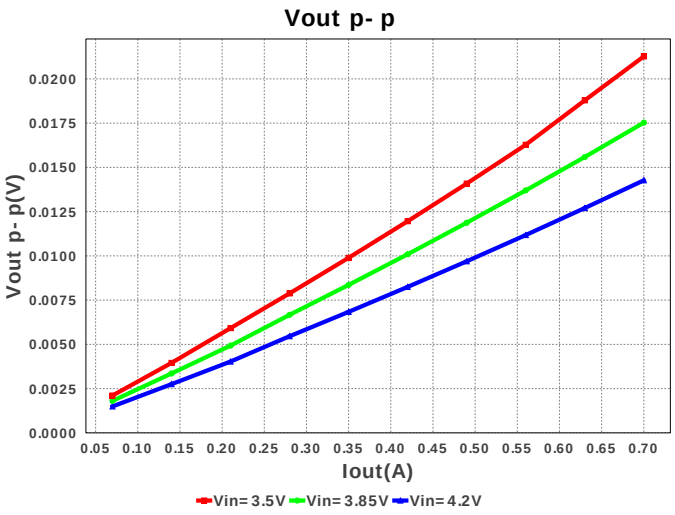


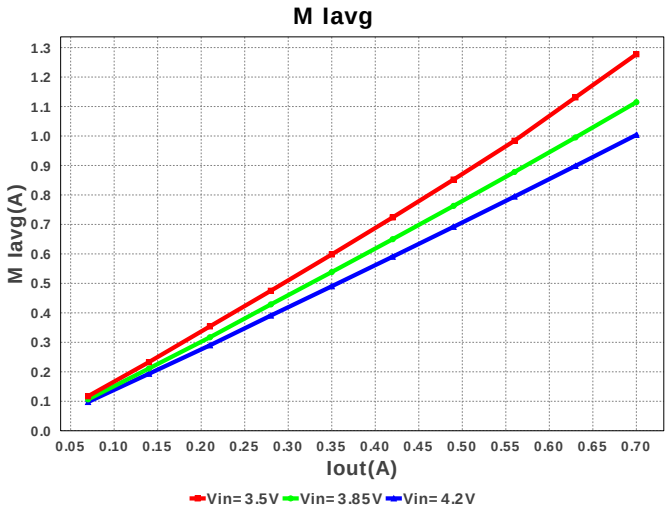


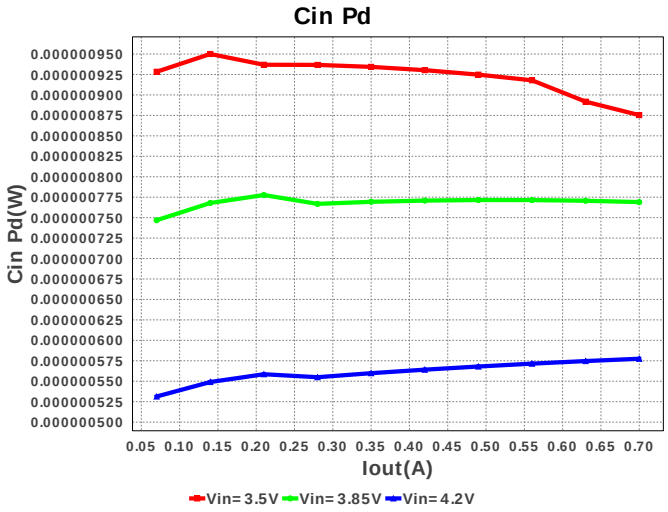


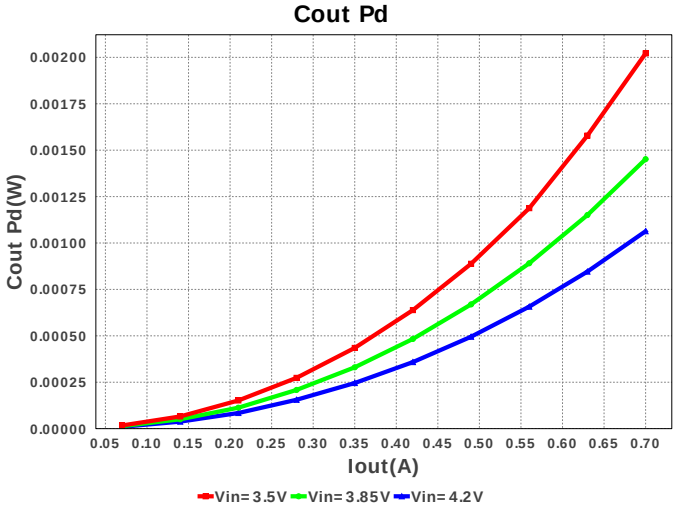


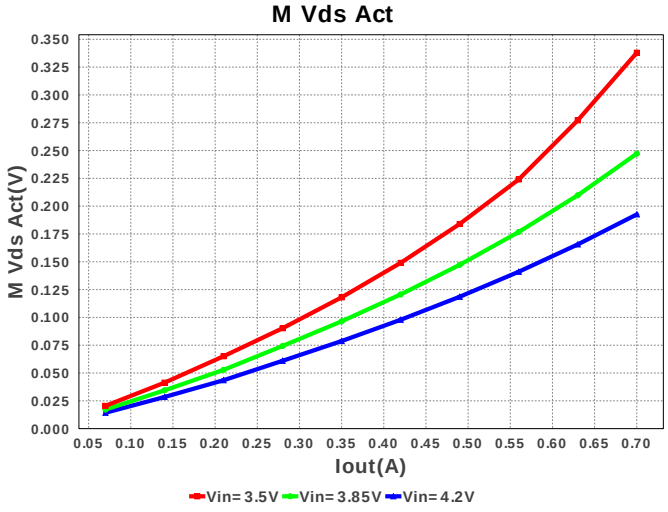


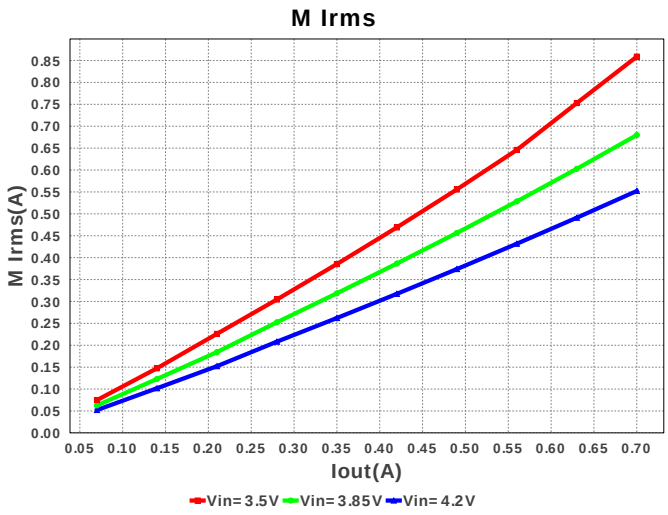


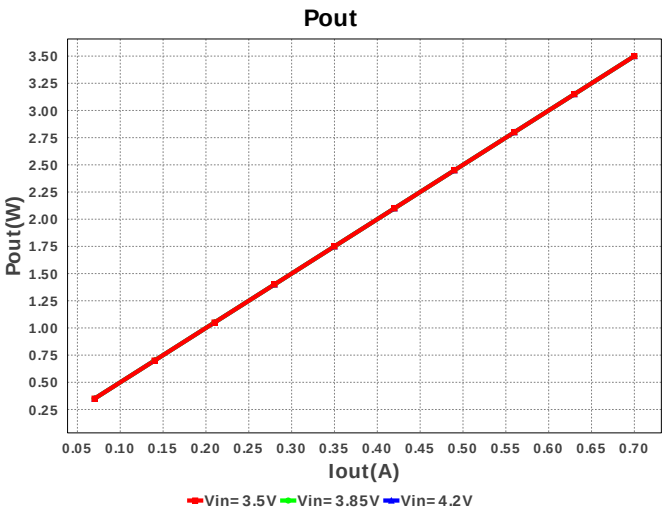


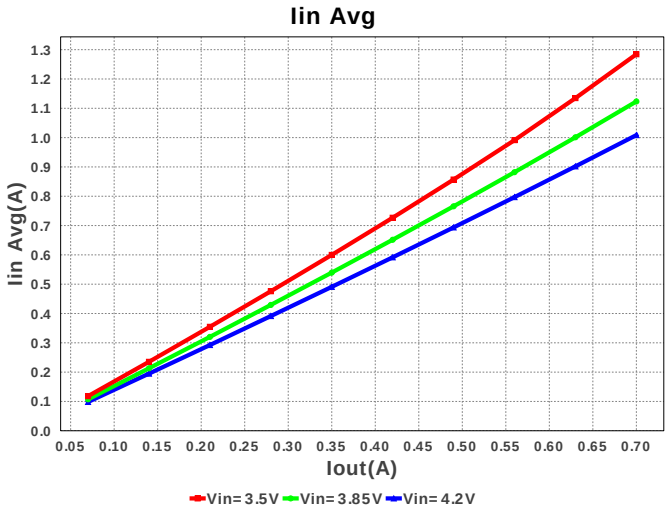


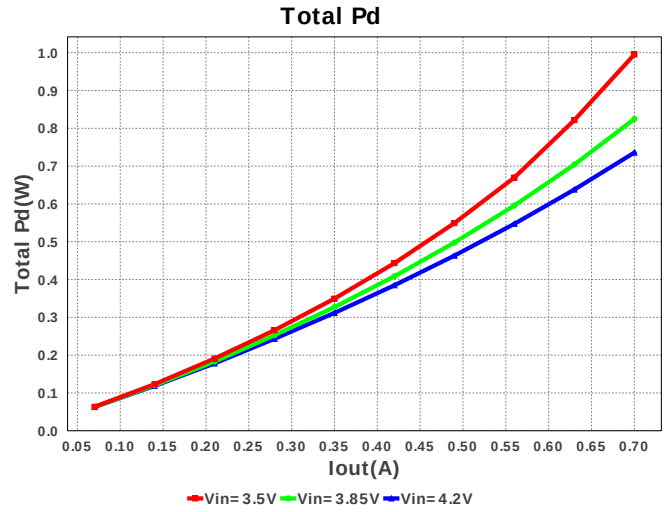


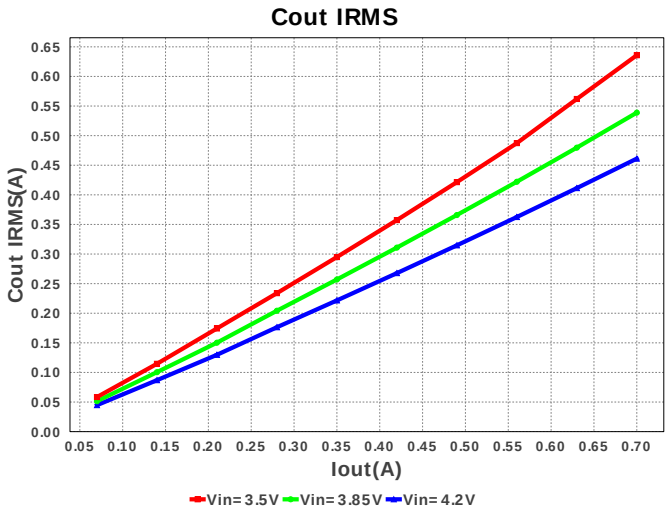


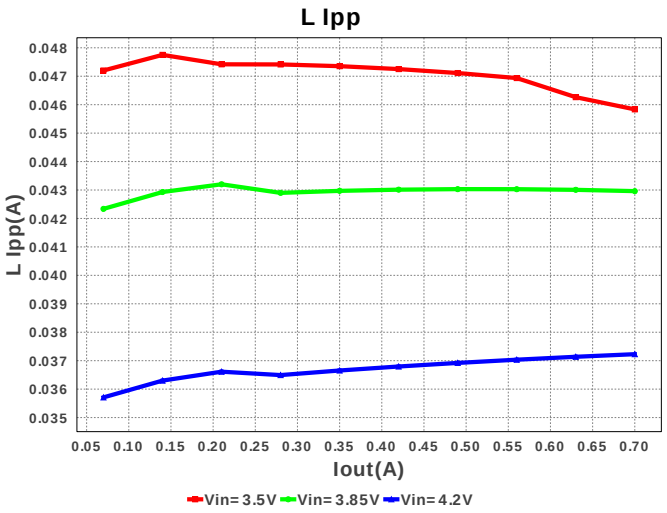


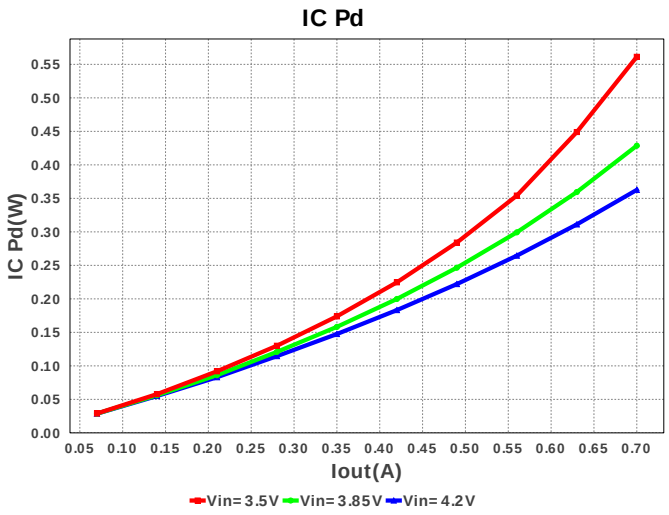


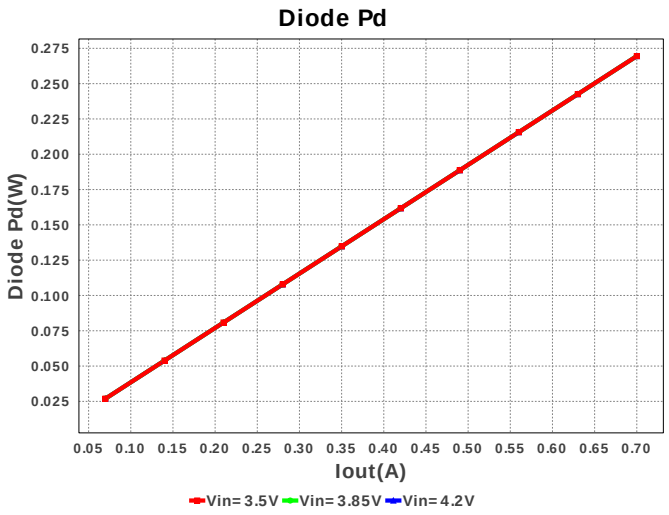












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	13.231 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	635.811 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.3 A	Current	Peak switch current in IC
4.	Iin Avg	1.284 A	Current	Average input current
5.	L Ipp	45.835 mA	Current	Peak-to-peak inductor ripple current
6.	M Iavg	1.277 A	Current	MOSFET Average current
7.	M Irms	858.834 mA	Current	MOSFET RMS current
8.	BOM Count	9	General	Total Design BOM count
9.	FootPrint	127.0 mm2	General	Total Foot Print Area of BOM components
10.	Frequency	1.6 MHz	General	Switching frequency
11.	IC Tolerance	25.0 mV	General	IC Feedback Tolerance
12.	M Vds Act	337.918 mV	General	Voltage drop across the MosFET
13.	Pout	3.5 W	General	Total output power
14.	Total BOM	$1.2	General	Total BOM Cost
15.	D1 Tj	85.517 degC	Op_Point	D1 junction temperature
16.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
17.	Duty Cycle	45.2 %	Op_point	Duty cycle
18.	Efficiency	77.86 %	Op_point	Steady state efficiency
19.	IC Tj	80.513 degC	Op_point	IC junction temperature
20.	ICThetaJA	90.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	700.0 mA	Op_point	Iout operating point
22.	VIN_OP	3.5 V	Op_point	Vin operating point
23.	Vout p-p	21.266 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	875.355 nW	Power	Input capacitor power dissipation
25.	Cout Pd	2.021 mW	Power	Output capacitor power dissipation
26.	Diode Pd	269.5 mW	Power	Diode power dissipation
27.	IC Pd	561.263 mW	Power	IC power dissipation
28.	L Pd	156.331 mW	Power	Inductor power dissipation
29.	Total Pd	995.282 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	700.0 mA	Maximum Output Current
2.	Iout1	700.0 mAmps	Output Current #1
3.	VinMax	4.2 V	Maximum input voltage
4.	VinMin	3.5 V	Minimum input voltage
5.	Vout	5.0 V	Output Voltage
6.	Vout1	5.0 Volt	Output Voltage #1
7.	base_pn	LM2731X	Texas Instruments Base Part Number
8.	source	DC	Input Source Type
9.	ta	30.0 degC	Ambient temperature

Design Assistance

1. LM2731X Product Folder : http://www.ti.com/product/lm2731 : contains the data sheet and other resources.